ENVIRONMENTAL MANAGEMENT PLAN

PADONMAR SOAP FACTORY

Revised Report: May, 2024

Prepared by

GREEN ENVIRONMENTAL, HEALTH, SAFETY & SOCIAL CONSULTANCY COMPANY LTD.
1112/C2 (A), Time Square Condo, Merchant Road, Botataung Township, Yangon, Union of Myanmar

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ABBREVIATIONS

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CO	Carbon Monoxide
CO_2	Carbon Dioxide
CSR	Corporate Social Responsibility
dBA	' A' weighted equivalent decibels
ECD	Environmental Conservation Department
EMP	Environmental Management Plan
EMT	Environmental Management Team
ERT	Emergency Response Team
HSE	Health, Safety and Environmental
IC	Incident Coordinator
IEC	Independent Environmental Consultant
km	Kilometer
KVA	Kilo (Volt P x Amps)
Kw	Kilowatt
Kyats	Myanmar Currency
MIC	Myanmar Investment Commission
MOECAF	Ministry of Environmental Conservation and Forestry
NA	Not Applicable
NO_x	Nitrogen Dioxide
O_3	Ozone
OIC-AA	Officer-in-charge at Assembly Area
PAP	People Affected Person
PM	Particulate Matter
PPE	Personal protective equipment
Qty.	Quantity
RST	Report Supported Team
SEZ	Special Economic Zone
SO_2	Sulphur Dioxide
US$	US Dollar
USD	US Dollar
WHO	World Health Organization

YCDC	Yangon City Development Committee
YESC	Yangon Electricity Supply Corporation
˚C	Celsius
μg	Micro gram
m^3	Cubic meter

ENVIRONMENTAL COMMITMENT

Green EHSS Consultancy

GREEN ENVIRONMENTAL, HEALTH, SAFETY & SOCIAL CONSULTANCY CO., LTD
Room 1112, Building C2-A, Time Square Condo, Merchant Road, Botataung Township, Yangon, Myanmar.

An Environmental Management Plan (EMP) which includes Environmental Monitoring Plan is a procedure that identifies, describes, evaluates and develops means of mitigating potential impacts of a proposed activity on the environment.

This EMP report was prepared using information from the following sources: review of selected literature, reports, and advisories; personal visitation with several persons and the experience of the EMP team. And we strongly commit that this report was prepared in compliance with Myanmar Environmental Laws and Regulations.

Signature :

Catherine Soe Soe Aung
Managing Director
Green EHSS Consultancy Co.,Ltd.

This Environmental Management Plan Report (EMP) has been prepared by Green Environmental, Health, Safety & Social Consultancy Company Limited and I hereby certify the project particulars in this report are correct and true to the best of my knowledge. I am commitment to comply with the existing environmental rules and regulations and criteria laid down by the Ministry of Natural Resources and Environmental Conservation (MONREC) and Region Government.

I do hereby affirm and declare that I fully understand and undertake to operate the project strictly in accordance with the said conditions for impacts and mitigation measure plans, and commitments in this Environmental Management Plan. I am commitment to develop the implementing program for preventing and controlling the environmental and social conditions during Plant closure phase.

(Myanmar translation)

ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု အစီရင်ခံစာကို Green Environmental, Health, Safety & Social Consultancy Company Limited မှ ရေးဆွဲထားပြီး အစီရင်ခံစာတွင် ပါရှိသော အကြောင်းအရာများသည် မှန်ကန်တိကျခိုင်မာပါသည်။ သဘာဝသယံဇာတ နှင့် ပတ်ဝန်းကျင် ထိန်းသိမ်းရေး ဝန်ကြီး ဌာန နှင့် ဒေသဆိုင်ရာ အစိုးရများမှ ချမှတ်ထားသော ဥပဒေ၊ နည်းဥပဒေ၊ လုပ်ထုံးလုပ်နည်းများ ကိုတိကျစွာလိုက်နာ မည်ဖြစ်ကြောင်းကတိကဝတ်ပြုပါသည်။ ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု အစီရင်ခံစာပါ ကတိကဝတ်များ၊ ပတ်ဝန်းကျင် ထိခိုက်မှု လျော့ချရေး လုပ်ငန်းများ နှင့် အစီအစဉ်များကို အပြည့်အဝ အစဉ်အမြဲ လိုက်နာဆောင်ရွက်မည်ဖြစ်ပါသည်။ စက်ရုံလုပ်ငန်း ပြီးစီး၍ စီမံကိန်းပိတ်သိမ်းချိန်တွင် လူမှုဝန်းကျင်အား ထိခိုက်မှု မဖြစ်စေရန် နှင့် ထိခိုက်မှုများ ရှိလာပါက ထိခိုက်မှု အနည်းဆုံးဖြစ်စေရေး အစီအမံများ ချမှတ်ဆောင်ရွက်မည်ဖြစ်ပါသည်။

Signature : _____

Name : ဦးဟိန်းထက်အောင်
စက်ရုံမှူး

Designation : ပဒုမ္မာဆပ်ပြာစက်ရုံ(ပေါင်မြို့နယ်)

1. EXECUTIVE SUMMARY

This Environmental Management Plan (EMP) report presents environmental and social assessments and management plan of the Padonmar Soap factory in accordance with the Environmental Conservation Rules on 5th June 2014 and Environmental Impact Assessment Procedures on 29th December 2015.

According to the instruction from Department of Environmental Conservation, Mon State, to develop Environemntal Management Plans for the factory's operations, the management of the Factory engaged GREEN ENVIRONMENTAL, HEALTH, SAFETY & SOCIAL CONSULTANCY CO., LTD. to prepare Environmental Management Plan (EMP) report to assess and identify potential environmental impacts associated with the factory's activities and to mitigate the impacts effectively.

The scope of the project report cover the operation and decommissioning phases of the Padonmar Soap factory. The assessment's spatial boundary extends to 500 meters from the Factory based on the sensitive areas.

1.1 Legal Requirement

Environmental Conservation Department (ECD) is set up as a separate organization under the Ministry of Environmental Conservation and Forestry (MOECAF) on 11 October 2012. The Ministry of Environmental Conservation and Forestry promulgated The Environmental Conservation Law on 30th March, 2012. MOECAF issued Environmental Conservation Rules on 5th June 2014 and Environmental Impact Assessment procedures on 29th December 2015.

EMP team observed thoroughly the legal requirements that Padonmar Soap Factory shall comply with are as follows:

1. Occupational Safety and Health Law (2019)
2. Environmental Conservation Law (2012)
3. Environmental Conservation Rules (2014)
4. The Conservation of Water Resources and River Law, 2nd October (2006)
5. Myanmar Investment Law (2016)
6. Myanmar Investment Rule (2017)

7. The Import Export Law (2012)
8. Building Regulations (2014)
9. The Amended Law for Plant Act (2016)
10. Myanmar Fire Brigade Law (2015)
11. National Environmental Quality (Emission) Guidelines (No. 615/ 2015) (29 Dec, 2015)
12. Land Acquisition Law (2015)
13. The Payment of Wages Law 2016 (Jan 2016)
14. The Minimum Wages Law (2013)
15. The Social Security Law (2012)
16. The Leave and Holiday Act, 1951(Law Amended July,2014)
17. The Settlement of Labor Dispute Law, 2012 (Amendment, 2014)
18. Workman Compensation (Amendment) Act (2005)
19. The Public Health Law
20. Prevention and Control of Communicable Diseases Law (1995)
21. The related laws enacted by the respected Regional Hlauttaw and rules issued by respected Regional Government
22. The Water Power Act (1927)
23. The Labour Organization Law (2011)
24. The Labour Organization Rules (2012)
25. Motor Vehicle Rules (1989)
26. Vehicle Laws(1964)
27. Road and Inland Water Transport Law(1963)
28. Myanmar Forest Law (1995)
29. National Health Policy (1993)
30. Underground Water Act (1930)
31. National Land Use Policy(2016)
32. Inland Stream Vessel Act (1917)
33. Laws amending the 1951 Factory Acts
34. Explosive Substances Act (1908)
35. Emergency provision Act (1950)
36. Environmental Impact Assessment Procedure (2015)
37. The Private Industrial Enterprise Law, 1990
38. The Prevention of Hazard from Chemical and Related
39. Boilar Law (2015)
40. Other Applicable Laws, Acts, Standards and Guidelines

Moreover, the Plants ensures to meet the Requirements of Applicable Licenses and Permits.

The following references were used in assessing and evaluating the focal environmental impacts relating to the Plant activities.

Water Quality:

- WHO Water Quality Standard, World Bank Standards,
- Yangon City Development Committee Standards
- Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges (General Application) National Environmental Quality Guidelines

Air Quality:

- Air Emission Level of National Environmental Quality (Emission) Guidelines

Soil Quality:

- Canada Environmental Parameters Guidelines for Human Health and Environment

Noise Level:

- Noise Level of National Environmental Quality (Emission) Guidelines

Safety, Health and Environment:

- Factory Acts, Myanmar
- Occupational Health and Safety Acts, Ministry of Labour, Myanmar
- General Environmental, Health and Safety Guidelines, IFC

2.1 Project Description

Location

Padonmar Soap Factroy is located at Thae Phyu Kone village, Ye Pyar Kone quarter just Mawlamyine-Yangon road near to Paung Township at the coordinate grids between E 97. 57°to 97.58° and N 16.56° to 16.55°. Mawlamyine-Yangon road is 189 miles long ang just baside the factory. The factory area is approximately 50.73 acreas.

Nearby residential areas are Ye Pyar Kone quarter. The factory location was selected based on the suitability and availability of raw materials in the region. Average elevation of the factory area is 31 m.

Figure 1.1 Factory Location

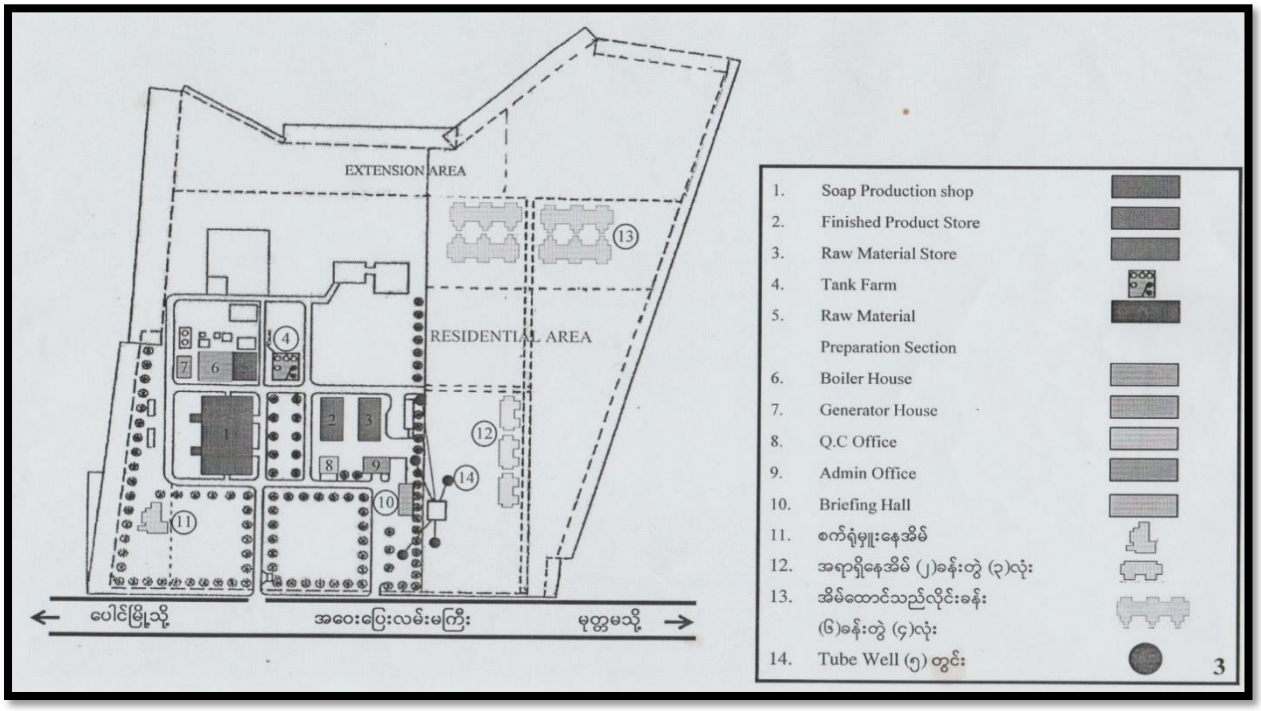


Figure 1. 2 Facilities Plan within the Factory Premises

Prodcution Processes

The main raw material require in the soap production are organic raw materials such as crude palm oil, crude coconut oils and palm fatty acid as well as inorganic materials such as caustic soda, sodium silicate and salts. The final procudts are bar soaps and tube soaps. In general, 1878 tons of bar soaps and 1072 tons for tube soaps are produced per annun.

The Full Boiled process is used in the soap production. The full boiled process includes Neutralisation, Saponification, Washing, Fitting, Cleaning and final productions.

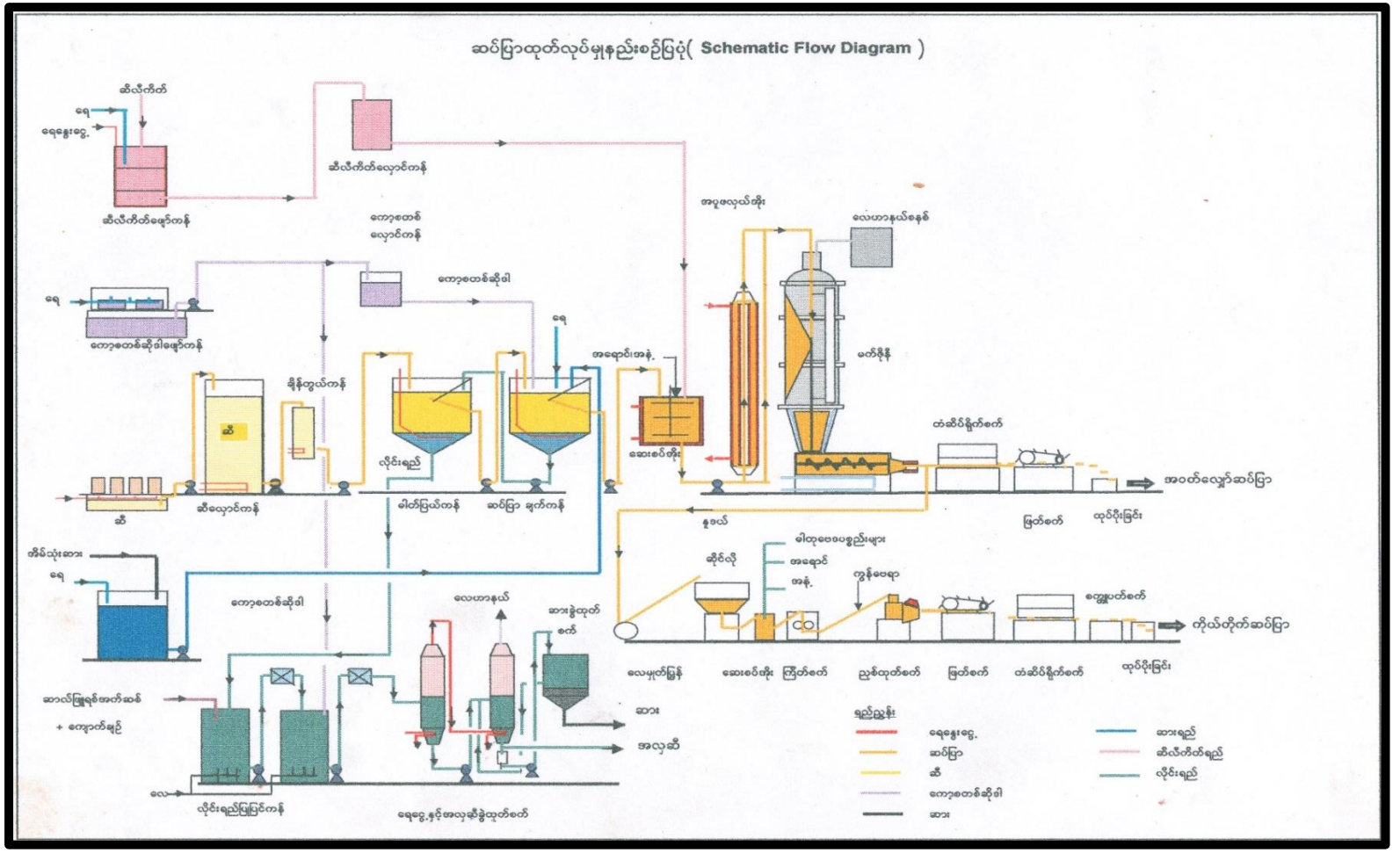


Figure 1.3 Production Process

Particulars of Padonmar Soap Factory

The salient features of the company are mentioned below.

Name of Factory	:	PADONMAR SOAP FACTORY
Year of Established	:	2003
Address	:	Paung Township, Mon State, Myanmar
Name of Principal Organization	:	**MYANAMA ECONOMIC HOLDING PUBLIC COMPANY LTD (MEHPCL)**
Type of Business	:	Manufacturing of Soap
Type of Investment	:	100% Local Investment
System of Sales	:	100% Local
The Factory Area	:	50.73 Acres
Commence date of Construction	:	4th July 2002
Commence date of Operation	:	23rd May 2003
Factory Manager	:	U Zaw Naing Oo

3.1 Baseline Environmental and Social Quality

The study area is located in the Mon State and Factory is situated in Paung Township. Paung Township is 436.75 sq mi wide. The township has a total population of 253,637 (124,759 male and 128,878 female) with 41,927 households including 44,869 families. Agriculture is the dominant land use in **Paung Township**.

The nearest villages are Thea Hpyu Kone Village, Kan Hpyu Village and Ye Pyar Kone Village.

The factory is situated in the Paung Township. The climate of the region has considered as a tropical monsoon climate. Approximately 2.1 km east of the Plant is Thanlwin (Salween) River that flows from north to south.

In general, the surrounding areas of the Factory is considerably flat and covered with shrubs and trees.The geological setting around the Plant area is Eutric Gleysols.

Table 1.1 Particulars of nearby Townships

Sr.	Township/ Town	Sq. Mile
1	Paung Town	2.13
2	Zin Kyaik Town	1.74
3	PaungTownship Sq. Mile	436.75

Figure 1.4 Map of Paung Township with Padonmar Soap Factory

Table 1.2 Revised Air Quality Measurements at Operation Areas

Area	PM(2.5) µg/m³	PM(10) µg/m³	Period
Boiler	21.8	48.6	24 hours
Generator	23.2	47.3	24 hours
Stimplex Plodder	23	45.3	24 hours
Soap Pan	20.4	44.7	24 hours
Mazzoni	21.5	42.1	24 hours
Virgo	21.8	48.4	24 hours

Table 1.3 Monitoring Measurement of Noise (dBA)

Area	Noise level (dB)
Stemplex Plodder	**76.8**
Soap Pan	**75.5**
Mazzoni	**82.8**
Virgo	**78.0**
Boiler	**82.4**
Generator	**98.6**
Waste Water Treatment (1)	**48.0**
Waste Water Treatment (2)	**53.7**
store	**58.3**
Gate	**51.0**
Tube Well	**60.6**
Average Noise Level	**69.6**

Table 1.4 Water Quality Results from Final Discharged Water Pond

Sr.	Item	Waste Water Pond	YCDC Target range
1	Dissolved Oxygen (DO)	4.2	>1 ppm
2	Biochemical Oxygen Demand (BOD_5) (5days at 20˚C) (mg/L)	106	20-60 ppm
3	Chemical Oxygen Demand (COD)(Adaptation of the USEPA 410.4 Approved method) (mg/L)	20	<200 ppm
4	pH effluent water	7.23	6<pH<9.6
5	Suspended solids (SS)	123	<500 ppm
6	Nitrate (NO_3^-N)	0.0	N/A
7	Oil and Grease	8.0	N/A

4.1 Environmental Impact and Mitigation Measures

After evaluating the environment impacts of the Padonmar Soap Factory**, potential environmental Impacts** and mitigation measures were developed to manage the identified impacts. Assessments and management plans of the environemental impacts were selected based on collected and baseline monitored data. The management palns for air emissions, water quality, noise emission, waste generation, land contamination, occupational and community heath and safety hazards and impacts on the public traffics.

The Environmental Management Plan for the Padonmar Soap factory is developed by **Green Environmental, Health, Safety and Social Consultancy Co., Ltd. Green EHSS** conducted the site visit and environmental background data collections during June, August and October 2019. Baseline air quality, noise levels were measured during the site visit on June 2019. Ssurface water quality from the retaining ponds, underground water quality form the factory tubewell and final treated water quality from treatment pond were collected and tested in August 2019. Social suvery and assessment were conducted in October 2019.

Based on the site surveys, references and monitoring and tested data, the potential environmental and social impacts associated with the factory's production activities and decommission phase were predicted, identified and evaluated. The environmental impact assessment was developed by anylizing severity/ magnitude of the impact, occurrence/probability of the impacts and existing control measures.

Following table stated summary of environmental risks related to the factory's operation and decommission phases. The summary of the environmental and social assessments are indicated in Table 1.1.

Table 1.5 Summuary of Environmental and Social Risk Assessment

Category	Scoping Item	Scoping Results			Assessment Result			Reason of Impact level Consideration
		Construction	Operation	Decommission	Construction	Operation	Decommission	
Environmental	Air Quality	NA	M	L	-	M	L	The main air pollution sources include the emission from generator and boiler. The significance impact is

								considered to be medium due to existing controls and small scale production of the factory. However, it is recommended to conduct regular inspections of boiler, generator and sound management for potential dust sources. Emission of dusts may occur during demolition of the structures. However, The factory is considered as a small scaled factory and emission of dust can be controllable. This impact will be considered to be low with proper mitigation.
	Noise	-	M	L	-	M	L	Operation activities and use of noisy machines can generate the high level of noise. The generator is kept inside the separated room and other noise exposure is temporary. Due to noise level monitoring results, some machines emitted high levels of noise, therefore, the level of impact is considered as medium. It is recommended to provide hearing protectors to workers and to ensure not to allow unauthorized person near to the machine. Noise emission may occur from some demolition activities, however, the exposure is considered as a short time and temporary. The impact level is, therefore, low.
	Water Quality	-	M	L	-	M	L	Manufacturing of soaps releases process water. The factory is far from surface water source. The drainage system and treatment system are provided. HTV sheets will be provided inside the ponds. However, if the factory does not properly manage the effluent, it can impact on the underground water quality. Therefore, the impact level is

								considered as Medium for operation phase. Low impact level in demolition phase as it is unlikely to have an impact during demolition.
	Solid Waste	-	L	L	-	L	L	The solid wastes such as soaps are properly managed and reused. In addition. Small quantity of domestic wastes and packing wastes are disposed in the landfill area.In this reasons, the impact level of Solid wastes is Low. Soild wastes generated from the demolition will be resued or recycled. Unusable wastes will be collected by a waste collector. The impact is considerd as Low for demolition phase.
	Process Waste Water Effluent,	-	M	L	-	M	NA	The factory established discharged water treatment ponds. The factory has engaged a contractor to renovate and proper HTB barriers in the ponds. The water quality results including BOD and COD of final discharged water from the treatment pond and drainage showed acceptable and within the YCDC' starget level. Due to the water quality results, existing condition and control measures, the impact level is assumed Medium. However, it is recommended to monitor and manage the effluent water to ensure no impact on the soil. It is unlikely to discharge waste water during demolition phase. The impact level is regarded as Low.
	Soil Contamination	-	M	L	-	M	NA	The storage and loading area are provided with concrete floor. Spillages are immediately

								cleaned.Due to the soil pH results, existing condition and control measures, the impact level is assumed Medium. The floors of maintenance workshop are built with concrete. However, it is suggested to provide spill tray at the maintenance areas. It is unlikely to impact the soil during demolition as no chemical or hazardous materials will be released. The impact level is regarded as Low.
	Water Consumption		L	NA		L	NA	The factroyuses mainly the own tube well water for production. It is less likely to impact groundwater avalibility due to the production. The impact on ground subsidence is condisered as Low. There will be no impact on ground subsidence during demolition.
	Odor	-	L	NA	-	L	NA	Soap production process creates insignificant odor. This ordor impact is condsidered Low level. Not applicable for demolition.
	Bottom Sediment	-	NA	NA	-	NA	NA	The Factory is far from the surface water sources and no discharge of the solid wastes into any river. Not applicable for bottom sediment. Not applicable for demolition.
Natural Environment	Protected Area	-	NA	NA	-	NA	NA	There is no protected area in the project area.
	Flora/Fauna and Ecosystem	--	L	NA	-	L	NA	Impact of the existing ecosystem is considered to be low as the Factory itself is surrounded by thick woodlands within the premises.. These factoryations provide good shelters and foods for fauna as food chains. Not applicable for demolition.

	Topography and geology	-	L	NA	-	L	NA	Topography and geology impacts are considered to be low.
Social Environment	In voluntary Resettlement	-	NA	NA	-	NA	NA	No physical resettlement involved for the factory's processes.
	Local conflict of interests	-	L	NA	-	L	NA	The factory complies with laws and relevant internal guidelines and cooperates with local authorities and community. There is no conflict of interest as the factory is owned by MEHCL and no local authorities involves in the ownership.
	Gender	-	L	NA	-	L	NA	The workforce is mainly locals and women workers are employed without gender discrimination. Employment conditions meets national laws and international standards. The impact is Low.
	Ethnic minorities and indigenous peoples	-	NA	NA	-	NA	NA	There are no indigenous people in the project area.
	Poor		+H	M		+H	L	Positive impact for operation phase. It is expected to accept and to be employed in the project's activities with high hopes for improvement in neighborhood would bring higher living standard and education status. Loss of employment is negative impact for decommissioning phase.
	Living and livelihood	-	+M	L	-	+M	L	Job opportunities and business development should be considered as positive economic impact for regional or national development. It is considered to be significant positive impact for local people.
	Existing social infrastructures and services	-	L	NA	-	L	NA	There is low significance impact for existing rural condition.

	Cultural heritage		NA	NA		NA	NA	There are no historical and cultural monuments located nearby the project site.
	Landscape		L	NA		+L	NA	Landscape is expected to be low impact without mitigation and becoming positive impact as the factory applies management on greening.
	Risks for infectious disease such as AIDS/HIV	-	L	NA	-	L	NA	Influx of people may cause negative impact on health condition of local people. The significance assigned to this impact for the operation phase is considered to be low with mitigation by knowledge and health care support.
	Working Conditions (including occupational safety)	-	L	M	-	L	L	The factory working hour comply with the labour laws. The factory provides residents for the staff from other regions. Workers are provided necessary PPE. The potential impact is considered as Low.
Other	Accident	-	M	L	-	L	L	The machines and equipment are regularly maintained and inspected. Emergency team is formed to tackle the potential emergency situation. Fire extinguishers and emergency fire water are provided in the factory compound. The potential impact, therefore, is Low. However, it is recommended to provide some training like first aid and basic fire fighting. Accident for decommissioning phase is expected to be low impact with proper mitigation such as providing PPE, fencing, warning sign, etc.
	Global Warming	-	L	NA	-	L	NA	The factory is surrounded by trees and 6700 acres factoryations. The trees can reduce global warming by transpiration and managing climate change. As a small scale factory, the

								machines and vehicles used for the processes are manageable quantity. Due to this reason, the impact on the global warming is considered Low.

NA: Not Applicable
+: positive impact

5.1 Environmental and Social Management Plan

The environmental management practices, procedures and responsibilities are defined herein to get full compliance with the existing environmental policy, laws, rules and regulations of the Republic of the Union of Myanmar. The main sections in this Environmental Management Plan (EMP) are as follows:

1) Environmental Management Plan for Air and Dust Emission Reduction

2) Environmental Management Plan for Effluent

3) Environmental Management Plan for Generated Wastes

4)Management Plan for Community and Occupational Health And Safety

Table 1.6 Summary of Environmental and Social Management Plan for Operation Phase

Key Indicator	Description	Actions on prevention	Time Frame	Responsible Person
Air and Dust				
Air Pollution	Boiler Maintenance	• Routine boiler maintenance is done to minimizing emission. • ဘွိုင်လာမှထွက်ရှိသည့် အခိုးအငွေ့များနှင့်ပတ်သတ်၍ အမှုန်မှုန်များလျော့ကျစေရန် Dust Collector တပ်ဆင်ထားခြင်းနှင့်တစ်ရက်လျှင်တစ်ကြိမ် Maintenance ပြုလုပ်ပြီး တစ်နှစ်လျှင် စက်လည်ပိတ်ရက် ၉၀ ရက်အတွက် ၉၀ ကြိမ်ပြုလုပ်ပါသည်။	The whole operation period	EMT
	Boiler Ash	• Continual ash removal is done to ensure optimum performance and reduce ash entrainment like PM emission. • တစ်ပတ်လျှင် တစ်ကြိမ် ပြုလုပ်ပါသည်	The whole operation period	EMT
	Boiler Tube	• The boiler tubes are clean pneumatically. The pneumatic tube cleaning helps to minimize the soot build-up on the heat exchange surfaces of the boiler and therefore helps to maintain the optimum boiler efficiency. • သုံးလလျှင် တစ်ကြိမ် အမြဲ ပြုလုပ် ပါသည်	The whole operation period	
Wastewater				
Lime waste effluent	Reducing high COD and BOD values.	• Proper HTV sheets must be installed in the wastewater treatment ponds. • Ensure to conduct regular inspection of HTV sheets. •	The whole operation period	Project Proponent EMT
Washing and cleaning water	Reducing water consumption	• Water should be minimised. • Detergent usage should be minimised.	The whole operation period	Production EMT
Cooling water from boiler	Reducing equipment damage. Reducing oil loss through	• Water should be collected for washing and cleaning with routine collection. •	The whole operation period	Utility EMT

	leakage and accident.			
Solid Waste				
Process waste	Use of Paper and plasctics for packaging	• Ensure to recollect the soap wastes and reused the wastes.	Operation period	Purchasing
Domestic Waste	Waste accumulation and poor housekeeping	• Recycle paper wastes. • Proper disposing of plastic wastes.	Operation period	Operation
Disposing Solid Waste	Factory waste Domestic waste	• Temporary store in waste bins and removed by using township municipal car.	Operation period	EMT
Health and Safety				
Public Health and Safety	Health and safety hazards due to the Plant's operation	• Develop Emergency Response Plan •	Operation period	EMT

6.1 Monitoring Plan

In line with proposed environmental management plans, the monitoring plans for crucial parameters including frequency of monitoring were developed.

The budget in environmental monitoring program is estimated to be **10,000,000 kyats** (kyat 100 lakhs) for operation phase. The top management of plant will ensure to provide necessary finances for environmental management plans and monitoring plans if the allocated budget is insufficient. According to the monitoring plan, the management of the factory will be responsible for the implementation of monitoring for air, noise, water and safety measures. Results of air quality and noise level monitoring, and analysis of water quality will be recorded in files to check and audit. Monitoring will be carried out strictly as required by the related national regulations and the monitoring results of required parameters should be reported to local authorities.

Table 1.7 Proposed Environmental Monitoring Programmes – Operation Phase

Environmental Issues	Monitoring Location and Indicator	Monitoring and Reporting Frequency	Cost Estimate (USD) Per Year	Responsibility Party
Air Pollution				
Ambient Air Quality **Parameter** (H2S,SO2,NO2 CO, CO2, O3, PM(2.5), PM(10), TSP	1.Boilor Stack (916.560415, 97.583854) 2.Site boundary (16.559350, 97.583680) (Measurement of Air Quality) -National Environmental Quality (Emission) Guideline for Air Emission -Check compliance with the Air pollution Mitigation measure	twice a year	1200	EMT
Vehicle exhaust	Within the factory compounds	Twice per year	200	EMT
Noise				
Noise level **Parameter** dB(A)	1. Site boundary (16.559350, 97.583680) (Measurement of Noise)) -National Environmental Quality (Emission) Guidelines -Check compliance with noise mitigation measure	Twice a year	100	EMT
Water Quality				
Surface Water Quality	1.Final Effluent Pond (16.559670, 97.585001) and Drainage (BOD, COD, pH, TSS)	Twice a year Biannual	120 120	EMT EMT

Waste Water Quality **Parameter** (BOD), (COD) pH, (SS) , (NO3 – N), Oil and Grease	-Check compliance with the water pollution mitigation measure			
Solid Waste generation from Production Process				
EFB wastes	Empty EFB disposal areas -bag or ton of ffb	Monthly	No Extra Cost	Utility EMT Agro-technician
Non- Hazardous Waste	- Cleanliness (The Factory compounds) ▪ Waste bags/bins - Inspect waste storage area (Visual check and record amount)	Daily Daily Weekly	No Extra Cost No Extra Cost No Extra Cost	EMT EMT EMT
Hazardous Waste (eg. Spent/waste oils and solvent waste and etc.)	-Inspect potential areas such as workshop, maintenance (Visual check and record amount)	Weekly	No Extra Cost	EMT
Waste Disposal	-Normal Waste (Disposal point in factory campus) -Nonhazardous Waste (disposed of at a qualified facility –see section 9.5.2)	Weekly Monthly	No Extra Cost 100	EMT EMT
Health and Safety				
Working Condition (Room temperature and humidity)		Daily	No Extra Cost	EMT ERT

Safety Measures for Health Status	-Statistic of accidents, injuries and infectious diseases -Inspection of compliance with Occupational Health and Safety measure (eg. medical kit box)	Monthly inspection for health and safety at work place	500	EMT ERT
Fire Safety Measures	-	Once a year	500	EMT ERT
Emergency Safety Measure	-Firefighting training and drill -Inspection of compliance with Occupational Health and Safety measure (eg. Fire extinguisher, signboard on safety, mask, glove)	Twice a year	1000	EMT ERT

7.1 Stakeholder Engagement and Information Disclosure

In the frame of the preparation of this EMP report, Green EHSS has organized meetings with stakeholders with the active support of Padonmar Soap Factory.

In October 2019, two face to face meetings were conducted.

1) Face to face meeting with Thea Hpyu Kone Villages Tract Administrator.
2) Face to face meeting with Zin Bar Villages Administrator (Moke Ta Ma Villages Tract).

During October 2019, household surveys were conducted with 15 respondents from Thea Hpyu Kone Village Tract of Paung Township. 16th October 2019, public consultation and participation was conducted by Green EHSS Social consultants with representatives of Padonmar Soap Factory. It was held at Briefing Hall of Padonmar Soap Factory with 34 attendees (22 attendees from the surrounding villages of Thea Hpyu Kone Village, Ye Pyar Kone Village, Zin Bar Village, Pathein Kwin Village, Kan Hpyu Village and Nat Sin Kone Village and 12 employees from Padonmar Soap Factory including Factory Manager, Dy. Manager).

Their concerns are related with the waste water situation in 2018. In 2019, the meeting attendees indicated that the impact of waste water on the local community become decrease due to the renovation of waste water controlling system by the factory.

The views are as follows:

- To manage the factory waste water by using treatment methods for the purpose of controlling environment
- To continue the controlling of waste water and other negative impact on surrounding villages
- To collaborate the factory employee with local people in the activities
- Wishing the factory to have success

Local residents also stated that Padonmar Soap Factory can create local employment opportunities (over 80% of factory employees is local residents) and the positive impacts of decreasing price of soap with good quality in local area due to the establishment of Padonmar Soap Factory in the region.

Responses and action plan from the Padonmar Soap Factory are described in section 8.

8.1 Conclusion

Padonmar Soap factory is considered as a small -scaled soap producer. The factory's average operation days per year is 96 days.

Potential environmental impacts together with management plans were identified in this Environmental Management Plan (EMP) report.

Baseline monitoring of ambient air quality, underground water quality, soil pH, demonstrated that all monitoring results are within the National Emission Standards and acceptable levels. Noise levels from some machines exceeded the acceptable level.

In accordance with the assessment data, the impacts on ambient air quality, surface water and underground water quality, soil quality, occupational health and safety hazards and risks to the workers and community, traffic congestion and odor emission were identified and evaluated as medium to low impacts.

It can be concluded that the exiting control measures are likely to be adequate; however, it is required to monitor the impacts continuously and obtain the stakeholder feedbacks as necessarily.

1. အကျဉ်းချုပ်အစီရင်ခံစာ

ပဒုမ္မာဆပ်ပြာ စက်ရုံ ၏ပတ်ဝန်းကျင်စီ မံခန့်ခွဲမှုအစီရင်ခံစာ (EMP)တွင် ပတ်ဝန်းကျင် နှင့် လူမှုရေးဆိုင်ရာ သက်ရောက်မှုများဆန်းစစ်ချက်များ နှင့် စီမံခန့်ခွဲမှု အစီအစဉ်များ ကိုရေးသားတင်ပြထားပြီး ၎င်းတို့ကို သယံဇာတနှင့် သဘာဝ ပတ်ဝန်း ကျင် ထိန်းသိမ်းရေး ဝန်ကြီးဌာန မှ ၂၀၁၄ ခုနှစ် ဇွန်လ ၅ ရက်နေ့တွင် ထုတ်ပြန်ထား သော ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးဥပဒေ နှင့် ၂၀၁၅ ခုနှစ် ဒီဇင်ဘာလတွင် ထုတ်ပြန်ထားသော ပတ်ဝန်းကျင်ဆိုင်ရာ သက်ရောက်မှုများ ဆန်းစစ်ခြင်း လုပ်ငန်းစဉ်များ အရ ရေးဆွဲ တင်ပြထားပါသည်။

မွန်ပြည်နယ်ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန မှ ပတ်ဝန်းကျင်စီမံခန့် ခွဲမှု အစီရင်ခံစာ(EMP) တင်ပြရန် ညွှန်ကြားချက်အရ စက်ရုံတာဝန်ရှိသူများသည် စက်ရုံ လည်ပတ်ခြင်းနှင့်လုပ်ငန်းလုပ်ကိုင် ဆောင်ရွက်ခြင်းကြောင့် ဖြစ်ပေါ်လာနိုင်သော ပတ်ဝန်းကျင် ထိခိုက်မှုဖြစ်ပေါ်စေနိုင်မည့် အကြောင်းအရာများကို သတ်မှတ်ဖော်ထုတ်ခြင်း၊ ထိခိုက်မှု များ သက်ရောက်နိုင်မည့်အတိုင်းအတာပမာဏများကိုခန့်မှန်းတွက်ချက်ခြင်း၊သက်ရောက်မှု လျော့ချ နိုင်မည့် အရေးယူကုစားနိုင်မည့်နည်းလမ်းများကို ဖော်ထုတ်တင်ပြနိုင်ရေးအတွက် ပတ်ဝန်း ကျင် စီမံခန့်ခွဲမှု အစီရင်ခံစာ ပြုစုရေးသားရန် အကြံပေးအဖွဲ့ဖြစ်သော GREEN ENVIRONMENTAL, HEALTH, SAFETY & SOCIAL CONSULTANCY CO., LTD နှင့် ဆက်သွယ် ဆောင်ရွက်ခဲ့ပါသည်။

စီမံကိန်း၏အစီရင်ခံစာနယ်ပယ်သည်ပဒုမ္မာဆပ်ပြာစက်ရုံ၏ လုပ်ငန်းလည်ပတ် နေစဉ် ကာလ နှင့် စက်ရုံပိတ်သိမ်းသည့်ကာလများအတွက် အကြုံးဝင်ရန်တင်ပြထားပါသည်။ ထိခိုက်မှု များကို ခန့်မှန်းတွက်ချက်ရာတွင် နယ်နိမိတ်အကျယ်အဝန်း ကို ထိခိုက် နိုင်သော ဒေသများ ပေါ် အခြေခံပြီး စက်ရုံမှ (၅၀၀) မီတာအကွာ အကျယ်အထိ သတ်မှတ်ခဲ့ပါသည်။

၁.၁ ဥပဒေကြောင်းဆိုင်ရာ မူဘောင်

သဘာဝပတ်ဝန်းကျင် ထိန်းသိမ်းရေးဦးစီးဌာန (ECD) ကို သစ်တော နှင့် သဘာဝပတ်ဝန်းကျင် ထိန်းသိမ်းရေးဝန်ကြီးဌာန (MOECAF) ၏ လက်အောက် သီးခြားအဖွဲ့အစည်း အဖြစ် အောက်တိုဘာ လ ၊ ၁၁ ရက် ၊ ၂၀၁၂ ခုနှစ် တွင် ဖွဲ့စည်းခဲ့ပါသည်။ သစ်တော နှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဝန်ကြီးဌာန (MOECAF) မှ သဘာဝပတ်ဝန်းကျင် ထိန်းသိမ်းရေး ဥပဒေ (Environmental Conservation Law) ကို မတ်လ ၊ ၃၀ ရက် ၊ ၂၀၁၂ ခုနှစ် တွင် ထုတ်ပြန်ကြေငြာခဲ့ပါသည်။ သစ်တော နှင့် သဘာဝ ပတ်ဝန်းကျင် ထိန်းသိမ်းရေး ဝန်ကြီးဌာန (MOCAF) မှ သဘာဝပတ်ဝန်းကျင် ထိန်းသိမ်းရေး စည်းမျဉ်းဥပဒေများ (Environmental Conservation Rules) ကို ဇွန် လ ၊ ၅ ရက် ၊ ၂၀၁၄ ၊ နှင့် သဘာဝပတ်ဝန်းကျင် သက်ရောက်မှုဆိုင်ရာ အကဲဖြတ်မှု လုပ်ထုံးလုပ်နည်းများ (Environmental Impact Assessment procedures) ကို ဒီဇင်ဘာ လ ၊ ၂၉ ရက် ၊ ၂၀၁၅ တွင် အသီးသီး ထုတ်ပြန်ခဲ့ပါသည်။

(EMP) အဖွဲ့သည် ကံပေါက် စားအုန်းဆီကြမ်းစက်ရုံမှ ဥပဒေဆိုင်ရာလိုက်နာရန် လိုအပ်ချက်များပါအောက်ဖော်ပြပါအချက်များအပေါ် လိုက်နာမှုရှိစေရန် သေချာစွာ စောင့်ကြည့် လေ့လာမှု ပြုထားပါသည်။

i. သဘာဝပတ်ဝန်းကျင် ထိန်းသိမ်းရေး ဥပဒေ (၂၀၁၂)
ii. သဘာဝပတ်ဝန်းကျင် ထိန်းသိမ်းရေး စည်းမျဉ်းဥပဒေများ (၂၀၁၄)
iii. ရေအရင်းအမြစ် နှင့် မြစ်ကြောင်း ထိန်းသိမ်းရေး ဥပဒေ၊ ၂ ရက် အောက်တိုဘာလ ၂၀၁၆
iv. မြန်မာရင်းနှီးမြှုပ်နှံမှု ဥပဒေ (၂၀၁၆)
v. မြန်မာရင်းနှီးမြှုပ်နှံမှု နည်းဥပဒေ (၂၀၁၇)
vi. မြန်မာရင်းနှီးမြှုပ်နှံမှု ဥပဒေ (၂၀၁၂)
vii. အဆောက်အဦးဥပဒေ(၂၀၁၄)
viii. အလုပ်ရုံအက်ဥပဒေကို ပြင်ဆင်သည့်ဥပဒေ (၂၀၁၆)
ix. မြန်မာနိုင်ငံမီးသတ်တပ်ဖွဲ့ဥပဒေ (၂၀၁၅)

x. အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး(ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များ (အမိန့်ကြော်ငြာစာ အမှတ်၆၁၅/၂၀၁၅) (၂၀၁၅ခုနှစ်၊ ဒီဇင်ဘာလ ၂၉ ရက်)

xi. မြေယာစီမံခန့်ခွဲရေး ဥပဒေ (၂၀၁၅)

xii. အနည်းဆုံး လုပ်ခ လစာ ဥပဒေ ၂၀၁၆ (ဇန်နဝါရီ လ ၊ ၂၀၁၆)

xiii. အနည်းဆုံး လုပ်ခ လစာ ဥပဒေ (၂၀၁၃)

xiv. လူမှုဖူလုံရေးဥပဒေ (၂၀၁၂)

xv. ခွင့် နှင့် အလုပ်ပိတ်ရက်ကို ပြင်ဆင်သည့် ဥပဒေ(ဇူလိုင် ၂၀၁၄)

xvi. အလုပ်သမားရေးရာ အငြင်းပွားမှု ဖြေရှင်းရေး ဥပဒေ ၂၀၁၂ (ပြင်ဆင်ချက် ၂၀၁၄)

xvii. အလုပ်သမား နစ်နာကြေး အက်ဥပဒေ

xviii. ပြည်သူ့ ကျန်းမာရေး ဥပဒေ

xix. ကူးစက်ရောဂါကာကွယ်နှိမ်နင်းရေးဥပဒေ (၁၉၉၅)

xx. သက်ဆိုင်ရာ ဒေသဆိုင်ရာ အစိုးရ နှင့် လွှတ်တော် တို့မှ အခါအားလျော်စွာထုတ်ပြန်ထားသော ဥပဒေများ

xxi. ရေ စွမ်းအားအရင်းအမြစ် အက်ဥပဒေ (၁၉၇၂)

xxii. အလုပ်သမားအဖွဲ့အစည်း ဥပဒေ (၂၀၁၁)

xxiii. အလုပ်သမားအဖွဲ့အစည်း နည်းဥပဒေ (၂၀၁၂)

xxiv. မော်တော်ယာဉ်ဥပဒေ (၁၉၈၉)

xxv. ကုန်းလမ်း နှင့် ရေကြောင်းပို့ဆောင်ရေး ဥပဒေ (၁၉၆၃)

xxvi. မြန်မာ့သစ်တောဥပဒေ (၁၉၉၅)

xxvii. ပြည်သူ့ ကျန်းမာရေး ပေါ်လစီ (၁၉၉၃)

xxviii. Environmental Impact Assessment Procedure (2015)

xxix. The Private Industrial Enterprise Law, 1990

xxx. The Prevention of Hazard from Chemical and Related

xxxi. Boilar Law (2015)

xxxii. Other Applicable Laws, Acts, Standards and Guidelines

အဆိုပြုထားသည့် စီမံကိန်း လုပ်ဆောင်ချက်များ နှင့် သက်ဆိုင်သည့် အဓိက သဘာဝပတ်ဝန်းကျင် အကျိုးသက်ရောက်မှုများ (focal environmental impacts) ကို အကဲဖြတ်ခြင်း နှင့် စစ်ဆေးခြင်း ဆောင်ရွက်ရာတွင် အောက်ဖော်ပြပါ ကိုးကားချက်များ ကို အသုံးပြုထားပါသည်။

၂.၁ စီမံကိန်းအကြောင်းအရာ ဖော်ပြချက်

စက်ရုံအနီးရှိလူနေရပ်ကွက်မှာ ရေပြာကုန်းရပ်ကွက်ဖြစ်ပါသည်။စက်ရုံသည် တည်ဆောက် ရန် သင့်တော်မှုနှင့် ကုန်ကြမ်းပစၥည်းရရှိနိုင်မှု စသော အချက်များအပေါ် အခြေခံပြီးစက်ရုံ၏တည်နေရာကိုရွေးချယ်ခဲ့ပါသည် ။ဒေသ၏ပျမ်းမျှပင်လယ်ရေမျက်နှာပြင်မှာ (၃၁) မီတာ ဖြစ်ပါသည်။

ပဒုမ္မာဆပ်ပြာ စက်ရုံသည် သဲဖြူကုန်းကျေးရွာ ရေပြာကုန်းရပ်ကွက်,မော်လမြိုင်-ရန်ကုန် ကားလမ်းမကြီးဘေး အနီးတည်ရှိပြီး အရှေ့လောင်ဂျီကျူ ၉၇.၅၇ ဒီဂရီ မှ ၉၇.၅၈ ဒီဂရီ အတွင်း မြောက်လတ္တီကျူ ၁၆.၅၆ ဒီဂရီ မှ ၁၆.၅၅ ဒီဂရီ အကြားတွင် တည်ရှိပါသည်။

မော်လမြိုင်-ရန်ကုန်ကားလမ်းမှာ(၁၈၉)မိုင်ရှည်လျားပြီး စက်ရုံ၏ ဘေးတလျှောက် တွင် တည်ရှိ ပါသည်။ စက်ရုံမြေ အကျယ်အဝန်းမှာ ၅၀.၇၃ ဧက ကျယ်ဝန်းပါသည်။

Figure 1.1 Factory Location

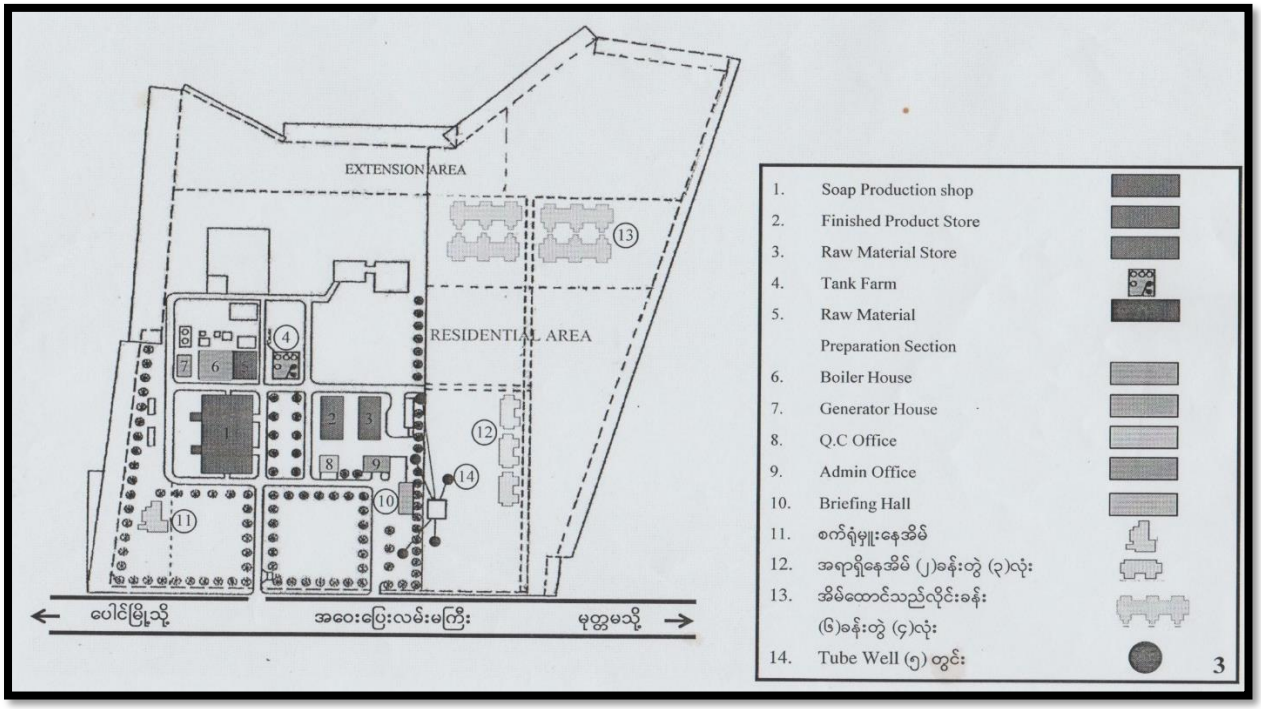


Figure 1.2 Facilities Plan within the Factory Premises

ကုန်ထုတ်လုပ်မှုလုပ်ငန်းစဉ်

ဆပ်ပြာ ထုတ်လုပ်မှုအတွက်အဓိက ကုန်ကြမ်းများမှာ ထန်းအက်စစ်ဆီ(Palm Fatty Acid Distillate)၊ ဆီဖြူခဲ(Refined Bleached Deodorised Palm Stearine)၊ ဆီအုန်းအရည်(Crude Palm Oil)၊ ဆီအုန်းအခဲ(Crude Palm Stearing)၊ ဖွဲနုဆီခဲ(Hydrogenated Rice Bran Oil) (Tallow)နှင့် အမဲဆီ inorganic materials such as caustic soda, sodium silicate and salts. ပေါင်းခံငွေ့ တို့ဖြစ်ပါသည်။ ထုတ်လုပ်ခြင်း အသေးစိတ် လုပ်ငန်းအဆင့်ဆင့် များကိုပုံ ၁.၃ နှင့် ၁.၄ တို့တွင် ရှင်းလင်းပြထားပါသည်။

ကုန်ချောပစ္စည်းများမှာ-ဆပ်ပြာတုံးများ၊ဆပ်ပြာတောင့်များ ဖြစ်ပါသည်။ တစ်နှစ်လျှင် ဆပ်ပြာတုံး(၁၈၇၈) တန်နှင့်ဆပ်ပြာတောင့် (၁၀၇၂) တန်ထုတ်လုပ်ပါသည်။

ဆပ်ပြာ အမျိုးအစားအလိုက် ကုန်ကြမ်းပြုပြင်ဌာနမှ ပေးပို့သည့်ရောစပ်ပြီး ဆီရော များကို လုံးလုံးဆူချက်နည်း (Full Boiled Process) နည်းစနစ်အရ အောက်ဖေါ်ပြပါ အဆင့် များအတိုင်း ဆောင်ရွက်ပါသည်။ ဓါတ်ပြယ်ခြင်းအဆင့် (Neutralisation), ဆပ်ပြာ ချက်လုပ်ခြင်းအဆင့် (Saponification), ဆေးကြောခြင်းအဆင့် (Washing), ဆပ်ပြာညှိခြင်း (Fitting), ဆပ်ပြာသန့် အဆင့် (Cleaning) နှင့်ကုန်ချောပစ္စည်းထုတ်လုပ်ခြင်း တို့ဖြစ်ပါသည်။

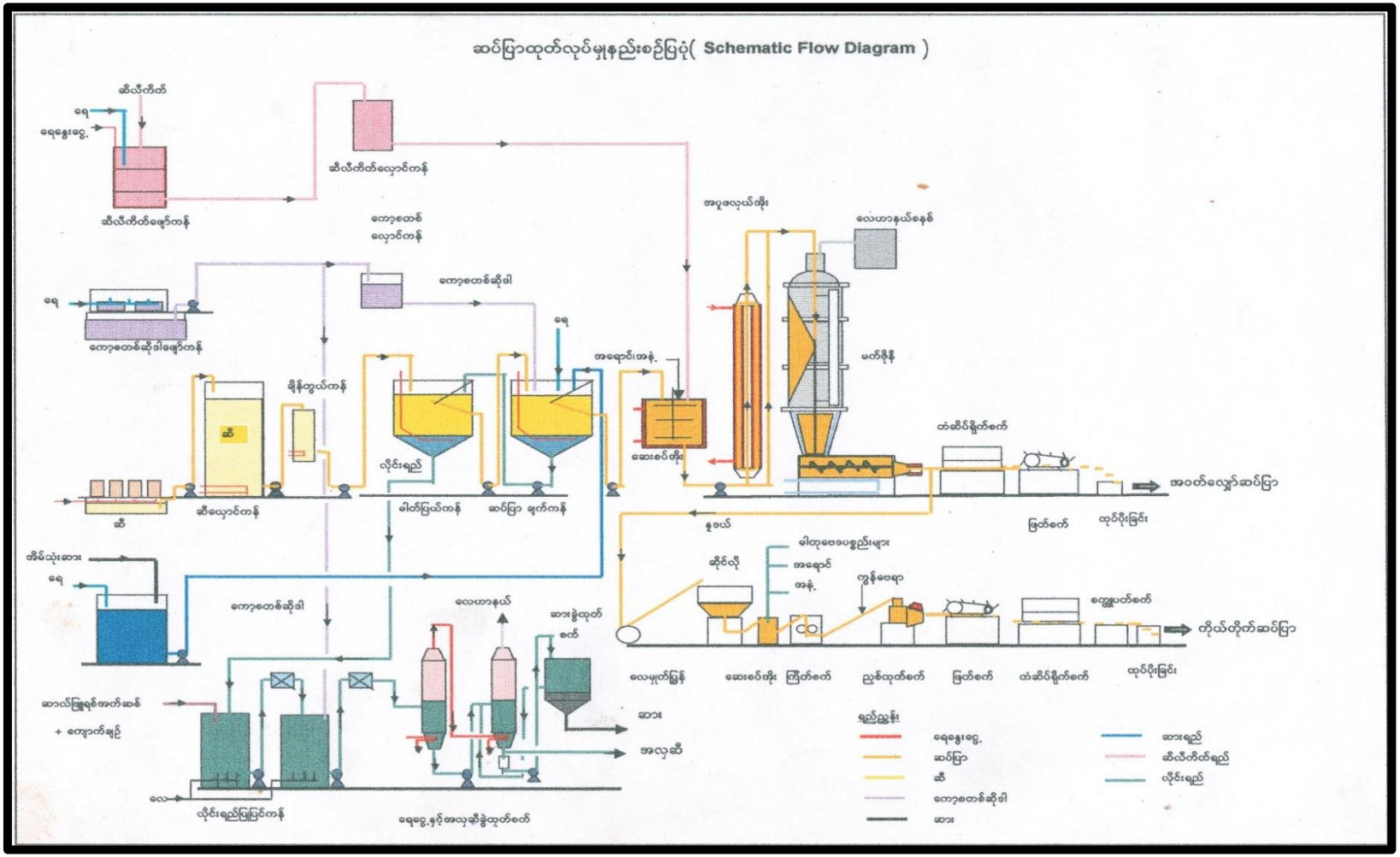


Figure 1.3 Production Process

Padonmar Soap စက်ရုံ၏ အကြောင်းအရာများ

စက်ရုံအမည်	:	ပဒုမ္မာဆပ်ပြာ စက်ရုံ
တည်ထောင်သည့်ခုနှစ်	:	အောက်တိုဘာလ ၂၀၀၃
လိပ်စာ	:	ပေါင် မြို့နယ်၊ မွန်ပြည်နယ်၊ မြန်မာ
Name of Principal Organization	:	**MYANAMA ECONOMIC HOLDING PUBLIC COMPANY LTD (MEHPCL)**
လုပ်ငန်းအမျိုးအစား	:	**ဆပ်ပြာ**ထုပ်လုပ်ခြင်း
ရင်းနှီးမြုပ်နှံမှုအမျိုးအစား	:	၁၀၀% ပြည်တွင်းရင်းနှီးမြုပ်နှံမှု
ရောင်းချမှုစနစ်	:	၁၀၀% ပြည်တွင်း
စက်ရုံ အကျယ်အဝန်း ဧက	:	၅၀.၇၃ ဧက
ဆောက်လုပ်ရေးစတင်သည့်အချိန်	:	၂၀၀၂
ထုတ်လုပ်မှုစတင်သည့်အချိန်	:	မေ ၂၀၀၃
စက်ရုံမန်နေဂျာ	:	ဦးဇော်နိုင်ဦး

၃.၁ပတ်ဝန်းကျင်နှင့်လူမှုရေးဆိုင်ရာ အရည်အသွေးများ

လေ့လာသည့် ဧရိယာသည် မွန်ပြည်နယ်အတွင်းတည်ရှိ ပြီးပေါင်မြို့နယ်အတွင်းတည်ရှိပါသည်။ ပေါင်မြို့နယ်သည် ၄၃၆.၇၅ စတုရန်းမိုင်ကျယ်ဝန်းပါသည်။ စုစုပေါင်းလူဦးရေမှာ ၂၅၃,၆၃၇(ကျား ၁၂၄,၇၅၉ နှင့် မ ၁၂၈,၈၇၈ ယောက်)ဖြစ်ပါသည်။ စုစုပေါင်း အိမ်ခြေအရေအတွက်မှာ ၄၁၉၂၇ နှင့် အိမ်ထောင်စု ၄၄၈၆ ဖြစ်ပါသည်။

အနီးဆုံးကျေးရွာများမှာ သဲဖြူကုန်းရွာ၊ ကန်ဖြူရွာ နှင့် ရေပြာရွာတို့ဖြစ်ပါသည်။
စက်ရုံသည် ပေါင်မြို့နယ် တွင်တည်ရှိပါသည်။ ပေါင်မြို့နယ် ၏ ရာသီဥတုသည် အပူပိုင်းမုတ်သုန်ရာသီဥတု ဖြစ်ပါ သည်။ စက်ရုံ၏ အရှေ့ဘက် ၂.၁ ကီလိုမီတာ အကွာတွင် သံလွင်မြစ် ရှိ၍ မြောက်မှတောင်သို့ စီးဆင်းနေပါသည်။

စက်ရုံပတ်ဝန်းကျင်ဒေသ၏ မြေပြင်အခြေအနေမှာ ညီညာပြန့်ပြူးပြီး သစ်ပင်များ ခြံနွယ်များ ဖုံးလွှမ်းပါသည်။ စက်ရုံပတ်ဝန်းကျင် ရှိ မြေဆီလွှာ မြေအမျိုးအစားမှာ Eutric Gleysols ဖြစ်ပါသည်။

ပေါင်မြို့နယ်၏ လူမှုရေးဆိုင်ရာ အချက်အလက်များမှာ အောက်ပါအတိုင်း ဖြစ်ပါသည်။

Table 1.1. မြို့နယ်စာရင်းအချက်အလက်များ

စဉ်	မြို့နယ်	ဧရိယာ (Sq. Mile)
၁	ပေါင်မြို့	၂.၁၃
၂	ဧင်းကျိုက် မြို့	၁.၇၄
၃	ပေါင်မြို့နယ်	၄၃၆.၇၅

Figure 1.4 ပေါင်မြို့နယ် **နှင့် စက်ရုံတည်နေရာပြပုံ**

Table 1.2 Revised Air Quality Measurements at Operation Areas

Area	PM(2.5) µg/m³	PM(10) µg/m³	Period
Boiler	21.8	48.6	24 hours
Generator	23.2	47.3	24 hours
Stimplex Plodder	23	45.3	24 hours
Soap Pan	20.4	44.7	24 hours
Mazzoni	21.5	42.1	24 hours
Virgo	21.8	48.4	24 hours

Table 1.3 Monitoring Measurement of Noise (dBA)

Area	Noise level (dB)
Stemplex Plodder	76.8
Soap Pan	75.5
Mazzoni	82.8
Virgo	78.0
Boiler	82.4
Generator	98.6
Waste Water Treatment (1)	48.0
Waste Water Treatment (2)	53.7
store	58.3
Gate	51.0
Tube Well	60.6
Average Noise Level	69.6

Table 1.4 Water Quality Results from Final Discharged Water Pond

Sr.	Item	Waste Water Pond	YCDC Target range
1	Dissolved Oxygen (DO)	4.2	>1 ppm
2	Biochemical Oxygen Demand (BOD_5) (5days at 20°C) (mg/L)	106	20-60 ppm
3	Chemical Oxygen Demand (COD)(Adaptation of the USEPA 410.4 Approved method) (mg/L)	20	<200 ppm
4	pH effluent water	7.23	6<pH<9.6
5	Suspended solids (SS)	123	<500 ppm
6	Nitrate (NO_3^-N)	0.0	N/A
7	Oil and Grease	8.0	N/A

၄.၁ ပတ်ဝန်းကျင်ဆိုင်ရာ သက်ရောက်မှုများနှင့် လျော့ပါးစေရေး နည်းလမ်းများ

ပဒုမ္မာဆပ်ပြာစက်ရုံ၏ပတ်ဝန်းကျင်ဆိုင်ရာ သက်ရောက်မှုများကို အကဲဖြတ်မှု ပြုလုပ်ပြီးနောက် သတ်မှတ်ဖော်ထုတ်ထားသော သက်ရောက်မှုများ ကို စီမံခန့်ခွဲနိုင်ရေးအတွက် ပတ်ဝန်းကျင်ဆိုင်ရာသက်ရောက်မှုများနှင့် လျော့ပါးစေရေး နည်းလမ်းများကို ဖော်ထုတ်ခဲ့ပါ သည်။ ပတ်ဝန်းကျင်ဆိုင်ရာ သက်ရောက်မှုများကို အကဲဖြတ်ခြင်း နှင့် စီမံခန့်ခွဲမှု အစီအစဉ် များစု ဆောင်း ရရှိသော အချက်အလက်များ နှင့် စောင့်ကြပ်ကြည့် ရှုမှုရ လာဒ်များ အရ ရွေးချယ်ထားပါသည် ။ထုတ်လွှတ်အခိုးအငွေ့၊ ရေအရည်အသွေး၊ ဆူညံသံ ထုတ်လွှတ်မှု၊ စွန့်ပစ် အစိုင်အခဲ၊ မြေ ထုညစ်ညမ်းခြင်း၊ လုပ်ငန်းခွင် နှင့် ရပ်ရွာကျမ်းမာရေးနှင့် ဘေးအန္တရာယ် ကင်းရှင်းရေး စီမံခန့်ခွဲမှုစီ မံချက် နှင့် ယာဉ်ကြော ကြပ်မှု စီမံခန့်ခွဲရေးတို့ပါဝင်ပါသည်။

ပဒုမ္မာဆပ်ပြာစက်ရုံ၏ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီရင်ခံစာ ကို Green Environmental, Health, Safety and Social Consultancy Co., Ltd. (Green EHSS) မှတာဝန်ယူ ရေးဆွဲပေးပြီး ပတ်ဝန်းကျင်ဆိုင်ရာ အခြေခံအချက်အလက်များ တိုင်းတာမှုများကို ၂၀၁၉ခုနှစ်ဖွန့်,ဩဂုတ်နှင့် အောက်တိုဘာလများအတွင်းကွင်းဆင်းရယူခဲ့ပါသည်။ ပတ်ဝန်းကျင် လေထုအရည်အသွေးနှင့် ဆူညံသံအဆင့်များကို ၂၀၁၉ခုနှစ်၊ဖွန်လတွင် ကွင်းဆင်းတိုင်းတာခဲ့ပါသည်။ မြေပေါ်ရေ အရည်အသွေးအတွက် ရေလှောင်ကန်မှလည်းကောင်း၊ မြေအောက်ရေ အရည်အသွေးအတွက် စက်ရုံသုံး အဂီစိတွင်းရေ မှ လည်းကောင်း၊ စက်ရံ ုနောက်ဆုံး စွန့်ပစ်ရေကို ရေစစ်ကန်မှလည်းကောင်း ရယူခဲ့ပြီး ၂၀၁၉ ခုနှစ် ဩဂုတ်လတွင် စမ်းသပ်စ စ်ဆေးခဲ့ပါသည်။

ကွင်းဆင်းစစ်ဆေးမှုများ နှင့် လေ့လာစောင့်ကြည့်ခြင်း နှင့် စမ်းသပ်ရရှိသောအချက်အလက်များကိုကိုးကားခြင်း တို့အပေါ်မူတည်၍စက်ရုံလုပ်ငန်းလည်ပတ် ဆောင်ရွက်သည့်ကာလ၊ နှင့် စက်ရုံပိတ်သိမ်း ဖြိုဖျက်မည့်ကာလ တို့တွင် ပတ်ဝန်းကျင်ဆိုင်ရာ သက်ရောက် နိုင်မည့် အတိုင်းအတာ ပမာဏများကို ခန့်မှန်းတွက်ချက်ခြင်း၊ သတ်မှတ်ဖော်ထုတ်ခြင်း၊ အကဲဖြတ်ခြင်းများ ပြုလုပ်ထား ပါသည်။ ပတ်ဝန်းကျင်ဆိုင်ရာ သက်ရောက်မှုများ ဆန်းစစ်ခြင်းကို သက်ရောက် နိုင်မည့် ပြင်းထန်မှုအတိုင်းအတာ၊ ပမာဏ၊ ဖြစ်ပေါ်နိုင်သည့် အကြိမ်အရေအတွက်နှင့် လက်ရှိလုပ်ဆောင်လျက်ရှိသောထိန်းချုပ်ကုစားနည်းလမ်းများ ပေါ်မူတည်၍ အကဲဖြတ်ခြင်း ဖြစ်ပါသည်။

စက်ရုံလည်ပတ်သောကာလ နှ ့ င့် စက်ရုံပိတ်သိမ်းသော ကာလတို့အတွက် သဘာဝ ပတ်ဝန်းကျင်နှ ့ င့် လူမှုစီးပွား အကျိုးသက်ရောက်နိုင်မှုများ အကျဉ်းချုပ်ကို အောက်ပါ တွင် ဖော်ပြထားပါသည်။

Table 1.5 သဘာဝပတ်ဝန်းကျင်နှင့် လူမှုစီးပွား အကျိုးသက်ရောက်နိုင်မှုများ အကျဉ်းချုပ်

အမျိုးအစား	အကြောင်းအရာ၏နယ်ပယ်	သက်ရောက်မှု အလားအလာ			အကဲဖြတ်ရလဒ်			သက်ရောက်မှု အဆင့် သတ်မှတ်ရသည့် အကြောင်းရင်း
		တည်ဆောက်လည်ပတ်သည့် အဆင့်	လည်ပတ်သည့် အဆင့်	ဆင်းသက်သည့်အဆင့်	တည်ဆောက်သည့် အဆင့်	လည်ပတ်သည့် အဆင့်	ဆင်းသက်သည့်အဆင့်	
ပတ်ဝန်းကျင်ဆိုင်ရာ သက်ရောက်မှုများ	လေအရည်အသွေး	သက်ဆိုင်ရာမရှိ	အလယ်အလတ်	အနည်းငယ်	-	အလယ်အလတ်	အနည်းငယ်	မီးစက် နှင့် ဘွိုင်လာတို့မှ အခိုးအငွေ့ထုတ်လွှတ်မှုများ သည် လေထု ညစ်ညမ်း စေသော အဓိက ဇစ်မြစ်များဖြစ်သည် ။ လက်ရှိ ထိန်းချုပ်မှုများ နှင့် စက်ရုံ၏ ပမာဏ အနည်းငယ်သာ ထုတ်လုပ်မှုတို့အရ ဆိုးကျိုး သက်ရောက်နိုင်မှုမှာ အသင့်အတင့် ဟုမှတ်ယူ နိုင်ပါသည်။ ဘွိုင်လာ,လျှပ်စစ်ထုတ်စက်တို ့ကိုပုံမှန်စစ်ဆေးပေးရန် နှင့် အမှုန်အမွှ ားများ ဖြစ်ပေါ်နိုင်သည့် အရင်းအမြစ်များ အတွက် သင့်တော်သောစီမံ ခန ့်ခွဲမှုများကို ပြုလုပ်ရန် အကြံပြုပါသည်။ အဆောက်အဦးများ ဖြိုချခြင်းလုပ်ငန်းခွင်မှ ထွက်သော ဖုန်မှုန့်များသည် ပတ်ဝန်းကျင် နေရာ များသို့ ပြန့်လွင့်ပြီး လေထုကို ညစ်ညမ်း နိုင်ပါသ ည်။ သို့သော် စက်ရုံသည် အသေးစားအရွယ်ဖြစ်ပြီး ဖုန်မှုန့်ပျံ့လွင့်မှုများကို ထိန်းချုပ်နိုင်ပါသည်။ ထို့ကြောင့် သက်ရောက်မှု အနည်းငယ် မျှသာ ဟုမှတ်ယူ နိုင်ပါသည်။

	ဆူညံသံ	-	အသင့်အတင့်	အနည်းငယ်	-	အသင့်အတင့်	အနည်းငယ်	စက်ပစ္စည်းများ အသုံးပြုခြင်းသည် ဆူညံသံနှင့် တုန်ခါမှုများကို အသင့်အတင့် ဖြစ်ပေါ်စေပါသည်။ မီးစက် (generator) များကို သီးခြားအခန်း အတွင်းထားခြင်း နှင့် အခြားထွက်ပေါ်လာသော ဆူညံသံများသည် ယာယီအချိန်မျှသာ ဖြစ်ပါသည်။ အချို့သော စက်များသည် ဆူညံမှုများစွာ ထွက်ရှိသော်လည်း ဆူညံသံ တိုင်းတာ ရရှိမှု ရလဒ်များအရ ဆူညံသံ၏ သက်ရောက်မှုကို အသင့်အတင့် ဟုမှတ်ယူနိုင်ပါသည်။ ဆူညံသံများသော နေရာရှိဝန်ထမ်းများကို နားအကာအကွယ် (earplugs) များပေးထား ရန် နှင့် တာဝန်ရှိသူမှအပ စက်ပစ္စည်းများ အနီးသို့ သွားလာခြင်း ကိုခွင့်မပြုရန်တို့ကို ပြုလုပ်ပါရန် အကြံပြုပါသည်။
	ရေအရည်အသွေး	-	အသင့်အတင့်	အနည်းငယ်	-	အသင့်အတင့်	အနည်းငယ်	Soap ထုတ်လုပ်မှုတွင် ဘေးထွက် ပစ္စည်း အဖြစ် effluent စွန့်ပစ်ရေ ထွက်ရှိပါသည်။ စက်ရုံသည် အသေးစား စက်ရုံ ဖြစ်ခြင်းကြောင့် စွန့်ပစ်ရေပမာဏမှာအနည်းငယ်သာ ဖြစ်ပါသည်။ ထို့အပြင် စက်ရုံသည် မြေပေါ်ရေ အရင်းအမြစ် မှ ဝေးကွာပါသည်။ HTV ပြားကို ရေကန်အတွင်း ထည့်ထားမည်ဖြစ်ပါသည်။ သို့သော် စက်ရုံသည် နောက်ဆုံးစွန့်ပစ်ရေအား ကောင်းမွန်စွာ စီမံခန့်ခွဲမှုမရှိပါက ၎င်းသည် မြေအောက်ရေ အရည်အသွေးကို သက်ရောက် နိုင်ပါသည်။ ထို့ကြောင့် လုပ်ငန်းလည်ပတ် သည့်ကာလ အတွင်း သက်ရောက်မှုမှာ အသင့် အတင့် (Medium) ဖြစ်ပါသည်။ စက်ရုံပိတ်သိမ်းခြင်းကာလအတွက် ဖြိုဖျက်ခြင်း လုပ်ငန်းမှ သက်ရောက်မှု မရှိနိုင်၍ ၎င်းကာလ အတွက်သက်ရောက်မှုမှာ အနည်းငယ်မျှ သာ ဖြစ်သည်။

	စွန့်ပစ်အစိုင်အခဲ ပစ္စည်း	-	အနည်းငယ်	အနည်းငယ်	-	အနည်းငယ်	အနည်းငယ်	ဆပ်ပြာကဲ့သို့သော စွန်ပစ်အစိုင်အခဲများကို ကောင်းမွန်စွာစီမံခန့်ခွဲခြင်းနှင့် ပြန်လည် အသုံးပြုခြင်းတို့ကိုပြုလုပ်ပါသည်။ မီးဖိုချောင်သုံး အမှိုက်နှင့် ထုတ်ပိုးသုံး စွန်ပစ်ပစၥည်းများကို မြေဖို့နေရာတွင် စွန်ပစ်ပါသည်။ အဆိုပါ အကြောင်း များကြောင့်အစိုင်အခဲ စွန်ပစ်ပစၥည်း ၏သက်ရောက်မှုမှာ အနည်းငယ်သာရှိပါသည်။ အသေးစားစက်ရုံ ဖြစ်၍ ထွက်ရှိလာသော စွန့်ပစ်ပစ္စည်း အနည်းငယ်ကို ပြန်လည် အသုံးပြုခြင်း နှင့် ကောင်းမွန်စွာ စီမံခန့်ခွဲနိုင်ပါသည်။ ထိုအကြောင်းရင်း များကြောင့် စွန့်ပစ်အစိုင်အခဲ ၏သက်ရောက်မှု မှာ အနည်းငယ် မျှသာ ဖြစ်သည်။ စက်ရုံ ပိတ်သိမ်းသည့် ကာလတွင် အဆောက်အဦးများ ဖြိုချခြင်းကြောင့် ဖြစ်ပေါ်လာသော အပျက်အစီးများကို ပြန်လည်အသုံးပြုမည်ဖြစ်ပါသည်။ ပြန်လည်အသုံးပြု၍ မရသော အရာများ ကို စွန့်ပစ်ပစ္စည်း သိမ်းဆည်းသူ (waste collector) မှတဆင့် စွန့်ပစ်မည် ဖြစ်သည်။ စက်ရုံ ပိတ်သိမ်းသည့် ကာလအတွက် သက်ရောက်မှုမှာ အနည်းငယ်မျှ သာဖြစ်သည်။

	မြေဆီလွှာ ညစ်ညမ်းခြင်း	-	အသင့်အတင့်	အနည်းငယ်	-	အသင့်အတင့်	သင်္ကာမရှိပြီ	ကားဂိုဒေါင် နေရာ နှင့် ပြင်ဆင်ထိန်းသိမ်း နေရာတွင် ကွန်ကရစ် အောက်ခင်း ထားပါသည်။ စက်ရုံအတွင်း လောင်စာ ဆီ ဖြည့်တင်း သည့် နေရာ မရှိပါ။ သို့သော် စက်ပြုပြင်ထိန်းသိမ်းသည့် နေရာတွင် ဆီခံဗန်း ထားရှိရန် အကြံပြု အပ်ပါသည်။ ရေစစ်ကန် အတွင်း သဘာဝပေါက်ပင်များ ပြန့်ကျဲစွာ ပေါက်ရောက်နေခြင်းသည် နောက်ဆုံးကန် (final treatment ponds) အတွင်းရှိ မြေဆီလွှာ အရည်အသွေး သည် နောက်ဆုံးစွန့်ပစ်ရေ (effluents) သက်ရောက်မှုမရှိကြောင်း ဖော်ပြနေ ပေသည်။ စက်ရုံပိတ်သိမ်းသည့် ကာလတွင် ဓာတုပစ္စည်း သို့မဟုတ် အန္တရာယ်ဖြစ်စေ သော အရာများ ထွက်ရှိမည် မဟုတ်၍ မြေဆီလွှာအပေါ် သက်ရောက်မှုရှိမည် မဟုတ်ပါ။ သက်ရောက်မှု အဆင့်မှာ အနည်းငယ် မျှသာ ဟုမှတ်ယူ နိုင်ပါသည်။

								- စက်ရုံသည်စွန့်ပစ်ရေ သန့်စင်သည့်ကန် ရှိပါသည်။ စက်ရုံသည် အဆိုပါကန်များအတွင်း HTB အကာများအား ထားရှိရန်နှင့် သန့်စင်စနစ်အားအဆင့်မြှင့် ပြုပြင်ရန် အတွက် စာချုပ်ချုပ် ဆိုပြီးဖြစ်ပါသည်။ - ရေသန့်စင်စနစ်မှထွက်ရှိလာသော နောက်ဆုံး စွန့်ပစ်ရေနှင့် ရေမြောင်းအတွင်းရှိရေများ၏ အရည်အသွေးမှာ BOD, COD အပါအဝင် စစ်ဆေးမှု ရလာဒ်များမှာ YCDC ၏အညွှန်း များအတွင်း ၌ရှိပြီး လက်ခံနိုင်ဖွယ် ရာ ဖြစ်ပါသည်။ မြေဆီလွှာ pH, POD and COD စစ်ဆေးမှုရလဒ်၊ လက်ရှိ အခြေအနေ နှင့် ထိန်းချုပ်မှု အခြေအနေ များကြောင့် သက်ရောက် မှု ကို အသင့် အတင့် (Medium) ဟုယူဆပါသည်။ သို့သော် မြေဆီလွှာအား သက်ရောက်မှု များ မဖြစ်စေရန် effluent အား စောင့်ကြပ်ကြည့်ရှု ပြီး စီမံခန့်ခွဲရန် အကြံပြု အပ်ပါသည်။ စက်ရုံပိတ်သိမ်းသည့် ကာလတွင် ဓာတုပစ္စည်း သို့မဟုတ် အန္တရာယ်ဖြစ်စေ သော အရာများ ထွက်ရှိမည် မဟုတ်၍ မြေဆီလွှာအပေါ် သက်ရောက်မှုရှိမည် မဟုတ်ပါ။ သက်ရောက်မှု အဆင့်မှာ အနည်းငယ် မျှသာ ဟုမှတ်ယူ နိုင်ပါသည်။

	ရေသုံးစွဲမှု		အနည်းငယ်	သင့်မြတ်မှုရှိ		အနည်းငယ်	သင့်မြတ်မှုရှိ	စက်ရုံလည်ပတ်ရန်နှင့် သန့်ရှင်းရေးသုံးရေ နှင့် အိမ်သာတို့မှ စွန့်ပစ်ရေသုံးရေ တို့ကို own tube well အဓိကရယူသုံးစွဲ ပါသည်။စက်ရုံ၏ ကုန်ထုတ် လုပ်ခြင်းမှ မြေအောက် ရေရရှိနိုင်မှုအပေါ် သက်ရောက် နိုင်မှုမှာ အနည်းငယ်မျှသာ ဖြစ်ပါသည်။ စက်ရုံ ဖြိုဖျက်ခြင်း တွင် underground water consumption အပေါ် သက်ရောက်မှုမရှိပါ။
	အနှံ့	-	အနည်းငယ်	သင့်မြတ်မှုရှိ	-	အနည်းငယ်	သင့်မြတ်မှုရှိ	ကုန်ထုတ်လုပ်မှု လုပ်ငန်းစဉ်သည် အနှံ့ ပျံ့လွင့်မှုကိုဖြစ်စေ နိုင်သော်လည်း သက်ရောက် မှုမှာ အလွန်နည်းပါသည်။ သို့သော် စက်ရုံ သည် လူနေထိုင် သော ဒေသများနှင့် လွန်စွာဝေးကွာသည် ဖြစ်၍ သက်ရောက် မှုကို အနည်းငယ် ဟုသာ ယူဆနိုင်သည်။ စက်ရုံပိတ်သိမ်း သည့် ကာလအတွက် သက်ဆိုင်မှု မရှိပါ။
	မြစ်ကြောင်း အနည် ကျခြင်း	-	သင့်မြတ်မှုရှိ	သင့်မြတ်မှုရှိ	-	သင့်မြတ်မှုရှိ	သင့်မြတ်မှုရှိ	စက်ရုံသည် မြေပေါ်ရေဖစ်မြစ် နှင့် ဝေးကွာပြီး စက်ရုံသည် စွန့်ပစ်ပစ္စည်းများ ကို မြစ်အတွင်း သို့ စွန့်ပစ်ခြင်းမပြုပါ။ ထို့ကြောင့် မြစ်ကြောင်း အနည်ကျခြင်း နှင့် သက်ဆိုင်မှုမရှိပါ။ စက်ရုံပိတ်သိမ်းသည့်ကာလအတွက် သက်ဆိုင်မှု မရှိပါ။
သဘာဝလ	ကာကွယ်ထား သော ဇရိယာ	-	သင့်မြတ်မှုရှိ	သင့်မြတ်မှုရှိ	-	သင့်မြတ်မှုရှိ	သင့်မြတ်မှုရှိ	စီမံကိန်း နယ်မြေအတွင်း ကာကွယ် ထိန်းသိမ်း ထားသော ဇရိယာ မရှိပါ။

	အပင် အကောင် နှင့် ဇီဝစနစ်	-	အနည်းငယ်	သင့်မြတ်မှုရှိ	-	အနည်းငယ်	အသင့်အတင	စက်ရုံ၏ ဘေးပတ်လည် မှာ စိုက်ခင်းများဖြင့် ပိုင်းနေသည်ဖြစ်၍ လက်ရှိ ဇီဝစနစ်အပေါ် အကျိုးသက်ရောက်မှုမှာ အနည်း ငယ်သာ ဖြစ်သည်။ ထို့အပြင် သစ်တော သစ်ပင် အနည်းငယ်တို့မှာ စက်ရုံအဝန်းအဝိုင်း အတွင်း ပေါက်ရောက်လျက် ရှိပါသည်။ အဆိုပါ ပေါက်ရောက် မှုများမှာ တိရိစ္ဆာန်များ အတွက် နေထိုင်စရာ နှင့် အစာရေစာ အဖြစ် ဖြစ်တည်နေပါသည်။ စက်ရုံပိတ်သိမ်းသည့် ကာလအတွက် သက်ဆိုင်မှုမရှိပါ။
	မြေမျက်နှာသွင်ပြင် နှင့် ဘူမိအနေအထား	-	အနည်းငယ်	သင့်မြတ်မှုရှိ	-	အနည်းငယ်	သင့်မြတ်မှုရှိ	မြေမျက်နှာသွင်ပြင် နှင့် ဘူမိအနေအထား အတွက် သက်ရောက်မှုမှာ အနည်း ငယ်မျှသာ ဖြစ်သည်။
လူမှုစီးပွားဆိုင်ရာပတ်ဝန်းကျင်	ပြောင်းရွှေ့နေရာချ ထားမှုများ	-	သင့်မြတ်မှုရှိ	သင့်မြတ်မှုရှိ	-	သင့်မြတ်မှုရှိ	သင့်မြတ်မှုရှိ	စီမံကိန်းကြောင့် မူလနေထိုင် သူများ အတွက် ပြောင်းရွှေ့နေရာချ ထားမှုများ မရှိပါ။
	ဒေသတွင်း မကျေနပ်မှု ဖြစ်ပွားခြင်း	-	အနည်းငယ်	သင့်မြတ်မှုရှိ	-	အနည်းငယ်	သင့်မြတ်မှုရှိ	စက်ရုံသည် နိုင်ငံတော်မှ ချမှတ်ထားသော ဥပဒေ၊ နည်းဥပဒေ နှင့် လုပ်ထုံးလုပ်နည်းများကို လိုက်နာကျင့်သုံး လျက်ရှိပြီးဒေသဆိုင်ရာ အာဏာပိုင်များ ဒေသခံများ နှင့် ပူးပေါင်းလုပ်ဆောင် လျက်ရှိပါသည်။ စက်ရုံသည် ဦးပိုင် မှ ပိုင်ဆိုင်ပြီး ပိုင်ဆိုင်မှုနှင့် ပက်သက်၍ ဒေသအာဏာပိုင်များမှ ပါဝင်မှုမရှိဘဲ ဒေသတွင်း မကျေနပ်မှု ဖြစ်ပွားခြင်းမရှိပါ။

	တိုင်းရင်းသား လူနည်းစုများ	-	သက်ရောက်မှုမရှိ	သက်ရောက်မှုမရှိ	-	သက်ရောက်မှုမရှိ	သက်ရောက်မှုမရှိ	စက်ရုံဧရိယာအတွင်း နှင့် ပတ်ဝန်းကျင်တွင် တိုင်းရင်းသား လူနည်းစုများ မရှိပါ။
	ဆင်းရဲနွမ်းပါးမှု		သိသာထင်ရှားသောကောင်းကျိုးသက်ရောက်မှု	အသင့်အတင့်		သိသာထင်ရှားသောကောင်းကျိုးသက်ရောက်မှု	အနည်းငယ်	လူမှုစီးပွားကို ကောင်းကျိုးပြု စေပါသည်။ စီမံကိန်း အကောင်အထည် ဖော်ခြင်းကြောင့် အနီး ပတ်ဝန်းကျင် နေထိုင်သူများအတွက် အလုပ်အကိုင် အခွင့်အလမ်းများ ဖန်တီး ပေးနိုင်ပြီး လူနေမှု အဆင့်အတန်း နှင့် ပညာရည် မြင့်မားမှုတို့ကို ဖြစ်ပေါ်စေပါသည်။ စက်ရုံပိတ်သိမ်းသောအခါ အလုပ်အကိုင် ဆုံးရှုံးမှုများ ဖြစ်ပေါ်စေနိုင်၍ ဆိုးကျိုးကို ဖြစ်ပေါ်စေ ပါသည်။
	လူနေထိုင်မှု နှင့် ဝင်ငွေရရှိမှု	-	+ ကောင်းကျိုး သက်ရောက်မှု အသင့်အတင့်	အနည်းငယ်	-	ကောင်းကျိုး သက်ရောက်မှု အသင့်အတင့်	အနည်းငယ်	အလုပ်အကိုင်များ ဖန်တီးပေးနိုင်မှု နှင့် စက်မှုစီးပွား လုပ်ငန်းများ ဖွံ့ဖြိုးမှုတို့သည် ဒေသဆိုင်ရာ ဖွံ့ဖြိုးမှု နှင့် နိုင်ငံစီးပွား တိုးတက်မှု များအတွက် စီးပွားရေးဆိုင်ရာ ကောင်းကျိုးများကို ဖြစ်ထွန်းစေပါသည်။ ထို့မှတဖန် ဒေသခံတို့ အတွက် သိသာသောကောင်းကျိုးများ ကိုဖြစ်ပေါ်စေ ပါသည်။
	လက်ရှိ လူမှုဆိုင်ရာအခြေခံ အဆောက်အအုံ များနှင့်ဝန်ဆောင် မှုများ	-	အနည်းငယ်	သက်ရောက်မှုမရှိ	-	အနည်းငယ်	သက်ရောက်မှုမရှိ	လက်ရှိဖြစ်ပေါ်နေသော ကျေးလက် အခြေအနေများ အပေါ် သက်ရောက်မှုမှာ အနည်းငယ်ဟု မှတ်ယူနိုင်ပါသည်။

	ယဉ်ကျေးမှုဆိုင်ရာ အမွေအနှစ်		သက်ရောက်မှုမရှိ	သက်ရောက်မှုမရှိ		သက်ရောက်မှုမရှိ	သက်ရောက်မှုမရှိ	စက်ရုံအနီးတဝိုက်တွင် ယဉ်ကျေးမှုဆိုင်ရာ အဆောက်အဦးများ မရှိပါ။
	ရှုခင်းအနေအထား		အနည်းငယ်	သက်ရောက်မှုမရှိ		+ ကောင်းကျိုးသက်ရောက်မှု အနည်းငယ်	သက်ရောက်မှုမရှိ	စီမံကိန်း ဖော်ဆောင်ခြင်းကြောင့် ရှုခင်း အနေ အထား အပေါ် သက်ရောက်မှု မရှိနိုင်ပါ။ စိမ်းလန်းစိုပြေခြင်း အစီအစဉ် အရ အပင်များစိုက်ပျိုး လာသော အခါ ပိုမိုလှပသော အနေအထား ဖြစ်လာမည်ဖြစ်ပေသည်။
	ကူးစက်ရောဂါ ပျံ့နှံ့ခြင်း ဥပမာ AIDS/HIV	-	အနည်းငယ်	သက်ရောက်မှုမရှိ	-	အနည်းငယ်	သက်ရောက်မှုမရှိ	ကျမ်းမာရေး ရှုထောင့်အရ လူဦးရေ ရွှေ့ပြောင်း အခြေချမှုများ သည် ဒေသခံ များ အပေါ် ဆိုးကျိုး သက်ရောက်မှုကို ဖြစ်စေနိုင်ပါသည်။ သို့သော် ကျမ်းမာရေး ဆိုင်ရာ ဗဟုသုတ နှင့် စောင့်ရှောက်မှု များပြုလုပ်ပေး ခြင်းဖြင့် သက်ရောက် မှုများကို လျော့နည်းအောင် ပြုလုပ်နိုင် ပါသည်။
	လုပ်ငန်းခွင် ဘေးအန္တရာယ်	-	အနည်းငယ်	အလယ်အလတ်	-	အနည်းငယ်	အနည်းငယ်	စက်ရုံသည် လုပ်ငန်းချိန်များတွင် အလုပ်သမားဥပဒေအတိုင်း လိုက်နာဆောင်ရွက် လျက်ရှိ ပါသည်။ အခြားဒေသ များမှ ဝန်ထမ်း များကို အိမ်ယာစီစဉ်ပေးလျက် ရှိပါသည်။ လိုအပ်သော PPE များကိုလည်း ဝန်ထမ်းများကို အသုံးပြုစေပါသည်။ သက်ရောက်နိုင်မှု အလားအလာ မှာ အနည်း ငယ် သာဖြစ်ပါသည်။

မြောက်	မတော်တဆ မှုများ	-	အလယ်အလတ်	အနည်းငယ်	-	အနည်းငယ်	အပြုသဘော	စက်ပစ္စည်း ကိရိယာများကို ပုံမှန် ထိန်းသိမ်း စစ်ဆေးခြင်းကိုပြုလုပ်ပါသည်။ ဖြစ်ပေါ်လာ နိုင်သည့် အရေးပေါ် အခြေအနေ များအတွက် အရေးပေါ် ကယ်ဆယ်ရေး အဖွဲ့ကို ဖွဲ့စည်းခဲ့ပါသည်။ အရေးပေါ်မီးသတ် ရေ နှင့် မီးသတ်ဆေး ဗူးများ ကိုလည်း စက်ရုံအတွင်း ထားရှိပါသည်။ ထို့ကြောင့် သက်ရောက်မှု မှာ အနည်းငယ် သာဖြစ်ပါသည်။ သို့သော် ရှေးဦးသူနာပြု သင်တန်း၊ အခြေခံမီးသတ် သင်တန်းကဲ့သို့သော သင်တန်းများကို ပြုလုပ်ပေးသင့်ကြောင်း အကြံပြုအပ်ပါသည်။ အဆောက်အဦးများ ဖြိုဖျက်ရာတွင် မတော် တဆမှုများ ဖြစ်ပေါ်နိုင်ပါသည်။ အကာအရံများ ပြုလုပ်ပေးခြင်း၊ ဂန်ထမ်း များကို PPE များပေးခြင်း၊ သတိပေး ဆိုင်းဘုတ်များ တပ်ဆင်ခြင်း တို့ဖြင့် သက်ရောက်မှု လျော့နည်း အောင် ပြုလုပ်နိုင်ပါသည်။

NA: သက်ဆိုင်မှုမရှိ

+: ကောင်းကျိုးသက်ရောက်မှု

၅.၁ ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု အစီအစဉ်

စီမံကိန်းကြောင့် ဖြစ်ပေါ်နိုင်သည် ထိခိုက်မှုများကို လျော့နည်းစေရန်အတွက် ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု အစီအစဉ် Environmental Management Plans (EMP) ကို သဘာဝပတ်ဝန်းကျင်နှင့် လူမှုပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်း၏ ရလာဒ်များကို အခြေခံ ၍ ရေးဆွဲပါသည်။ EMP ၏ အဓိက အရေးပါသော စီမံခန့်ခွဲမှု စီမံချက် များမှာ အောက်ပါအတိုင်းဖြစ်ပါသည်။

1) လေ ထုတ်လွှတ်မှု နှင့် အမှုန်အမွှား လျော့နည်းစေရေးစီမံချက်
2) ပဒုမ္မာဆပ်ပြာ စက်ရုံ အစိုင်အခဲ စွန့်ပစ်ပစ္စည်း စီမံခန့်ခွဲမှု
3) ပဒုမ္မာဆပ်ပြာ စက်ရုံ စွန့်ပစ်အရည် စီမံခန့်ခွဲမှု
4) လုပ်ငန်းခွင် ကျမ်းမာရေး နှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေး စီမံချက်
5) အရေးပေါ်တုံ့ပြန်ရေးစီမံချက်

Table 1.6 Summary of Environmental and Social Management Plan for Operation Phase

Key Indicator	Description	Actions on prevention	Time Frame	Responsible Person
Air and Dust				
Air Pollution	Boiler Maintenance	• Routine boiler maintenance is done to minimizing emission. • ဘွိုင်လာမှထွက်ရှိသည့် အခိုးအငွေ့များနှင့်ပတ်သတ်၍ အမှုန်များလျော့ကျစေရန် Dust Collector တပ်ဆင်ထားခြင်းနှင့်တစ်ရက်လျှင်တစ်ကြိမ် Maintenance ပြုလုပ်ပြီး တစ်နှစ်လျှင် စက်လည်ပိတ်ရက် ၉ဖ ရက်အတွက် ၉ဖ ကြိမ်ပြုလုပ်ပါသည်။	The whole operation period	EMT
	Boiler Ash	• Continual ash removal is done to ensure optimum performance and reduce ash entrainment like PM emission. • တစ်ပတ်လျှင် တစ်ကြိမ် ပြုလုပ်ပါသည်	The whole operation period	EMT

	Boiler Tube	• The boiler tubes are clean pneumatically. The pneumatic tube cleaning helps to minimize the soot build-up on the heat exchange surfaces of the boiler and therefore helps to maintain the optimum boiler efficiency. • သုံးလလျှင် တစ်ကြိမ် အမြဲ ပြုလုပ် ပါသည်	The whole operation period	
Wastewater				
Lime waste effluent	Reducing high COD and BOD values.	• Proper HTV sheets must be installed in the wastewater treatment ponds. • Ensure to conduct regular inspection of HTV sheets. •	The whole operation period	Project Proponent EMT
Washing and cleaning water	Reducing water consumption	• Water should be minimised. • Detergent usage should be minimised.	The whole operation period	Production EMT
Cooling water from boiler	Reducing equipment damage. Reducing oil loss through leakage and accident.	• Water should be collected for washing and cleaning with routine collection. •	The whole operation period	Utility EMT
Solid Waste				
Process waste	Use of Paper and plasctics for packaging	• Ensure to recollect the soap wastes and reused the wastes.	Operation period	Purchasing
Domestic Waste	Waste accumulation and poor housekeeping	• Recycle paper wastes. • Proper disposing of plastic wastes.	Operation period	Operation
Disposing Solid Waste	Factory waste Domestic waste	• Temporary store in waste bins and removed by using township municipal car.	Operation period	EMT
Health and Safety				
Public Health and Safety	Health and safety hazards due to the Plant's operation	• Develop Emergency Response Plan •	Operation period	EMT

၅.၁ ပတ်ဝန်းကျင် စောင့်ကြပ်ကြည့်ရှုမှုအစီအစဉ်

အဆိုပြု ထားသော ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု အစီအစဉ် နှင့် ကိုက်ညီ ရန် ပတ်ဝန်းကျင်စောင့်ကြပ် ကြည့်ရှုသည့် အကြိမ်အရေ အတွက်အပါအဝင် အဓိက သတ်မှတ်ချက် ပါရာမီတာများ(parameters)ပါဝင်သည့်ပတ်ဝန်းကျင် စောင့်ကြပ်ကြည့်ရှုမှုအစီအစဉ်ကို ရေးဆွဲ ထားပါသည်။

စီမံကိန်း လည်ပတ်စဉ် ကာလအတွက် ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုမှု အစီအစဉ်ကို အကောင်အထည်ဖော် ဆောင်ရွက်ရန် အသုံးစရိတ်ရံပုံငွေကို တစ်နှစ်လျှင် ၁၀,၀၀၀,၀၀၀ ကျပ် (ကျပ် ၁၀၀ သိန်း) ခန့်လျာထားပါသည်။ ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုမှု အစီအစဉ်အရ စီမံကိန်းပိုင်ရှင်သည် ဝန်းကျင်လေထုအရည်အသွေး၊ ဆူညံသံ၊ စွန့်ထုတ်ရေ အရည်အသွေးနှင့် ဘေးအန္တရာယ် ကင်းရှင်းရေးတို့ကို စောင့်ကြပ်ကြည့်ရှု ရမည်ဖြစ် သည်။စောင့်ကြပ်ကြည့်ရှု၍ ရရှိလာသော လေထုတိုင်းတာရရှိမှုများ၊ ရေအရည်အသွေး တိုင်းတာရရှိမှုများ နှင့် ဆူညံသံတိုင်းတာရရှိမှု ရလာဒ်များကို ပြန်လည်စိစစ် စစ်ဆေးနိုင်ရေး အတွက် မှတ်တမ်းများကို ဖိုင်များဖြင့် သေချာစွာသိမ်းဆည်းထိန်းသိမ်းထားရန် လိုအပ်ပြီး သက်ဆိုင်ရာ တာဝန်ရှိ ဌာနများသို့ တင်ပြအစီရင်ခံရမည်ဖြစ်ပါသည်။

Table 1.7 Proposed Environmental Monitoring Programmes – Operation Phase

Environmental Issues	Monitoring Location and Indicator	Monitoring and Reporting Frequency	Cost Estimate (USD) Per Year	Responsibility Party
Air Pollution				
Ambient Air Quality **Parameter** (H2S,SO2,NO2 CO, CO2, O3, PM(2.5), PM(10), TSP	1.Boilor Stack (916.560415, 97.583854) 2.Site boundary (16.559350, 97.583680) (Measurement of Air Quality) -National Environmental Quality (Emission) Guideline for Air Emission -Check compliance with the Air pollution Mitigation measure	twice a year	1200	EMT

Vehicle exhaust	Within the factory compounds	Twice per year	200	EMT
Noise				
Noise level **Parameter** dB(A)	1. Site boundary (16.559350, 97.583680) (Measurement of Noise)) -National Environmental Quality (Emission) Guidelines -Check compliance with noise mitigation measure	Twice a year	100	EMT
Water Quality				
Surface Water Quality Waste Water Quality **Parameter** (BOD), (COD) pH, (SS) , (NO3 – N), Oil and Grease	1.Final Effluent Pond (16.559670, 97.585001) and Drainage (BOD, COD, pH, TSS) -Check compliance with the water pollution mitigation measure	Twice a year Biannual	120 120	EMT EMT
Solid Waste generation from Production Process				
EFB wastes	Empty EFB disposal areas -bag or ton of ffb	Monthly	No Extra Cost	Utility EMT Agro-technician
Non- Hazardous Waste	- Cleanliness (The Factory compounds) ▪ Waste bags/bins - Inspect waste storage area (Visual check and record amount)	Daily Daily Weekly	No Extra Cost No Extra Cost No Extra Cost	EMT EMT EMT

Hazardous Waste (eg. Spent/waste oils and solvent waste and etc.)	-Inspect potential areas such as workshop, maintenance (Visual check and record amount)	Weekly	No Extra Cost	EMT
Waste Disposal	-Normal Waste (Disposal point in factory campus) -Nonhazardous Waste (disposed of at a qualified facility –see section 9.5.2)	Weekly Monthly	No Extra Cost 100	EMT EMT
Health and Safety				
Working Condition (Room temperature and humidity)	-Statistic of accidents, injuries and infectious diseases -Inspection of compliance with Occupational Health and Safety measure (eg. medical kit box) - -Firefighting training and drill -Inspection of compliance with Occupational Health and Safety measure (eg. Fire extinguisher, signboard on safety, mask, glove)	Daily Monthly inspection for health and safety at work place Once a year Twice a year	No Extra Cost 500 500 1000	EMT ERT EMT ERT EMT ERT EMT ERT
Safety Measures for Health Status				
Fire Safety Measures				
Emergency Safety Measure				

၆.၁ အများပြည်သူ နှင့် တိုင်ပင်ဆွေးနွေးခြင်းနှင့်သတင်းအချက်အလက်များ ထုတ်ဖော် တင်ပြခြင်း

ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု အစီအစဉ် ကိုပြင်ဆင် ရေးဆွဲရာတွင် အကြံပေးအဖွဲ့ Green EHSS သည် ပဒုမ္မာဆပ်ပြာ စက်ရုံရှိ တာဝန်ရှိသူများ၏ ကူညီထောက်ပံ့မှုများဖြင့် ဒေသခံများနှင့် တိုင်ပင် ဆွေးနွေးခြင်း များကိုပြုလုပ် ခဲ့ပါသည်။

၂၀၁၉ ခုနှစ်၊ အောက်တိုဘာလ အတွင်း face to face meeting နှစ်ခုကိုပြုလုပ်ခဲ့ပါသည်။

၁) သဲဖြူကုန်းကျေးရွာအုပ်စု အုပ်ချုပ်ရေးမှူးနှင့် တွေ့ ဆုံဆွေးနွေးမှုပြုလုပ်ခဲ့ပါသည်။

၂) ဇင်ဘာအုပ်ချုပ်ရေးမှူး (မုတ ်မကျေးရွာအုပ်စု) နှင့်တွေ့ ဆုံဆွေးနွေးမှုပြုလုပ်ခဲ့ပါသည်။

၂၀၁၉ ခုနှစ် အောက်တိုဘာလ အတွင်း တွင် household surveys ကိုပြုလုပ်ခဲ့ရာ သဲဖြူကုန်း ကျေးရွာတို့အတွင်းရှိ အိမ်ထောင်စုပေါင်း(၁၅)ခုတို ့ကို ကွင်းဆင်း ၍ စက်ရုံနှင့် ပက်သက်၍ ဒေသခံ များ၏ သဘောထား မှတ်ချက်များကို ကောက်ခံခဲ့ပါသည်။

၂၀၁၉ ခုနှစ်အောက်တိုဘာလအတွင်း ပေါင်းမြို့နယ် သဲဖြူကုန်းကျေးရွာအုပ်စုမှ နေထိုင်သူ(၁၅) ဦးအား မေးမြန်းမှုများ ပြုလုပ်ခဲ့ပါသည်။ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အကြံပေးဖြစ်သော Green EHSS ၏လူမှုဆိုင်ရာ အကြံပေးသူနှင့် ပဒုံမဆောဆပ်ပြာစက်ရုံ၏ ကိုယ်စားလှယ်များသည်သတင်းအချက်အလတ်များဖော်ထုတ်ခြင်းနှင့် လူထုဆွေးနွေးပွဲကို ၂၀၁၉ခုနှစ် အောက်တိုဘာလ ၁၆ရက်တွင် ပြုလုပ်ခဲ့ပါသည်။ အဆိုပါဆွေးနွေးပွဲ ကို ပဒုံမဆောဆပ်ပြာစက်ရုံ၏ အစည်းအဝေးခန်းမတွင် ကျင်းပခဲ့ရာအစည်းအဝေး တက်ရောက်သူ စုစုပေါင်း ၄၅ဦး တက်ရောက်ပါသည်။အဆိုပါ၃၄ ဦးမှာစက်ရုံမှူး၊ဒုတိယစက်ရုံမှူး နှင့် စက်ရုံဝန်ထမ်းစုစုပေါင်း ၁၂ဦး အပါအဝင်ပတ်ဝန်းကျင်ကျေးရွာများ ဖြစ်သော သဲဖြူကုန်းရွာ ၊ ရေပြာကုန်း ရွာ၊ ဇင်ဘာရွာ ၊ ပုသိမ်ကွင်းရွာ ၊ ကံဖြူရွာ နှင့် နတ်စင်ကုန်းရွာ တို့ မှဒေသခံစုစု ပေါင်း ၂၂ ဦးတို့ဖြစ်ပါသည်။

ဒေသခံများမှ၂၀၁၈ ခုနှစ်အတွင်း စွန့်ပစ်ရေနှင့်ပတ်သတ်၍တင်ပြခဲ့ ကြပါသည် ။ ယခုအခါ စက်ရုံ သည် စွန့်ပစ်ရေသန့်စင်သည့် စနစ် ကိုပိုမိုကောင်းမွန်အော င်ပြုပြင်

ထားပြီးဖြစ်သ ည့်အတွက်အစည်းအဝေးသို့ တက်ရောက်လာ ကြသောဒေသ ခံများမှဒေသအ တွင်းစက်ရုံစွန့်စ ရေ၏ သက်ရောက်မှုကြောင့် ထိခိုက်နိုင်မှုမရှိ/ လျော့နည်းကြောင်း တင်ပြခဲ့ကြ ပါသည်။

အစည်းအဝေးတက်ရောက်ကြသူများ၏ အကြံပြုချက်များမှာ အောက်ပါအတိုင်းဖြစ်ပါသည် --

-စွန့်ပစ်ရေကို နည်းပညာ အသုံးပြု၍ကောင်းမွန်စွာ ထိမ်းသိန်းထား ရန်နှင့် ပတ်ဝန်းကျင် မပျက် ဆီး စေရန်

-ဘေးပတ်ဝန်းကျင် ကျေးရွာများကို ရေဆိုးမပြန့်အောင် အခြားဆိုးကျိုး မရှိအောင် ဆက်လက် ထိန်းသိမ်း ပေးရန်

- စက်ရုံဝန်ထမ်းနှင့် ကျေးရွာလူထု ဒေသခံများ ပူးပေါင်းဆောင်ရွက်ရန်
- စက်ရုံ ယခုထက်ပို၍ အောင်မြင်ပါရန်

- ပဒုံမဆောဆပ်ပြာစက်ရုံသည် ဒေသအတွင်း အလုပ်အကိုင်အခွင့်အလမ်းများ ဖန်တီးပေးနိုင်ခြင်း (စက်ရုံဝန်ထမ်းများ၏ ၈၀% မှာဒေသခံများဖြစ်ကြပါသည်။) ဆပ်ပြာစက်ရုံရှိခြင်းကြောင့် အရည်အသွေးကောင်းသည့် ဆပ်ပြာကို သင့်တင့်သောဈေးန ုန်းနှင့် ၀ယ်ယူရရှိနိုင်ခြင်းစ သာ အကျိုးများ ရရှိနိုင်ကြောင်း ဒေသခံများမှ တင်ပြကြပါသည်။

စက်ရုံ မှ ပြန်ကြားချက်များ နှင့် ဆောင်ရွက်မည့် လုပ်ငန်းများကို အခန်း (၈) တွင် ဖော်ပြထားပါသည်။

၇.၁ နိဂုံး

ပဒုမ္မာဆပ်ပြာ စက်ရုံသည် ပမာဏ အနည်းငယ် သာထုတ်လုပ်သည့် စက်ရုံအမျိုး အစားအဖြစ် မှတ်ယူနိုင်ပါ သည်။ စက်ရုံသည် တစ်နှစ်လျှင် ပျမ်းမျှစက်လည်ပတ်ရ က် ၁၂၈ ရက်သာရှိ ပါသည်။

သဘာဝပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီရင်ခံစာ စာအုပ်တွင် ပတ်ဝန်းကျင်ဆိုင်ရာသက်ရောက်နိုင်မည့်အလားအလာ နှင့် စီမံခန့်ခွဲမှု အစီအစဉ် များကို သတ်မှတ် ဖော်ထုတ်ခြင်း ထား ပါသည်။

လေထုအရည်အသွေး၊ မြေအောက်ရေ အရည်အသွေး၊ မြေဆီလွှာ ချဉ်ဖန်ကိန်း (pH) စသော အခြေခံအရည်အသွေးများကိုစောင့်ကြပ်ကြည့်ရှုခြင်း (baseline monitoring) မှ ရရှိလာသော ရလာဒ်များ သည် အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး(ထုတ်လွှတ်မှု) စံချိန်စံညွှန်းများ အတွင်းကျရောက်ပြီး လက်ခံနိုင်သည့် အခြေအနေတွင် ရှိပါသည်။ အချို့သော စက်ပစ္စည်းများ၏ တိုင်းတာရရှိချက်သည် စံနှုန်း ထက် ကျော်လွန်နေပါသည်။

သက်ရောက်မှုများကို ဆန်းစစ်ခြင်းများအရ လေထုအရည်အသွေး၊ မြေအောက်ရေ အရည်အသွေး၊ မြေဆီလွှာ အရည်အသွေး၊ လုပ်ငန်းခွ င် နှင့် ရပ်ရွာကျမ်းမာရေးန ့ှင့် ဘေးအွန္တရာယ်ကင်းရှင် းရေး၊ ယာဉ်ကြောကြပ်မှု နှင့် အနံ့ အသက် ထွက်ရှိမှုများ ကို သတ်မှတ်ဖော်ထုတ်ခဲ့ပြီး ၎င်းတို့ကို သက်ရောက်မှု အသင့်အတင့် မှ သက်ရောက်မှု အနည်းငယ် အဖြစ် အကဲဖြတ်မှတ်ယူနိုင်ပါသည်။

လက်ရှိလုပ်ဆောင်လျက်ရှိသော သက်ရောက်မှုများကို လျော့နည်း စေရန် လုပ်ဆောင်ချက်များ သည် လုံလောက်မှုရှိသည်ဟု ကောက်ချက်ပြုနိုင်ပါ သည်။ သို့သော်လည် း သက်ရောက်မှုများကို စဉ်ဆက်မပြတ် စောင့်ကြပ်ကြည့်ရှုရန် (monitor) နှင့် လိုအပ်ပါက အများပြည်သူတို့၏ သဘောထားတုံ့ပြန်ချက်များကို ရယူရန် လိုအပ်ပါသည်။

2. INTRODUCTION

2.1PROJECT PROPONENT AND BACKGROUND

The Padonmar Soap Factoryis 100% owned by **MYANAMA ECONOMIC HOLDING PUBLIC COMPANY LTD (MEHPCL).** MEHPCL was established in February 1990 under the Special Companies Act. Myanmar Economic Holding Limited has been transformed into a public company in 2016. MEHPCL has operated various industries around the Myanmar including Padonmar Soap factory. Project Proponent is U Hein Htet Aung (Factory Manager) 09-781848699 (padonmar393@gmail.com).

Padonmar Soap factory mainly produce bar soaps and tube soaps. Raw crude palm oils required for soap manufacturing are provided by Padonmar Soap factory.

The factory was built on 4th July 2002 by No 1 Ministry of Industry and completed on 23rd March 2003. On that day, the factory started manufacturing of soaps as a pilot testing. The factory was transferred to MEC on 9th October 2003.

The present capacity of soap manufacturing of the Padonmar Soap Factory is 1716 tons per year with 2.5 ton per hour.

Contact Person: U Hein Htet Aung (Factory Manager)

09-781848699 (padonmar393@gmail.com)

Environmental Department of Mon State suggested Padonmar Soap factory to develop the Environmental Management Plan (EMP) to ensure to minimize the potential impacts associated to the factory's operations. Padonmar Soap factory, therefore, engaged GREEN EHSS CONSULTANCY CO., LTD. to prepare an EMP report as a third party consultant on behalf of the factory.

2.2PADONMAR SOAP FACTORY'S OBJECTIVE

Padonmar Soap factory is established in 2003 to produce bar soaps and tube soaps to fullfil local demands with affordable prices. In addition, in order to create employment opportunities for local peoples and to promote supply chains of local suppliers of raw materials.

2.3 PURPOSES OF THE ENVIRONMENTAL MANAGEMENT PLAN

GREEN ENVIRONMENTAL, HEALTH, SOCIAL & SAFETY CONSULTANCY CO., LTD. conducted Environmental Management Plan for **PADONMAR SOAP FACTORY** on manufacturing of soaps.

The purpose of this EMP report is to identify the potential environmental and social (E&S) impacts associated with production processes and provide the effective management programs for the identified environmental and social impacts (E&S) of Padonmar Soap factory. The environmental management plan will help the factory to understand and manage the potential E&S impacts and to improve its E&S performances at every operational activity through regular monitoring systems.

2.4 CONSULTANT TEAM

Environmental Management Plan for operation of **PADONMAR SOAP factory** is conducted by **GREEN ENVIRONMENTAL, HEALTH, SAFETY & SOCIAL CONSULTANCY COMPANY LIMITED**. GREEN EHSS COMPANY LIMITED is established in Myanmar under Incorporate Registration No: 4289/2011-12.

Green EHSS Consultancy firm has been providing Environmental, Health, Safety and Social related services for local and international organizations. EMP consultant team includes competent professionals with more than 20 years of local and international experience in Environment, Health, Safety and Social domain.

2.4.1 PERSONNEL INFORMATION OF CONSULTANT TEAM

No.	Name	Designation	Academic and Professional Qualifications	Field of EIA
1	Catherine Soe Soe Aung	Team Leader, Sr. Environmentalist Certified Environmental Professional, Canada Approved Risk Consultant, MOM,	Master in Environmental Engineering, National University of Singapore Master in Zoology, YU	Air Pollution Soil and Noise and Vibration Occupational health and safety

		Singapore ADB's Consultant Management	Bachelor in Zoology, YU	
	Contact	catherine@greenehss.com 09 42 5353553		
2	Dr. May Thin Swe	Department Head Jivitadana Sangha Hospital	M.B.B.S(Yangon)	Health Assessment
	Contact	09765026245		
2	Dr. Theingi Ye Myint	Waste Management and Water Quality Specialist	Ph.D(YU) Master in Environmental Engineering, NUS Master in Industrial Chemistry, YU Bachelor in Industrial Chemistry, YTU	Waste Management Water pollution
	Contact	095095555		
3	Dr. Esther Kumar	Biodiversity Specialist, Fauna Team Leader	Master in Zoology, YU Bachelor in Zoology, YU	Biodiversity
	Contact	info@greenehss.com		
4	U San Aye	Mapping and GIS Specialist	Bachelor in Maths, Diploma in Mapping, Japan	Geology and Map
	Contact	marketing@greenehss.com		
5	Daw Swe Swe Aung	Social Impact Assessment Specialist	Master in Geography, YU Bachelor in Geography, YU Diploma in GIS, Communication Skill for Business, Singapore Polytechnic	Social Impact Assessment
	Contact	green.sweaung@gmail.com 095026245		
6	Daw Mi Mi	Social Impact	Master in Public	Social Impact

	Soe	Assessment Specialist	Administration Bachelor in Chemistry Diploma in Computer Science Post-Graduate Diploma In Applied Psychology	Assessment
	Contact	09965026245		
7	U Aung Aung	Project Assistant	B.Sc (Chemistry)	Monitoring and Data collection
8	U Aung Ze Ya	Project Manager	B.Sc (Math)	Oversee project
	Contact	09787874674		

3. PROJECT DESCRIPTION

3.1SALIENT FEATURES OF THE COMPANY

The salient features of the company are mentioned below.

Name of Factory	:	PADONMAR SOAP FACTORY
Year of Established	:	2003
Address	:	Paung Township, Mon State, Myanmar
Name of Principal Organization	:	**MYANAMA ECONOMIC HOLDING PUBLIC COMPANY LTD (MEHPCL)**
Type of Business	:	Manufacturing of Soap
Type of Investment	:	100% Local Investment
System of Sales	:	100% Local
The Factory Area	:	50.73 Acres
Commence date of Construction	:	4th July 2002
Commence date of Operation	:	23rd May 2003
Contact Person	:	U Hein Htet Aung (Factory Manager) 09781848699 padonmar393@gmail.com

3.2PROJECT LOCATION

Padonmar Soap Factroy is located at Thae Phyu Kone village, Ye Pyar Kone quarter just Mawlamyine-Yangon road near to Paung Township at the coordinates grids between E 97. 57°to 97.58° and N 16.56° to 16.55° (16° 33′36.90″N 97° 34′ 55.07″E, 16° 33′26.49″N 97° 34′ 59.49″E)(Figure 3.1 and 3.7). စက်ရုံတည်နေရာအသေးစိတ်မှာမွန်ပြည်နယ်၊ ပေါင်မြို့နယ်၊ သဲဖြူကုန်းကျေးရွာအနီး၊ မပည(LU၄၉၃၃၀၄) ရန်ကုန်-မော်လမြိုင်ကားလမ်းဘေး မိုင်တိုင်အမှတ် (၁၈၄/၆)နှင့် (၁၈၅/၀) အကြား တည်ရှိပါသည်။

Mawlamyine-Yangon road is 189 miles long ang just baside the factory. The land size is 50.73 acreas.

Nearby residential areas are Ye Pyar Kone quarter. The factory location was selected based on the suitability and availability of raw materials in Myanmar as explained. Average elevation of the factory area is 31 m.

Table 3.1 List of Production and Associated Facilities

No.	Facility	Area	Unit
1	Main Briefing and Meeting Hall	30′x80′	
2	Drum Yard and Refined Glyscrine	160′x200′	
3	Admin Office	40′x60′	
4	QC Office	30′ x 40′	
5	Briefing Halls	30′ x 80′	
6	Raw Materials store	50′x100′	
7	Raw Materials preparation section	50′x60′	
8	Raw Materials tank	65′x75′	
9	Boiler House	50′x80′	
10	Cooling Tower Ground Tank	28′x28′	
11	Pump House	10′x10′	
12	Mazzoni and Finished product store	120′x200′	
13	Tube wells	50 feet	5
14	Car Garage	50′x100′	
15	စက်ရုံမှူးနေအိမ်	70′ x 7′0	1 unit
16	အရာရှိနေအိမ်	50′ x 130′	(၂)ခန်းတွဲ (၃) လုံး
17	အိမ်ထောင်သည်လိုင်းခန်း	35′x53′	(၆)ခန်းတွဲ
18	Canteen	30′x40′	1 unit
19	Gate	10′x15′	
20	Finish Product Store	50’ x 100’	
21	Tank Farm	50′ x 60′	
22	Genertor House	40′ x 30′	


N

Figure 3.1 Factory Loations

Figure 3.2 Arieal View of Factory Loations

Figure 3.3 Factory Location with Boundary GPS Points

Figure 3.4 Factory Location with Center GPS Points

Figure 3.5 Factory Location and Surrounding Areas

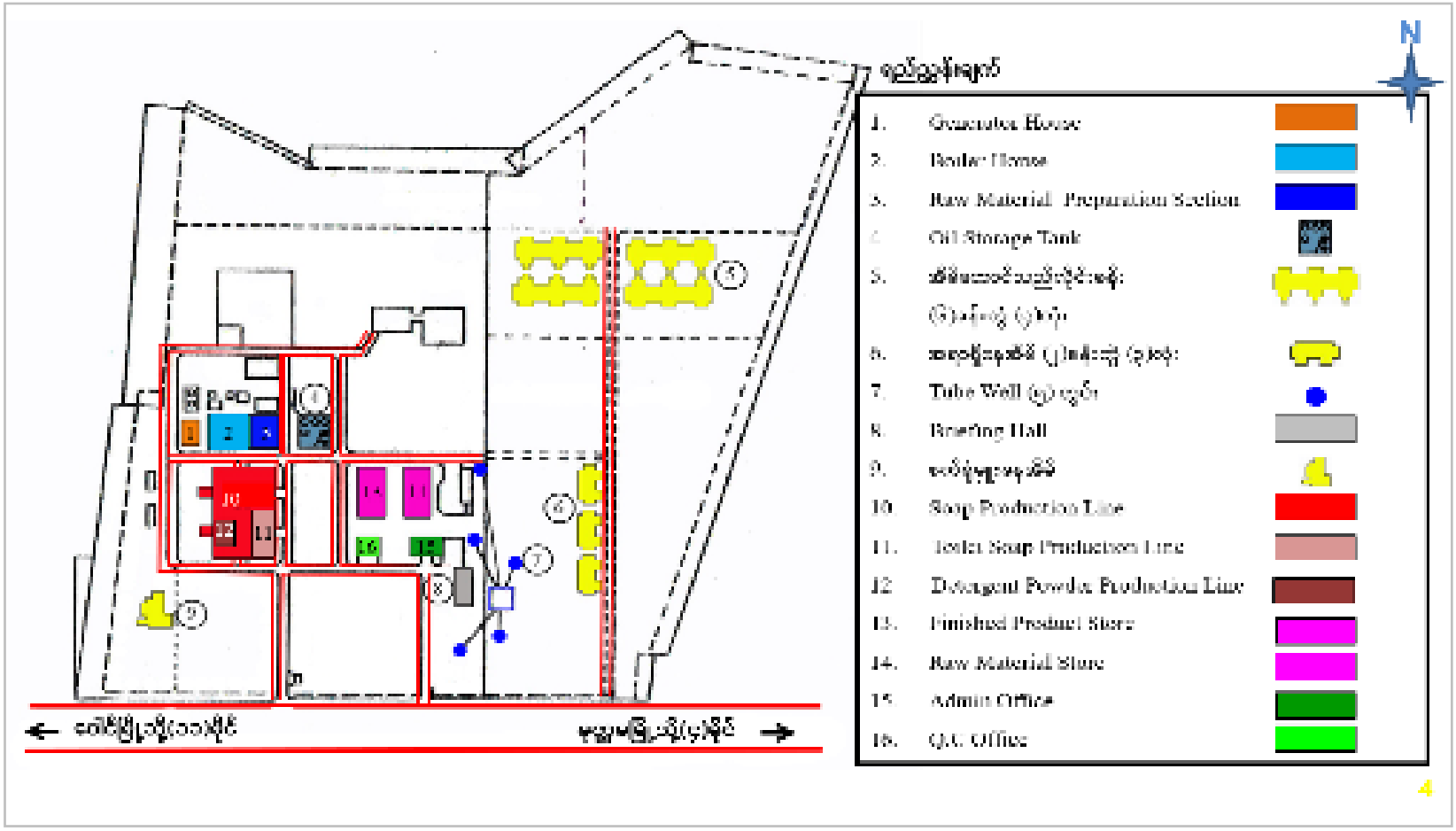


Figure 3.6 Facilities Plan within the Factory Premises


Stimplex Plodder
Mazzoni
Soap Pan
Generator
Boiler
Waste Water Treatment(1)
Waste Water Treatment(3)
Waste Water Treatment(2)
Gate
Waste Water Treatment(4)
Virgo
Store
Tube well
Mawlamyaing Rd
Sign in
Google My Maps
Map data ©2024 Imagery ©2024 CNES / Airbus, Maxar Technologies
Terms
20 m
Keyboard shortcuts

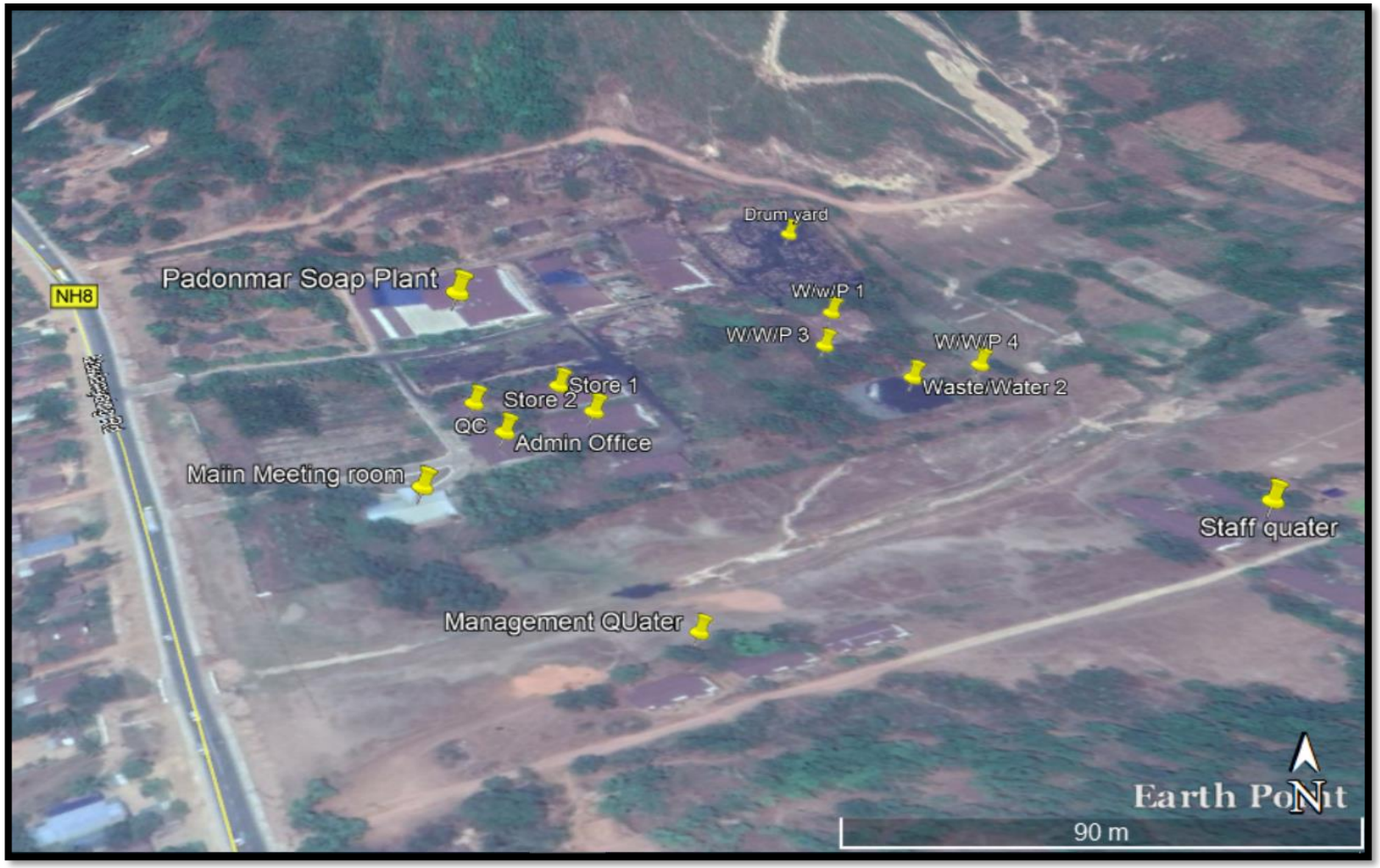


Figure 3.7 Factory and Associated Facilities

3.3 FACTORY LAYOUT AND ASSOCIATED FACILITIES

Within the Factory compound, total 17 facilities including production units and Staff residents. (Figure 3.6).95% of the buildings are built with bricks and concrete meanwhile only 5% of the buildings are wood structures.

The land area of the factory is approximately 50.73 acres. Detailed factory's facilities and sizes are listed in Table 3.2. The layout plan of the factory and associated buildings are shown in Figure 3.7.

Table 3.2 List of Production and Associated Facilities

No.	Facility	Area	Unit
1	Main Briefing and Meeting Hall	30'x80'	
2	Drum Yard and Refined Glyscrine	160'x200'	
3	Office	40'x60'	
4	Raw Materials store	50'x100'	
5	Raw Materials preparation section	50'x60'	
6	Raw Materials tank	65'x75'	
7	Boiler House	50'x80'	
8	Cooling Tower Ground Tank	28'x28'	
9	Pump House	10'x10'	
10	Mazzoni and Finished product store	120'x200'	
11	Tube wells	50 feet	5
12	Car Garage	50'x100'	
13	Officer Quater	25'x60'	2 unitsx3
14	Staff Quarter	30'x180'	6 unitsx 4
15	Factory Manager house	35'x53'	1 unit
16	Canteen	30'x40'	
17	Gate	10'x15'	

3.4FINAL PRODUCTS

Four main types of products are produced annually by the factory. The categories and amount of the products are mentioned in Table 3.3.

Table 3.3 Lists of Products and Quantity Ton/year

No.	Product	Quantity (Ton)
1	Bar Soap (7.5″x 1.7″)	1878.80
2	Tube Soap (3″x 1.9″)	1072.26

Figure 3.8 Bar and Tube Soaps

3.5RAW MATERIAL REQUIREMENT

The main raw material require in the soap production are organic raw materials such as crude palm oil, crude coconut oils and palm fatty acid as well as inorganic materials such as caustic soda, sodium silicate and salts. Raw materials are purchased from local suppliers. In general, five types of raw materials such as crude palm and coconut oils, distilled palm fatty acid, coustic soda and sodium silicate are used in manufacturing.

The raw materials for soap productions are shown in the Figure 3.10.

ကုန်ကြမ်းများကို ကုန်ကြမ်းသိုလှောင်ရာ အဆောက်အဦးအတွင်း သိုလှောင်ထားပါသည်။ သက်ဆိုင်ရာ အမျိုးအမည် အလိုက် သီးခြား နေရာပြုလုပ်ကာ ခွဲခြားသိုလှောင်ပါသည်။
ကုန်ကြမ်းသယ်ယူရာတွင် ကုန်တင်ယာဉ်များဖြင့်သာ အသုံးပြုပြီးကုန်ကြမ်း အသုံးပြုမှုပမာဏမှာ အောက်ပါအတိုင်းဖြစ်ပါသည်-

Table 3.4 Raw Material Requierment

စဉ်	အမျိုးအမည်	ရေတွက်ပုံ	တစ်လ	တစ်နှစ်
၁။	ကုန်ကြမ်းဆီ(PKOI CPORBDPS ၊ PFAD)	တန်	၁၅၁.၂၀	၁၈၁၄.၄၀
၂။	Caustic Soda	တန်	၂၅.၂	၃၀၂.၄
၃။	Sodium Silicate	တန်	၇.၂	၈၆.၄
၄။	Salt	တန်	၁၂	၁၄၀
၅။	Diphenyl Oxide (ရေမွှေး)	တန်	၀.၂၄	၂.၈၈
၆။	Metyellow(အရောင်)	တန်	၀.၀၁၆၈	၀.၂

Figure 3.9 Photos of Raw material Storage Building and Storage Conditions

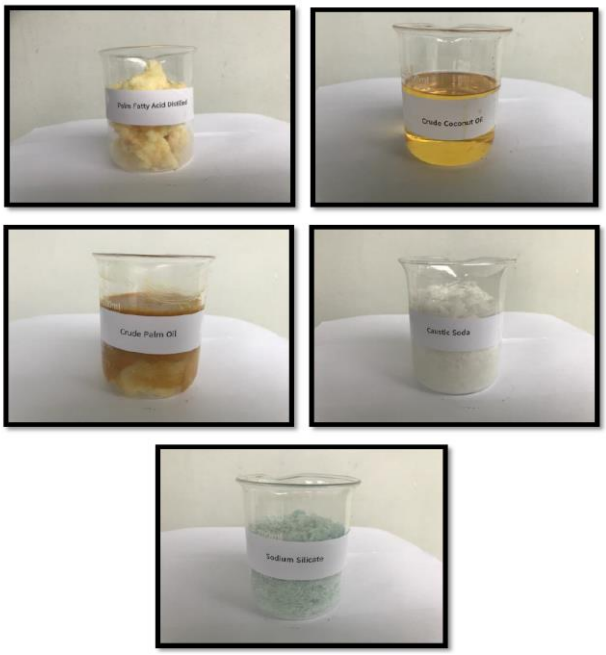


Figure 3.10 Raw Materials for Soap Manufacturing

3.5.1 CHEMICAL USAGE

အဝတ်လျှော်ဆပ်ပြာချက်လုပ်ရာ၌ အသုံးပြုသည့် Chemical အမျိုးအစား များးမှာ အောက်ပါအတိုင်းဖြစ်ပြီး ၎င်းတို့၏ MSDS အား Appendix C တွင် အသေးစိတ် ဖော်ပြထားပါသည်။

(က) Caustic Soda (ချေးချွတ်စေရန်)

(ခ) Sodium Silicate (ဆပ်ပြာမျက်နှာပြင်ပြောင်ချော စေရန်နှင့် အမြှုပ်ထွက်စေရန်)

(ဂ) Diphenyl Oxide (ရေမွှေးအကြမ်း၊ ဆီနံ့ပျောက်စေရန်)

(ဃ) Salt (ကြမ်း)(အိမ်သုံးဆား)

စဉ်	အမျိုးအမည်	ရေတွက်ပုံ	တစ်လ	တစ်နှစ်
၂။	Caustic Soda	တန်	၂၅.၂	၃၀၂.၄
၃။	Sodium Silicate	တန်	၇.၂	၈၆.၄
၄။	Salt	တန်	၁၂	၁၄၀
၅။	Diphenyl Oxide (ရေမွှေး)	တန်	၀.၂၄	၂.၈၈

3.6MACHINERIES, EQUIPMENT AND OFFICE ACCESSORIES

The main assessories to manufacture soaps are two boilers with seven tons capacity, two Mazzoni lines, eight soap manufacturing tanks, one 500 KV transformer, one 500 KV generator, nine raw materials stored tanks (Fats and Oil Tank (၆) လုံး-(ဣ)h-22' x D-22' (၂) လုံး (ခ)h-22' x D-12' (ဘ) လုံး(ဂ)h-16' x D-14' (၃) လုံးCaustic Soda Tank h-12' x D-8' (ဘ) လုံးSalt Tank h-12' x D-8' (ဘ) လုံးSodium Silicate Tank (8' x 8' x 4') (ဘ) လုံး), two cutting machines, two packing machines, one cylo, conveyor lines, two soap stamping machines, 15 raw mixer tanks and relevant offices such as Admin Office, QC office and Brifing room.

Figure 3.11 Packing Machines

Figure 3.12 Salt Tank

Figure 3.13 Steam and Water Lines

Figure 3.14 Mazzoni Lines

Figure 3.15 Raw Materials Tank

Figure 3.16 Cutting Machine

Figure 3.17 Operation Area

Figure 3.18 Caustic Soda Tank

Figure 3.19 Crude Palm Oil Tank

Figure 3.20 Raw Materials Storage Area

Figure 3.21 Soap Tank

Figure 3.22 Quality Control Sample Test Soaps

Figure 3.23 Finished Products Packing Materials

Figure 3.24 Packing Areas

Figure 3.25 Cooling Tower

Figure 3.26 Outside Water Tank

Figure 3.27 Quality Control Office

Figure 3.28 Briefting and Meeting Hall

Figure 3.29 Main Office

a. Boiler

A wood boiler is used to produce 160 psi steam for soap production. Boilers is regularly inspected by Township Boiler Inspection department. The factory performed regular maintenance of the boilers.

Figure 3.30 Boiler

ဘွိုင်လာ၌ အသုံးပြုသောလောင်စာမှာ ရော်ဘာထင်းဖြစ်ပြီး မှတ်တမ်း ဓါတ်ပုံနှင့် ခွင့်ပြုမိန့်အား ဖော်ပြအပ်ပါသည်။ Boiler stack height မှာ ပေ ၄၀ ဖြစ်ပါသည်။

Figure 3.31 Photo of Storage Condition of Boiler Wood

ပုံစံ (၄)

	ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော် စက်မှုဝန်ကြီးဌာန စက်မှုကြီးကြပ်ရေးနှင့်စစ်ဆေးရေးဦးစီးဌာန ဘွိုင်လာအသုံးပြုခွင့်လက်မှတ်	ဘွိုင်လာဥပဒေ ပုဒ်မ ၃၃၊ ပုဒ်မခွဲ(ခ)

စာအမှတ်၊ [illegible] / [illegible] / [illegible]

ဘွိုင်လာမှတ်ပုံတင်အမှတ်၊ မစ - [illegible]   ဘွိုင်လာအမျိုးအစား - [illegible]

မီးရှိန်ရမျက်နှာပြင်ဧရိယာ - 167.4 m^2 ထုတ်လုပ်သည့်နိုင်ငံနှင့်ခုနှစ် - Taiwan 2002.

ပိုင်ရှင်နှင့်လုပ်ငန်းအမည် - [illegible]

ဘွိုင်လာတည်နေရာ - [illegible]

စစ်ဆေးတွေ့ရှိချက်များ (ဖိအားခံအစိတ်အပိုင်းများ)

သံပြားအထူအပါး - ရှဲ/ဒရမ် --- [illegible] --- ထိပ်ပိတ်ပြား --- [illegible] --- ဖလူး/မီးသေတ္တာ --- [illegible] ---

ဘွိုင်လာအခြေအနေ - [illegible]   အနည်းဆုံးတွက်ချက်ရဖိအား - 13.09 kg/cm^2

ဖိအားပြနာရီချိန်ကိုက်စစ်ဆေးခြင်း - [illegible]

ပြုပြင်မှုများ -

ရေဖိအား --- [illegible] kg/cm^2 --- ဖြင့် --- [illegible] --- နေ့တွင် စစ်ဆေးပြီးဖြစ်သည်။

--- [illegible] --- Loaded --- အန္တရာယ်ကင်းဖိအားထိန်းအဆို့ရှင်ကို --- [illegible] kg/cm^2 --- ဖိအားထက်မပိုစေရ။

စစ်ဆေးခငွေကျပ် --- [illegible] --- ကို --- [illegible] --- နေ့တွင် ပေးသွင်းသည်။

ခွင့်ပြုဖိအား [illegible] kg/cm^2 --- ဖြင့် --- [illegible] --- နေ့မှ --- [illegible] --- နေ့အထိ အသုံးပြုရန်ခွင့်ပြုသည်။

၂၀ [illegible] --- ခုနှစ်၊ --- [illegible] --- လ၊ --- [illegible] --- ရက်နေ့တွင် လက်မှတ်ရေးထိုးသည်။

ပြည်နယ်/တိုင်းဒေသကြီး ဘွိုင်လာစစ်ဆေးရေးမှူး	ဒုတိယညွှန်ကြားရေးမှူး ဘွိုင်လာစစ်ဆေးရေးမှူး မွန်ပြည်နယ်-မော်လမြိုင်မြို့

ဘွိုင်လာစစ်ဆေးရေးမှူးချုပ်

Figure 3.32 Boiler Certificate

3.7PRODUCTION PROCESS

ဆပ်ပြာကို အောက်ပါနည်းစဉ်ဖြင့် ထုတ်လုပ်ပြီး တစ်နှစ်စက်လည်ပတ်ရက်မှာ ၉၆ ရက်သာ ဖြစ်ပါသည်။

ဆပ်ပြာအမျိုးမျိုးထုတ်လုပ်မှုနည်းစဉ်

၁။ **ကုန်ကြမ်းပြုပြင်ခြင်း**

(က) ဆပ်ပြာအမျိုးမျိုးတွင် အသုံးပြုသည့်အခန်းအပူချိန်၌ အခဲဖြစ်သော ထန်းအက်စစ်ဆီ(Palm Fatty Acid Distillate)၊ ဆီဖြူခဲ(Refined Bleached Deodorised Palm Stearine) ၊ ဆီအုန်းဆီအရည် (Crude Palm Oil)၊ ဆီအုန်းဆီအခဲ(Crude Palm Stearing)၊ ဖွဲနုဆီခဲ (Hydrogenated Rice Bran Oil)နှင့် အမဲဆီ(Tallow) တို့ ကိုဖိအား(Pressure) 60-80 PSI နှင့် အပူချိန် ၁၀၀° C ရှိသည့် Low Pressure Steam နှင့် တိုက်ရိုက်အပူပေး၍ ဆီတစ်မျိုးစီကိုအရည်ဖျော်ပြီး သတ်မှတ်ထားသည့် သိုလှောင် ကန်(Storage Tank)များတွင်ထည့်၍ အပူချိန် 60-80° C ထိ Close Coil Steam နှင့် ဆက်လက်အပူပေးပြီး (၂၄) နာရီ ထားပါသည်။ ယင်းနောက်ဆီတွင်ရောပါသွားသည့် (Condensed Water)များကိုဖယ်ထုတ်ရသည်။

(ခ) Caustic Soda ခဲများကို သိပ်သည်းဆ (1.35-1.40)ရရှိအောင် ရေနှင့် ဖျော်ပြီး ယင်းဖျော်ရည်များကို သိုလှောင်ကန်တွင်သိုလှောင်ထားသည်။

(ဂ) Sodium Silicate အခဲများကို သိပ်သည်းဆ (1.25-1.30)ရှိသည့် ဖျော်ရည်များရရှိအောင် Steam Pressure (60-70) PSI အသုံးပြု၍ အပူပေးပြီးအရည် ဖျော်၍ Sodium Silicate အရည်များကို သိုလှောင်ကန်တွင် သိုလှောင်ထားပါသည်။

(ဃ) ဆားများကို သိပ်သည်းဆ (1.175-1.25)ရှိသည့် ဖျော်ရည်များရရှိအောင် ရေနှင့်ဆားများကိုအချိုးကျရော၍ လေမှုတ်စက်(Air Compressure) အသုံးပြု၍ဖျော်ပြီး ပျော်ရည်များကို သိုလှောင်ပါသည်။

(င) ဆပ်ပြာအမျိုးအစားအလိုက် ဆပ်ပြာချက်လုပ်ရန်ဆီများကို ဆပ်ပြာချက် ဌာနမှ တောင်းယူသည့်အခါဆပ်ပြာအမျိုးအစားအလိုက် ရောစပ်ရမည့် ဆီများကို ရောစပ် ရသည့် အလေးချိန်အတိုင်း ချိန်ခွင် (Weighing Balance)တွင် ချိန်တွယ်၍ဆပ်ပြာချက် ဌာနသို့ပို့ပေးရသည်။

၂။ ဆပ်ပြာချက်လုပ်ခြင်း

ဆပ်ပြာအမျိုးအစားအလိုက် ကုန်ကြမ်းပြုပြင်ဌာနမှ ပေးပို့သည့် ရောစပ်ပြီး ဆီရောများကို လုံးလုံးဆူချက်နည်း(Full Boiled Process)နည်းစနစ်အရ အောက်ဖော်ပြပါအဆင့်များအတိုင်းဆောင်ရွက်ပါသည်။

(က) ဓါတ်ပြယ်ခြင်းအဆင့်(Neutralisation)

ယခင်ဆပ်ပြာချက်ရာမှ ဘေးထွက်ပစ္စည်းအဖြစ်ထွက်ရှိလာသည့် အလှဆီကြမ်းပါဝင်သောလိုင်းရည်များကို ဆပ်ပြာချက်လုပ်ရန်ရောစပ်ပြီးသည့် ဆီရောနှင့်ရော၍ သမပေးရပါသည်။ လိုင်းရည်တွင်ပါရှိနေသည့် Caustic Soda နှင့် ဆီရောများတွင် ပါရှိသည့် (Free Fatty Acid)တို့ကို ဓါတ်ပြုစေခြင်းဖြင့် ဓါတ်ပြယ်ခြင်း (Neutralisation)ပြုလုပ်ပေးခြင်းဖြစ်သည်။ ယင်းသို့ဓါတ်ပြယ်ခြင်းမပြုပါက သမပြီး လိုင်းရည်တွင် Caustic ဓါတ်များနေပါက အလှဆီကြမ်းထုတ်လုပ်ရာတွင် ကျောက်ချဉ်နှင့် အက်စစ်များပိုမိုသုံးစွဲရသည့်အပြင် Caustic Soda များ ဆုံးရှုံးမှုရှိပါသည်။ သမပြီး လိုင်းရည်ကိုအရည်အသွေးစစ်ဆေးရပါသည်။ Caustic ပါဝင်မှု (0.01% - 0.05 %) ရှိရပါသည်။ လိုင်းရည်တွင် အလှဆီပါဝင်မှုမှာ အသုံးပြုသည့် ဆီအမျိုးအစားလိုက်၍ ကွာခြားမှုရှိပါသည်။ ဓါတ်ပြယ်ခြင်းအဆင့်ကို အဝတ်လျှော်ဆပ်ပြာတစ်မျိုးတည်းသာ ဆောင်ရွက်ပါသည်။

(ခ) ဆပ်ပြာချက်လုပ်ခြင်းအဆင့်(Saponification)

ဓါတ်ပြယ်ခြင်းအဆင့်မှရရှိသည့် ဆပ်ပြာနှင့်ဆီရောများကို ဖိအား (60-80) PSI နှင့် အပူချိန် (100˚C) ရှိသည့် ရေနွေးငွေ့ကို Open Steam အနေနှင့်သုံး၍ အပူပေးပြီး Caustic Soda နှင့် ဓါတ်ပြုစေခြင်းဖြင့် ဆပ်ပြာချက်လုပ်ပါသည်။ ဆီမကျန် ရှိစေရန်နှင့် Caustic Soda မများစေရန် ဖိနှောသလင်းအညွှန်းပစ္စည်းအားသုံး၍ စမ်းသပ် သည်။

(ဂ) ဆေးကြောခြင်းအဆင့်(Washing)

ချက်လုပ်ပြီးဆပ်ပြာကို ဆားဖြင့်ဆေးကြောပေးခြင်းဖြင့် ဆပ်ပြာကို သန့်စင် စေပြီး ဆပ်ပြာချက်လုပ်ရာတွင် ဓါတ်ပြုထွက်ရှိလာသော အလှဆီကြမ်းပါဝင်သည့်လိုင်း ရည်(STRONG) ကိုရရှိစေပါသည်။ ဆပ်ပြာတွင် အလှဆီပါဝင်မှုများပါက အမွှေးနံ့ကို ထိခိုက်စေပါသည်။ ဆားရည်နှင့် အကြိမ်ကြိမ်ဆေးကြောပေးခြင်းဖြင့် ဆပ်ပြာတွင် အလှ ဆီပါဝင်မှုနည်းစေပြီး ဘေးထွက်ပစ္စည်းအလှဆီပိုမိုရရှိပါသည်။ ဆီ (၁)တန်ကို လိုင်းရည် (၁.၂) တန် ရရှိအောင်ဆေးကြောရသည်။

(ဃ) **ဆပ်ပြာညှိခြင်း(Fitting)**

ဆားရည်နှင့်ဆေးကြောပြီးသည့် ဆပ်ပြာများကို သတ်မှတ်ထားသည့် စံချိန် များနှင့် ကိုက်ညီသည့်ဆပ်ပြာသန့်ကိုရရှိစေရန် Caustic Soda၊ ရေနှင့် ဆားရည်တို့ကို မျှတ အောင်ရောစပ်ပြီး ရေနွေးငွေ့နှင့်အပူပေး၍ ပြန်လည်ခါတ်ပြုစေပြီး ချက်လုပ်ရသည်။ ၎င်းအဆင့်တွင် ဆပ်ပြာတွင် လိုအပ်သည်ထက်ပိုလျှံနေသည့် Caustic ပါဝင်မှုကို ခါတ်ခွဲစမ်းသပ် ထိန်းသိမ်းပေးရသည်။ Caustic Soda ပါဝင်မှုသတ်မှတ်ချက်မှာ (0.08%- 0.20%)ဖြစ်ပါသည်။

(c) **ဆပ်ပြာသန့်အဆင့်(Cleaning)**

ဆပ်ပြာသန့်သန့်ရရှိစေရန်အတွက် Fit လုပ်ပြီးဆပ်ပြာကို ဆပ်ပြာချက် လုပ်သည့် ဒယ်တွင် (၂၄) နာရီကြာငြိမ်ငြိမ်အအေးခံထားရသည်။ ထိုအခါဆပ်ပြာတွင် အပိုင်း (၃)ပိုင်းဖြစ်လာပါသည်။ အပေါ်ဆုံးအလွှာသည် ဆပ်ပြာသန့်ဖြစ်၍ အလယ်အလွှာ သည် အညစ်အကြေးဖြစ်ပြီး အောက်ဆုံးအလွှာသည် လိုင်းရည်များဖြစ်ပါသည်။ အပေါ် ယံလွှာဆပ်ပြာသန့်ကို နမူနာကောက်ယူ၍ အရည်အသွေးစစ်ဆေးရေးဌာနသို့ ပေးပို့ ရသည်။ ယင်းဆပ်ပြာနမူနာကို အောက်ဖေါ်ပြပါအချက်များ ခါတ်ခွဲစမ်းသပ်စစ်ဆေးရ ပါသည် -

(က) Total Fatty Matter %

(ခ) Free Alkali%

(ဂ) Sodium Chloride%

(ဃ) Glycerol %

(c) Unsaponified%

၃။ **ကုန်ချောပစ္စည်းထုတ်လုပ်ခြင်း**

(က) ဆပ်ပြာအမျိုးအစားအလိုက်ချက်လုပ်ထားသည့်ဆပ်ပြာသန့်ကို (Crutching Pot) (ဆေးစပ်အိုး)ထဲတွင် သတ်မှတ်ထားသည့် အလေးချိန်အလိုက်ထည့်ပြီး အရောင်၊ အနံ့နှင့် ခါတုပစ္စည်းများကို သတ်မှတ်ထားသည့် အလေးချိန်အတိုင်းရောစပ်ရသည်။ ထို့ နောက်သမအောင် ကောင်းစွာမွှေထားပေးရသည်။ ဆေးစပ်အိုးများတွင် ရောစပ်မှုမှန်မမှန် ကို အရည်အသွေးစစ်ဆေးရေးဌာနမှ စစ်ဆေးပေးရသည်။

(ခ) ရောစပ်ပြီးဆပ်ပြာများကို လေဟာနယ်အအေးခံအခြောက်ခံစက် (Continuous Vacuum Cooling and Drying Unit)စက်ထဲသို့ဖြတ်၍ ဆပ်ပြာ အခဲများဖြစ်အောင်ပြု လုပ်သည်။ ယင်းဆပ်ပြာ အအေးခံအခြောက်ခံစက်သည် ရေတွန်းအား (40-45)PSI နှင့် Steam Pressure (120-125) PSI လိုအပ်ပါသည်။ ရေအေး(Chilled Water)၏ အပူချိန်သည် (10-15)° C

ခန့်ရှိရပါသည်။ သို့မှသာလေဟာနယ် Vaccum 76 Cm/Hg ရရှိ၍ ဆပ်ပြာရည်များသည် ချက်ခြင်းခဲ၍ ဆပ်ပြာသားကျစ်လစ်ပြီး အရည်အသွေး ကောင်းသည့် ဆပ်ပြာရရှိပါသည်။

(ဂ) ထို့နောက်ထွက်ရှိလာသည့် ဆပ်ပြာများကို ဓါးစက် (Cutter) နှင့် သတ်မှတ်ထားသည့်အရွယ်အစားဖြတ်ခြင်း၊ တံဆိပ်ရိုက်ခြင်း၊ စက္ကူပတ်ခြင်း၊ သေတ္တာများထဲသို့သတ်မှတ်ထားသည့် အရေအတွက်များ ထည့်သွင်းခြင်းနှင့် ပလပ်စတစ်ကြိုး ပတ်ခြင်း (သို့မဟုတ်) Opp Tape နှင့် ထုပ်ပိုးခြင်းများပြုလုပ်၍ သိုလှောင်ရေးဌာနသို့ အပ်ပါသည်။

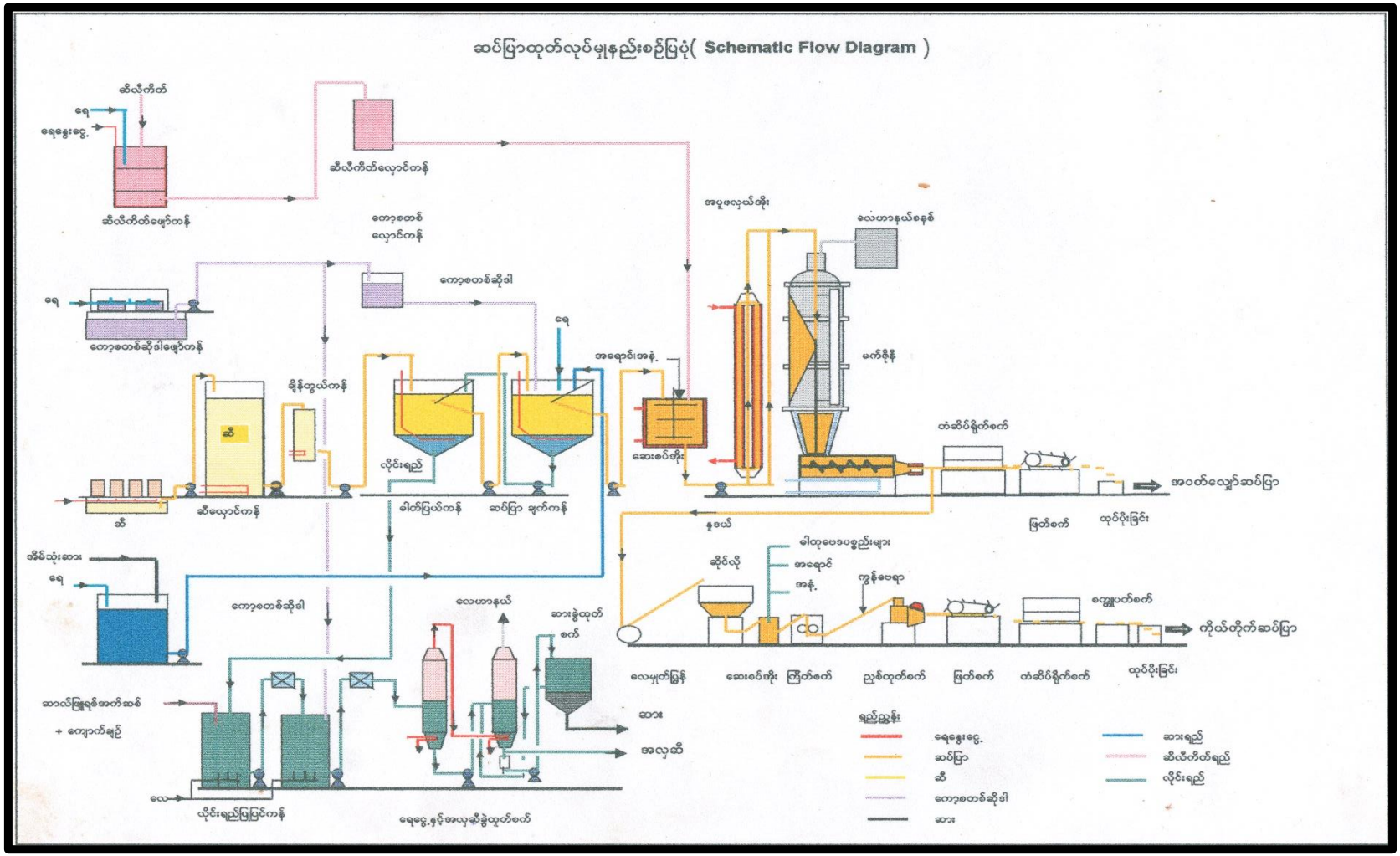


Figure 3.33 Process Activities Flowchart

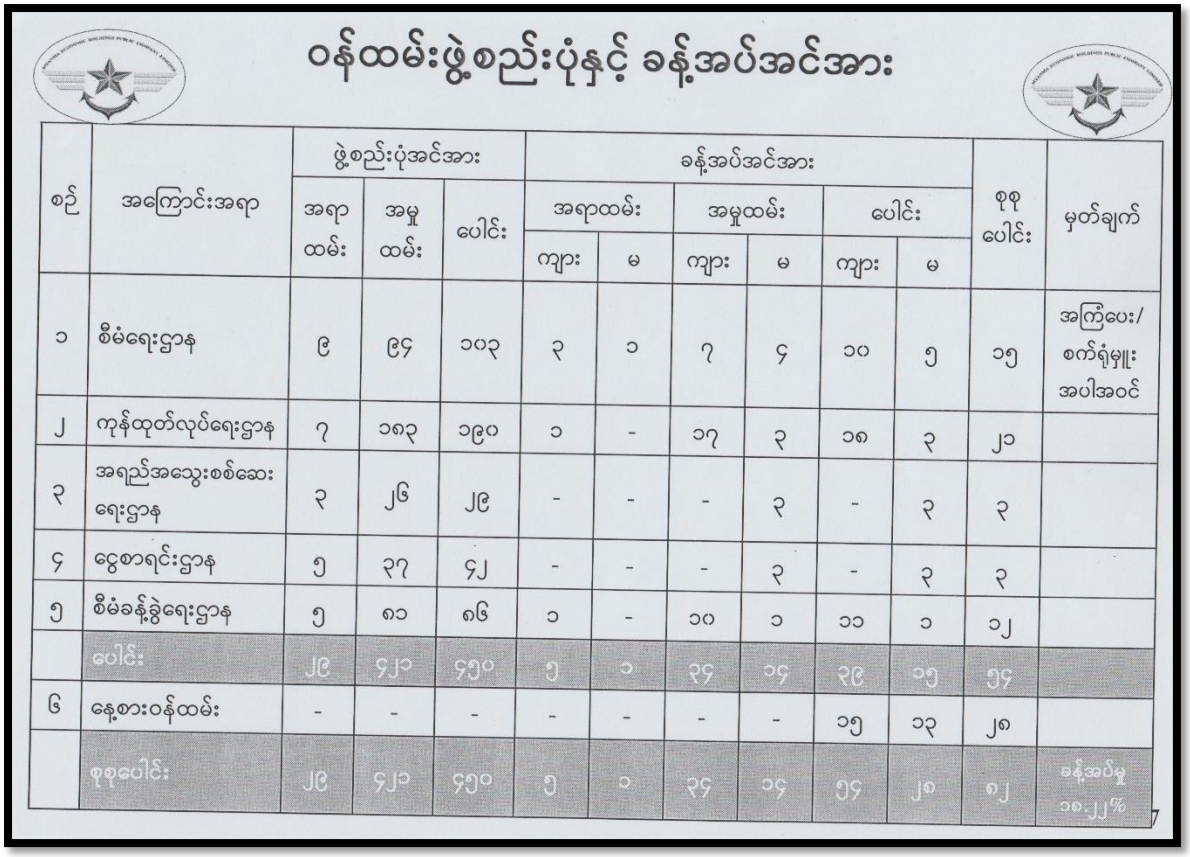
3.8RESOURCE REQUIREMENTS FOR PROJECT MANAGEMENT

3.8.1 HUMAN RESOURCE

The total workforce of the Padonmar Soap factory is 80 including 52 permanent staff and 28 daily wage earners with 52 men and 28 women staff. The factory employed mainly locals from nearby villages and towns.

The Factory Manager oversees and recommends the overall production processes. Assistant Factory Manager is responsible for managing the staff and handling administrative works.

Table 3.5 List of Staff per Section



ဝန်ထမ်းဖွဲ့စည်းပုံနှင့် ခန့်အပ်အင်အား

စဉ်	အကြောင်းအရာ	ဖွဲ့စည်းပုံအင်အား			ခန့်အပ်အင်အား						စုစုပေါင်း	မှတ်ချက်
		အရာထမ်း	အမှုထမ်း	ပေါင်း	အရာထမ်း		အမှုထမ်း		ပေါင်း			
					ကျား	မ	ကျား	မ	ကျား	မ		
၁	စီမံရေးဌာန	၉	၉၄	၁၀၃	၃	၁	၇	၄	၁၀	၅	၁၅	အကြံပေး/ စက်ရုံမှူး အပါအဝင်
၂	ကုန်ထုတ်လုပ်ရေးဌာန	၇	၁၈၃	၁၉၀	၁	-	၁၇	၃	၁၈	၃	၂၁	
၃	အရည်အသွေးစစ်ဆေးရေးဌာန	၃	၂၆	၂၉	-	-	-	၃	-	၃	၃	
၄	ဂွေစာရင်းဌာန	၅	၃၇	၄၂	-	-	-	၃	-	၃	၃	
၅	စီမံခန့်ခွဲရေးဌာန	၅	၈၁	၈၆	၁	-	၁၈	၁	၁၁	၁	၁၂	
	ပေါင်း	၂၉	၄၂၁	၄၅၀	၅	၁	၃၄	၁၄	၃၉	၁၅	၅၄	
၆	နေ့စားဝန်ထမ်း	-	-	-	-	-	-	-	၁၅	၁၃	၂၈	
	စုစုပေါင်း	၂၉	၄၂၁	၄၅၀	၅	၁	၃၄	၁၄	၅၄	၂၈	၈၂	ခန့်အပ်မှု ၁၈.၂၂%

3.8.2 WORKING HOUR

Since PADONMAR SOAP FACTORY operates a small scale production, the factory runs only two days per week for production processes. The operation hours is from 8.30 a.m to 4.30 p.m.

The productions capacity of one Mazzoni line per hour is five tons and 22 days per month, however, actual production of soaps from each Mazzoni line is 2.5 tons and only eight days per month. Therefore, only 96 days per year is existing working days of the factory.

When the production was halted, the factory performed maintenance, cleaning and inspection of machines and equipment.

3.9WATER AND ENERGY REQUIREMENTS

3.9.1 ELECTRICITY

11 kv from Mottama sub station to the factory sub-station. 400 V to operation and 220 v to offices and staff quarter.

Electricity source of the factory operations and the staff residents is from the generators. One set of 500 KVA generators is mainly used for the production processes. Gen set is used when city electricity is cut. Full load of 500 KVA transformer produces 180 units /hour and 1440 units / 8 hours for overall operations. 25 units/hour is used for domestic consumption.

The generator sets exist in the separated generator room. Adjacent to the gen room is the factory's transformer control room. Generator rooms and gen sets are show in Figure 3.34.

11 gallons/ hour is used for generator.

Figure 3.34 Sub Station and Generator Room

3.9.2 WATER SUPPLY

6 tub wells within the factory provide operation and domestic water use. From the tube wells, water is raised to the 13,000 gallons and 5000 gallons overhead water storage tank by using a motor pump. The ground water storage tank 32000 gallons stores boiler water. The water supply for the production areas and the residents are distributed through the pipes from the overhead tank.

ရေသုံးစွဲမှုပမာဏ

(က)	လုပ်ငန်းသုံး	=	၁၀၀၀၀ ဂါလန်
(ခ)	အထွေထွေသုံး	=	၄၀၀ ဂါလန်
(ဂ)	လိုင်းခန်းအသုံး	=	၂၅၀၀ ဂါလန်
(ဃ)	ဘွိုင်လာအသုံး	=	၂၀၀၀ ဂါလန်
	စုစုပေါင်း	**=**	**၁၄၉၀၀ ဂါလန်**

ရေဂါလန် ၁၂၀၀၀ အား အဝိစိ ၆ တွင်းမှ စုပ်ယူပြီး Ground Tank (အုတ်ကန်)မှတဆင့် မြေပြင်မှအမြင့်ပေ ၆၀ ရှိ ဂါလန် ၁၂၀၀၀ ဆံ့ Tank နှင့် ဂါလန် ၃၂၀၀ ဆံ့ Tank နှစ်လုံးဖြင့် သိုလှောင်အသုံးပြုပါသည်။ မီးသတ်ကန် သီးခြားထားရှိခြင်းမရှိသော်လည်း လိုအပ်ပါ က မြေအောက်ကန် မှ ရေကို အရေးပေါ် အခြေအနေ အတွက် အသုံးပြုနိုင်ပါသည်။

Table 3.6 Monthly Water Requirements for the facilities

No.	Facility	Gallons
1	Production	10000
2	General	400
3	Domestics water for Residents	2500
4	Boiler	2000
	Total	149000

Figure 3.35 Outdoor Over Head Tanks

3.9.3 DRAINAGE

To facialitate to discharge the rain water, the Factory constructed concrete drainage system around the factory. The drainage system is fully built with concrete. Rain water is collected by gutters of the roofs and transported the water into the drains around the factory buildings.

Final runoff water from the internal drain is released outside the factory. The pH discharged water from the drain was around 7. The final processed water is released into the external treatment ponds.

Figure 3.36 The Concreate drainage Systems within the factory areas

Figure 3.37 The Concreate drainage Systems outside the factory area

3.10 PRODUCTS AND PRODUCTION CAPACITY

The major product from the processing are soap bar and tube. The method of process is full boiled process.

The factory production capacity is 1878.80 tons of bar soap/year and 1072.26 ton of tube soap/year.

The entire process mainly uses organic materials and partially use nonhazardous chemicals.

By Product

ဘေးထွက်ပစ္စည်းလိုင်းရည်(၁)ရက်ထွက်ရှိမှုပမာဏ စက်ရုံအနေဖြင့် (၁)လ လျှင် (၈)ရက်သာ ထုတ်လုပ် မှု ဆောင်ရွက်ပါသဖြင့် ဘေးထွက်ပစ္စည်းလိုင်း ရေသည် (၈)ရက်သာထွက်ရှိသဖြင့် (၁)ရက် ပျှမ်းမျှ 1100 gall ထွက်ရှိပါသည်။

3.10.1 SALE SYSTEM

Padonmar Soap factory sells washing soaps to laocals and military use. The factory delievered the products to the buyers at the nearby townships. In general, total 52.22 tons of bar soap was sold as military supply and bar sopas 204.50 tons and tube soaps 1021.34 tons were distributed to local markets at Yangon division, Mandalay division, Bago division, Sagin division, Irrawaddy division, Mon and Kayin states.

Depending on the distance, products are transported to other cities via cargo trucks. Sale and Marketing department is mainly responsible for local market research and marketing.

Table 3.7 Lists of Soaps Sales between May 2017 and March 2019

(၂၀-၅-၂၀၁၇)ရက်နေ့မှ (၃၁-၃-၂၀၁၉)ရက်နေ့အထိ
ဆပ်ပြာထုတ်လုပ်မှု၊ ရောင်းချမှုနှင့် လက်ကျန်အခြေအနေ

စဉ်	အမျိုးအမည်	ထုတ်လုပ်မှု		ပြင်ပရောင်းချမှု		ဆဲသ/ခဝါရောင်းချမှု ဝန်ထမ်းသက်သာရောင်းချမှု		စက်စန်းဂိုဒေါင်လက်ကျန် စက်ရုံလက်ကျန်	
		သေတ္တာ	တန်	သေတ္တာ	တန်	သေတ္တာ	တန်	သေတ္တာ	တန်
၁	အတောင့်	၁၀၀၂၁၅	၁၈၇၈.၈၀	၁၀၉၁၀	၂၀၄.၅၄	၄၃၁၇၀	၈၀၉.၃၄	၄၉၇၉	၉၃.၃၄
						၁၆၃၅၀	၃၀၆.၅၂	၂၄၈၀၆	၄၆၅.၀၆
၂	အခဲ	၄၈၄၇၇	၁၀၇၂.၂၆	၄၆၁၇၅	၁၀၂၁.၃၄	-	-	၈၁၄	၁၈.၀၀
						-	-	၁၄၈၈	၃၂.၆၂
	ပေါင်း	၁၄၈၆၉၂	၂၉၅၁.၀၆	၅၇၀၈၅	၁၂၂၅.၈၈	၄၃၁၇၀	၈၀၉.၃၄	၅၇၃၃	၁၁၁.၃၄
						၁၆၃၅၀	၃၀၆.၅၂	၂၆၂၉၄	၄၉၇.၉၈

3.11 WASTE TYPES OF THE FACTORY

Padonmar Soap factory is a small scale soap producer based on the quantity of soaps production per month. It can be considered that the amount of waste generations from the process is likely small and controallble with effective waste managemnt systems.

In general, soap production creates solid soap wastes and semi-liquid wastes. The generated solid wastes include packing wastes and soap pieces. The liquid wastes discharged from the production is mainly line wastes.

3.11.1 SOLID WASTE

The main solids wates generated from the production activities are soap pieces, unqualified products and packing wastes.

Factory practises reducing and recycling of waste management.

စီမံကိန်းလည်ပတ်သည့်ကာလအတွင်း soap fragments နှင့် အညစ်အကြေးပါသည့် ဆပ်ပြာwaste များထွက်ရှိပြီး စွန့်ပစ်အစိုင်အခဲ တစ်ရက်ထွက်ရှိမှုပမာဏ ၂၀၀ kg ခန့်ရှိပါသည်။ အဆိုပါ soap fragments စွန့်ပစ်အစိုင်အခဲသည် recycle purpose အဖြစ် ဆပ်ပြာချက်ကန်အတွင်းသို့ ပြန်ထည့်၍ ချက်လုပ်အသုံးပြုပါသည် (section 3.11.1.1) တွင် ပုံနှင့်တကွ ဖော်ပြထားပါသည်။

Boiler မှ ပြာထွက်ရှိမှုပမာဏမှာ စက်လည်ပတ်သည့်ရက် ၁ ရက်လျှင် ၁ တင်းခွဲအိတ် ၄ အိတ် ခန့်ထွက်ရှိပြီး ၄င်းတို့ကို မြေတွင်းထဲတွင် ထည့်၍ သိုလှောင်စွန့်ပစ်ခြင်းဖြင့် စီမံခန့်ခွဲပါသည်။

3.11.1.1 STORAGE AND DSIPOSAL OF SOLID WASTES

Extra soap fragments released from the molding are reused in the process. The deposites from the lime water are collected in the filteration ponds. The accumulated wastes in the ponds are removed yearly witth machines.

Figure 3.38 Reused Solid Wastes

3.11.1.2 SOLID WASTE DURING DECOMMISSION ACTIVITIES

During this phase the plant site will be decommissioned and closed. Works involve the removal of machinery, equipment, vehicles, the dismantling and tearing down of building and structures. For existing installations, where potential problems have been identified, putting in place a programme of improvements.

Movable equipment would be moved to another site location owned by **MEHPCL**. Movable equipment both motorized such as motor vehicles, forklifts, etc. and non - motorized such as furniture, computers, and other office equipment, etc. would be moved to another site.

Once all usable equipment and facilities have been removed from site, the next step would be the dismantling of the remaining equipment and segregation of components into various material types for sale as scrap. There is provision for the draining and cleaning-out of vessels and pipework prior to dismantling. Dismantling activities for structure for machine and tanks will occur after project implementation. The dismantled material shall be stored in isolated units. Once the dismantling exercise has been completed the materials will be sold as scrap to the various scrap users.

During the initial closure stage, the generator shall be used for on-going activities. At the end of the closure phase, the remaining generator will be removed from the site.

Where buildings and structures (buildings, dormitory, storage shed) to be removed, they will be demolished with reusable or recyclable waste removed from site. All fixed and mobile equipment with marketable value will be removed from site and sold or reused wherever possible.

Padonmar Soap Factory shall focus on maximising the opportunities for reuse of factory properties. Some useable materials shall be contributed to the nearest community. If the wastes cannot be reused or recycled, then they will be disposed of in an appropriately landfill facility.

3.11.2 LIQUID WASTES

Lime liquid wastes are discharged from a soap pan as the final process.

3.11.2.1 STORAGE AND DISPOSAL OF LIQUID WASTES

လုပ်ငန်းမှစွန့်ထုတ်ရေအား Cooling Tower တွင် အအေးခံ၍ Circulation စနစ်ဖြင့် ပြန်လည်အသုံးပြုပါသည်။ အိမ်သုံးစွန့်ပစ်ရေ အနည်းငယ်သာရှိပြီး လိုင်းခန်းဧရိယာသည် ၅၀.၇၃ ဧရိယာရှိပါသဖြင့် မြေပြင်၌ပင် ခမ်းခြောက်သွားပါသည်။

Lime wastes are transported into to the 4 treatment ponds through the drains.

In the first earth pond, the pumped sludges are separated as liquid layer at the top and solid layer at the bottom. The accumulated sludges at the first pond are excavated yearly by using machine. After removing the solid particles, the liquid effluent turns into activated liquid fertilizers.

The proposed new pond are 100x40x10, new two 70x40x10 and firsrt pond 80x80x10. Second is 95x95x10.

The liquid at the top of the pond is transported into second earth pond. The Factory is considerably a small scale producer and accumulated little or zero liquid effluent at the final treatment pond. The small shrubs and vegetations are recorded in the wastewater treatment ponds. (Figure 3.40 to 3.43).

HTP lining installation will be managed by Modern Pioneer Industriual Group Co., Ltd. 2 K – Tech Engineering Co., Ltd will be responsible for new waste water treatment factory.

License for Use of Chemicals and relevant materials is already obtained.

လုပ်ငန်းမှ ထွက်ရှိသည့် စွန့်ပစ်ပစ္စည်းလိုင်းရေပမာဏ = တစ်လလျှင် ၈ ရက်သာ စက်လည်ပတ်သဖြင့် ၁ လတွင် စွန့်ပစ်ပစ္စည်းလိုင်းရေ ၈ ရက်သာ ထွက်ရှိပြီး ၁ ရက် လျှင် ဂါလန် ၂၀၀ (၄ ပီပါ)ခန့် ထွက်ရှိပြီး မစွန့်မီ ဆပ်ပြာချက်ကန်တွင် ခါတ်ပြယ်သည့် အထိ ၃ ရက်ခန့် ယာယီသိုလှောင်ပြီးမှသာ ရေဖြင့် ရောွ၍ ကွန်ကရစ်မြောင်းလိုင်းမှ တဆင့် စွန့်ပစ်ကန်ထဲသို့ စွန့်ပစ်စေခြင်းဖြစ်ပါသည်။ စွန့်ပစ်ပမာဏ

နည်းပါသဖြင့် နွေရာသီနှင့် ဆောင်းရာသီတွင် နေပူရှိန်ကြောင့် ကန်ထဲ၌ သာ ခမ်းခြောက်သွားပါသည်။ မိုးရာသီတွင် မိုးရေနှင့်ရောရွဲ ကန် ၄ ကန်ကို မြောင်းစနစ်ဖြင့် သိုလှောင်ထားပါသည်။

လုပ်ငန်းမှစွန့်ထုတ်ရေအား Cooling Tower တွင် အအေးခံ၍ Circulation စနစ်ဖြင့် ပြန်လည်အသုံးပြုပါသည်။ အိမ်သုံးစွန့်ပစ်ရေ အနည်းငယ်သာရှိပြီး လိုင်းခန်းဧရိယာသည် ၅၀.၇၃ ဧရိယာရှိပါသဖြင့် မြေပြင်၌ပင် ခမ်းခြောက်သွားပါသည်။

Figure 3.39 Filtration ponds

Figure 3.40 First Water treatment pond

Figure 3.41 Second Water treatment pond

Figure 3.42 Third Water treatment pond

Figure 3.43 Final Water treatment pond

3.11.3 HAZARDOUS WASTE

လုပ်ငန်းမှ ဘေးအန္တရာယ်ရှိ စွန့်ပစ်ပစ္စည်း အဖြစ် လုပ်ငန်းမှ ထွက်ရှိသည့် စွန့်ပစ်ပစ္စည်းလိုင်းဖြစ်ပြီး ရေပမာဏအားဖြင့် တစ်လလျှင် ၈ ရက်သာ စက်လည်ပတ်သဖြင့် ၁ လတွင် စွန့်ပစ်ပစ္စည်းလိုင်းရေ ၈ ရက်သာ ထွက်ရှိပြီး ၁ ရက် လျှင် ဂါလန် ၂၀၀ (၄ ပီပါ)ခန့် ထွက်ရှိပြီး မစွန့်မီ ဆပ်ပြာချက်ကန်တွင် ခါတ်ပြယ်သည့် အထိ ၃ ရက်ခန့် ယာယီသိုလှောင်ပြီးမှသာ ရေဖြင့် ရော၍ ကွန်ကရစ်မြောင်းလိုင်းမှ တဆင့် စွန့်ပစ်ကန်ထဲသို့ စွန့်ပစ်စေခြင်းဖြစ်ပါသည်။

Disposing

မိုးရာသီတွင် မိုးရေနှင့်ရော၍ ကန် ၄ ကန်ကို မြောင်းစနစ်ဖြင့် သိုလှောင်ထားပါသည်။ နေရောင်ဖြင့် အငွေ့ပြန်ခြင်းနည်းဖြင့် စီမံခန့်ခွဲထားပြီး စွန့်ပစ်ပမာဏ နည်းပါသဖြင့် နွေရာသီနှင့် ဆောင်းရာသီတွင် နေပူရှိန်ကြောင့် ကန်ထဲ၌ သာ ခမ်းခြောက်သွားပါသည်။ ထို့ကြောင့် အဆိုပါ စွန့်ပစ်ပစ္စည်းသည် ပြင်ပသို့ ထွက်ရှိခြင်းမရှိပါ။

Figure 3.44 Management of Hazardous Waste

3.11.4 OCCUPATIONAL HEALTH AND SAFETY

Workers are provided Uniforms and Personal Portective Equipement based of the assigned tasks. (Figure 3.45). Basic Fire Fighting training, Boiler operator training, Boiler inspection and machine operator training will provide to the relevant workers.

Warning signages are displayed at designated areas. Workers are informed potential hazards and risks associated with assigned tasks by Supervisors before commencement of work.

Assembly point is designated near to the main meeting room. The canteen and dinning room are provided for the staff. (Figure 3.46).

Figure 3.45 Issued Uniforms and PPE

Figure 3.46 Staff Canteen

4. LEGAL REQUIREMENT

4.1 ENVIRONMENTAL POLICY OF THE COMPANY

Top management of Padonmar Soap factory develops Quality and Environmental policy. The Factory is committed to

- Supply consistent quality products to ensure customers' satisfaction;
- Implement and maintain the requirements of Corporate's Environmnetal, Health & Safety;
- Comply with the legal requirements about Environment, Health and Safety;
- Prevent pollution by minimizing the adverse impacts to the environment and people health and safety, saving natural resources and reducing, reusing and recycling all possible waste; and
- Review periodically and involve our people in the Factory's environmental and safety performances.

4.2 HEALTH POLICY

Since Padonmar Soap factory is a small scale producer with totoal 52 permenant and 28 daily wages workers, the Factory does not have an In-House healthcare facilitiy. The staff, however, are provided with emergency first aid boxes, medical leaves and social welfares in accordance with the government guidelines.

4.3 NATIONAL LAWS AND REGULATIONS

The National laws and regulations for the environmental protection applicable to the project are compiled and presented. The Constitution of the Republic of the Union of Myanmar (2008) is the main concern for the environment conservation in Myanmar. The others are as follows:

EMP team observed thoroughly the legal requirements that Padonmar Soap Factory shall comply with are as follows:

1. Occupational Safety and Health Law (2019)
2. Environmental Conservation Law (2012)

3. Environmental Conservation Rules (2014)
4. The Conservation of Water Resources and River Law, 2nd October (2006)
5. Myanmar Investment Law (2016)
6. Myanmar Investment Rule (2017)
7. The Import Export Law (2012)
8. Building Regulations (2014)
9. The Amended Law for Plant Act (2016)
10. Myanmar Fire Brigade Law (2015)
11. National Environmental Quality (Emission) Guidelines (No. 615/ 2015) (29 Dec, 2015)
12. Land Acquisition Law (2015)
13. The Payment of Wages Law 2016 (Jan 2016)
14. The Minimum Wages Law (2013)
15. The Social Security Law (2012)
16. The Leave and Holiday Act, 1951(Law Amended July,2014)
17. The Settlement of Labor Dispute Law, 2012 (Amendment, 2014)
18. Workman Compensation (Amendment) Act (2005)
19. The Public Health Law
20. Prevention and Control of Communicable Diseases Law (1995)
21. The related laws enacted by the respected Regional Hlauttaw and rules issued by respected Regional Government
22. The Water Power Act (1927)
23. The Labour Organization Law (2011)
24. The Labour Organization Rules (2012)
25. Motor Vehicle Rules (1989)
26. Vehicle Laws(1964)
27. Road and Inland Water Transport Law(1963)
28. Myanmar Forest Law (1995)
29. National Health Policy (1993)
30. Underground Water Act (1930)
31. National Land Use Policy(2016)
32. Inland Stream Vessel Act (1917)
33. Laws amending the 1951 Factory Acts
34. Explosive Substances Act (1908)
35. Emergency provision Act (1950)
36. Environmental Impact Assessment Procedure (2015)

37. The Private Industrial Enterprise Law, 1990
38. The Prevention of Hazard from Chemical and Related
39. Boilar Law (2015)
40. Other Applicable Laws, Acts, Standards and Guidelines

Moreover, the Plants ensures to meet the Requirements of Applicable Licenses and Permits.

The following references were used in assessing and evaluating the focal environmental impacts relating to the Plant activities.

Water Quality:

- WHO Water Quality Standard, World Bank Standards,
- Yangon City Development Committee Standards
- Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges (General Application) National Environmental Quality Guidelines

Air Quality:

- Air Emission Level of National Environmental Quality (Emission) Guidelines

Soil Quality:

- Canada Environmental Parameters Guidelines for Human Health and Environment

Noise Level:

- Noise Level of National Environmental Quality (Emission) Guidelines

Safety, Health and Environment:

- Factory Acts, Myanmar
- Occupational Health and Safety Acts, Ministry of Labour, Myanmar
- General Environmental, Health and Safety Guidelines, IFC

4.4OTHER ACTS, STANDARDS AND GUIDELINES

The Factory complies with the principal organization, **MYANAMA ECONOMIC HOLDING PUBLIC COMPANY LTD (MEHPCL)'s Rules and Regulations. The** Factory also abides the relevant regulations and guidelines issued by the Regional Government, Tanintharyi Region Government. The Factory has obtained the madantory permit and licences required to operate the soap production processes.

4.4.1 ENVIRONMENTAL STANDARDS AND GUIDELINES

EMP team will take following references in assessing and evaluating the focal environmental sectors of EMP report for Padonmar Soap factory.

Water Quality:

- WHO Water Quality Standard, World Bank Standards,
- Yangon City Development Committee Standards
- Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges (General Application) National Environmental Quality Guidelines

Air Quality:

- Air Emission Level of National Environmental Quality (Emission) Guidelines

Soil Quality:

- Canada Environmental Parameters Guidelines for Human Health and Environment

Noise Level:

- Noise Level of National Environmental Quality (Emission) Guidelines

Safety, Health and Environment:

- Factory Acts, Myanmar
- Occupational Health and Safety Acts, Ministry of Labour, Myanmar

4.5 GOVERNING PARAMETERS

4.5.1 WASTEWATER QUALTIY

- Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges (General Application) National Environmental Quality Guidelines
- Wastewater is compared with NEQEG 2.3.1.6 for Vegetable Oil Production and Processing.

Table 4.1 Effluent Levels (NEQEG 2.3.1.6)

Parameter	Unit	Guideline Value
5-day Biochemical oxygen demand	mg/l	50
Active ingerdients/ Antigiotics	To be determined on a specific basis	
Chemical Oxygen Demand	mg/l	250
Oil and Grease	mg/l	10
pH	S.U[a]	6~9
Temperature Increase	˚C	<3[b]
Total coliform bacteria	100 ml	400
Total mitrogen	mg/l	10
Total phosphorus	mg/l	2
Total suspended solida	mg/l	50

[a] standard unit

[b] At the edge of a scientifically established mixing zone which takes into account ambient water quality, receiving water use, potential receptors and assimilative capacity: when the zone is not defined, use 100 meters form the point of discharge

4.5.2 AIR QUALITY EMISSION STANDARDS

Air quality (General Application) National Environmental Quality Guidelines

Air quality is compared with NEQEG 2.3.1.6 for Vegetable Oil Production and Processing.

Table 4.2 National Air Emissions (General Guideline)

Parameter	Averaging Period	Guidelines Value µg/m³
Nitrogen Dioxide	1-year 1-hour	40 200
Ozone	8-hours daily maximum	100
Particular matter PM_{10}[a]	1-year 24-hour	20 50
Particular matter $PM_{2.5}$[b]	1-year 24-hour	10 25
Sulphur Dioxide	24-hour 10-minute	20 500

a Particulate matter 10 micrometers or less in diameter
b Particulate matter 2.5 micrometers or less in diameter

Table 4.3 Air Quality Standards (NEQEG 2.3.1.6)

Parameter	Unit	Guideline Value
Dust	mg/Nm^{3a}	10 (dry dust) 40 (wet drust)
Hexane/ Volatile organic compounds	mg/Nm^3	100
Chloride	mg/Nm^3	Animal fat 1.5
Chlorine	mg/Nm^3	Castor 3
Copper and compounds	mg/Nm^3	Rape seed 1
Fluoride	mg/Nm^3	Sunflower seed 1
Hydrogen sulfide	mg/Nm^3	Soya beans (normal crush) 0.8
Lead, cadmium and their compounds	mg/Nm^3	Soya beans (white flakes) 1.2
		Other seeds and vegetable matter 1.5 (fractionation and vegetable matter 4 (degumming)

a Milligrams per normal cubic meter at specified temperature and pressure
b Refers to total solvent loss

4.5.3 NOISE

Noise emission (General Guidelines) National Environmental Quality Guidelines

Table 4.4 Noise Level Standard

Receptor	One Hour LAeq (dBA)[a]	
	Daytime 07:00-22:00 (10:00-22:00 for Public holidays)	**Nighttime 22:00-07:00 (22:00-10:00 for Public holidays)**
Residential, Institutional, educational	55	45
Industrial, commercial	70	70

[a] Equivalent continuous sound level in decibels

4.6INTERNATIONAL GUIDELINE AND STANDARD

Water Quality

- World Health Organization Guidelines (WHO)

Air Quality

- World Health Organization Guidelines (WHO)
- The American Conference of Governmental Industrial Hygienists (ACGIH)
- National Ambient Air Quality Standard (NAAQS)
-

Table 4.5 National Ambient Air Quality Standard (NAAQS)

Parameter	Averaging Period	Guidelines Value µg/m³
Particular matter $PM_{2.5}$	1-year 24-hour	12 **µg/m³** 35 **µg/m³**
Particular matter PM_{10}	1-year 24-hour	- 150 **µg/m³**
Ozone (O3)	8-hours 1 hour	0.070 ppm -
Nitrogen Oxides (NOx)	1-year 1-hour	0.053 ppm 0.100 ppm
Sulfur Oxides (Sox)	1-year 24-hour	- -
Carbon Monooxide (CO)	8-hour 1-hour	9 ppm 35 ppm

Safety and Health:

- Environmental, Health and Safety Guidelines for Vegetable Oil and Processing.
  ((IFC)ENVIRONMENTAL, HEALTH, AND SAFETY GUIDELINES *"Vegetable Oil Production and Processing")*

Noise

– IFC General Guideline

- Environmental, Health, and Safety (EHS) Guidelines: General EHS Guidelines: Occupational Health and Safety : www.ifc.org/ehsguidelines (https://www.ifc.org/wps/wcm/connect/1d19c1ab-3ef8-42d4-bd6b-cb79648af3fe/2%2Boccupational%2Bhealth%2Band%2Bsafety.pdf?MOD=AJPERES&CVID=nPtgxyx)

No employee should be exposed to a noise level greater than 85 dB(A) for a duration of more than 8 hours per day without hearing protection.

Table 4.6 Noise Limits for Various Working Environments

Location /activity	Equivalent level $LA_{eq,8h}$	Maximum $LA_{max,fast}$
Heavy Industry (no demand for oral communication)	85 dB(A)	110 dB(A)
Light industry (decreasing demand for oral communication)	50-65 dB(A)	110 dB(A)
Open offices, control rooms, service counters or similar	45-50 dB(A)	-
Individual offices (no disturbing noise)	40-45 dB(A)	-
Classrooms, lecture halls	35-40 dB(A)	-
Hospitals	30-35 dB(A)	40 dB(A)

- OSHA Occupational Noise Exposure
Occupational Safety & Health Administration (United States Department of Labor)
https://www.osha.gov/noise/standards

Table 4.7 Permissible Noise Exposure by OSHA

Permissible Noise Exposures

Comparison of Duration Per Day in Hours to Allowable Sound Level in dBA (Slow-Response SPL)

Duration per day (hours)	Sound level (dBA, slow response)	PEL = 90 dBA (TWA), or 100% Dose
8	90	
6	92	
4	95	
2	100	
1	105	
½	110	
0.25	115	

5. BASELINE ENVIRONMENTAL AND SOCIAL QUALITY

The study area is located in the Mon State, one of the fifteen administrative regions of the Republic of the Union of Myanmar. The Mon State is located in the southern part of Myanmar. Location of Mon State is shown in Figure 5.1 and Padonmar Soap Factory is situated in the southern part of Paung Township. The location of study area is shown in Figure 5.1. The key features of Paung Township were explained in the following sections.

5.1 BACKGROUND HISTORY OF PAUNG TOWNSHIP

လုကျ နှင့် ဝါဒ ရသေ့ညီနောင် နှစ်ပါးတို့၏ လျှောက်ထားချက်အရ မြတ်စွာဘုရားထံမှ ဆံတော်တစ်ဆူ ဆီကို ချီးမြှင့်ရရှိခဲ့သဖြင့် ၄င်းဆံတော်ရှင် (၂)ဆူကို ပေါင်းပြီးယခုပေါင်မြို့လယ်တွင် ဘုရားတည်ထားကိုးကွယ် ခဲ့ရာမှ ယင်းဘုရားကြီးကို ကျိုက်ပေါင်းဘုရားဟု အမည်ခေါ်တွင်ရာမှ ပေါင် ဟု ခေါ်ဆိုလာရခြင်း ဖြစ်ပါသည်။ ပေါင်မြို့နည်သည် ပြည်ထဲရေးဝန်ကြီးဌာန၏ (၇-၇-၁၉၇၂) ရက်စွဲပါစာအမှတ် ၁၀၃/၃၄/စိတ်(၁) ဖြင့် ဖွဲ့စည်းခဲ့ပါသည်။

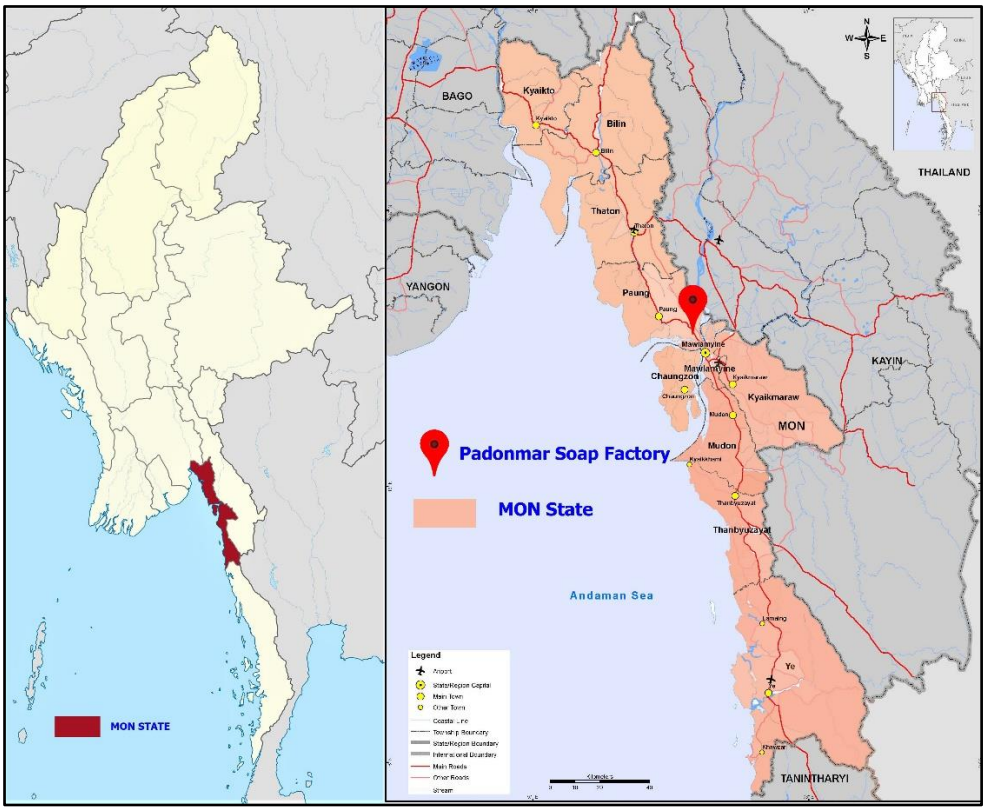


Figure 5.1 Location of Mon State in Myanmar and Location of Study Area

Figure 5.2 Map of Thaton District of Mon State

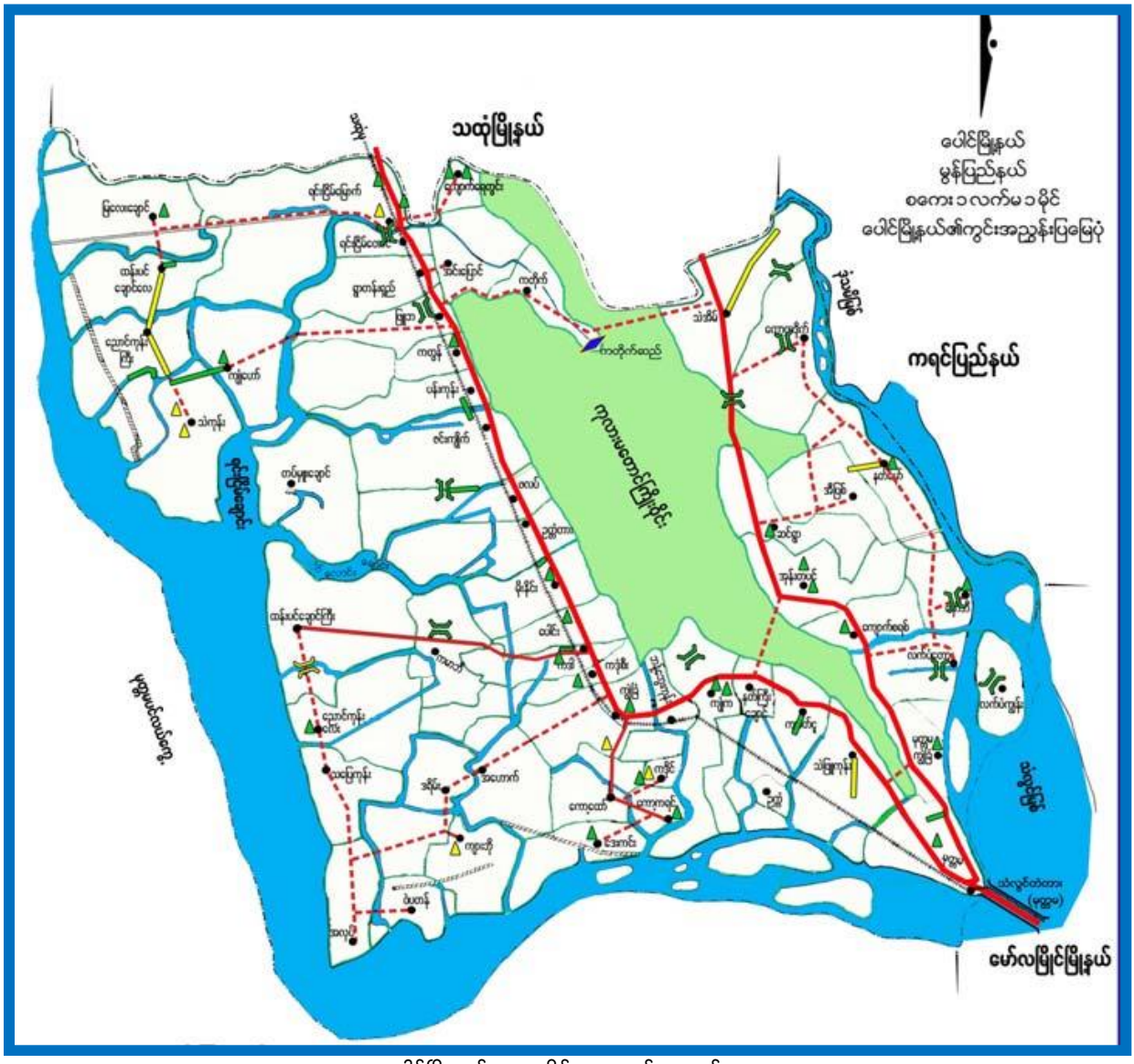
5.1.1 LOCATION AND AREA OF PAUNG TOWNSHIP

Paung Township is situated in Thaton District of Mon State. It is located between 16° 10′ N and 16° 48′ N, and 97° 16″E and 97° 38″E. Area of the township is as follows:

Table 5.1 Particulars of nearby Townships

Sr.	Township/ Town	Sq. Mile
1	Paung Town	2.13
2	Zin Kyaik Town	1.74
3	PaungTownship Sq. Mile	436.75

Source: “ပေါင်မြို့နယ်ဒေသဆိုင်ရာအချက်အလက်များ2017”



Source: "ပေါင်မြို့နယ်ဒေသဆိုင်ရာအချက်အလက်များ2017"

Figure 5.3 Map of Paung Township of Mon State

Figure 5.4 Map of Paung Township with Padonmar Soap Factory

5.1.2 NATURAL VEGETATION AND WILD LIFE

The observations on biodiversity show the following features:

Forest : As the project is located in southern part of Myanmar, there are tropical rain forest trees near the project area. Tropical evergreen forest and monsoon deciduous forests can be found in Paung Township because of heavy torrential rainfall. They are palm factoryations near the project compound. All the flora and fauna are of common category. Common natural vegetation in Paung are Kyun, Pyinkadow,Pa-dauk, Thityar, In Gyin, Ka Nyin, Kok-ko, Pyin-ma, Thit-cha and bamboo.

Wildlife: There is no way appears to endanger or disturb the existing wildlife of the area due to the development of the Padonmar soap factory.

5.1.3 LAND USE

Agriculture is the dominant land use in **Paung Township**. Agricultural land use is 154,163 acres. 10.24% of township is occupied by forest. The main types of land use are shown in the following table.

Table 5.2 Land Utilization in Paung Township

No.	Type of Land	Area (Acre)	Remark
1	Le Land (Paddy Land)	129,398	
2	Kaing Land (Alluvial Farming)	999	
3	Garden Land	22,923	
4	Dahni (Nipa Palm)	843	
5	Fallow Land	7,115	
6	Pasture Land	5,145	
7	Industrial Land	37	
8	Urban Settlement	1362	
9	Rural Settlement	14,074	
10	Other	24,621	
11	Reserved Forest	28,631	
12	Bare Land	44,373	
	Total	279,521	

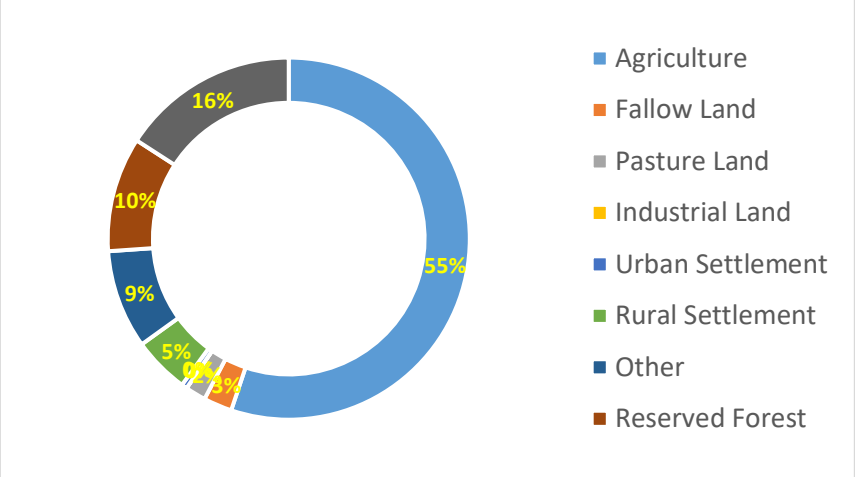


Figure 5.5 Land Utilization of Paung Township

5.1.4 SOCIO-ECONOMIC ENVIRONMENT

Padonmar Soap Factory is located within Paung Township, Mon State, Myanmar.

The social assessment team used both qualitative and quantitative techniques to collect data and information on the social and economic status of the community.

- Socio-economic data collection was conducted on 14-10-2019 by discussion with Thea Hpyu Kone Villages Tract Administrator

Secondary sources of data includes:

- Secondary data sources came from literature, relevant authorities which are cited throughout this report, and listed in the references section for soil, metherological, biological, protected area and cultural heritage data.
- A detailed desk study of Paung Township Profile in 2017 was analyzed to collect up-to-date and precise information on the current socio-economic conditions, climate, flora and fauna condition, land use, and infrastructure conditions at the project area and township.

5.1.5 SOCIAL CONDITION

Paung Township is 436.75 sq mi wide. The township has a total population of 253,637 (124,759 male and 128,878 female) with 41,927 households including 44,869 families.

The population characteristics in Paung Township are as follow.

a) Population By Sex

Table 5.3 Population by Sex in Paung Township

	Male	Female	Total
Urban	29865	29749	59614
Rural	94894	99129	194023

Source: "ပေါင်မြို့နယ်ဒေသဆိုင်ရာအချက်အလက်များ 2017"

b) Religion

Table 5.4 Religious Groups of Ethnic in Paung Township

Sr.	Type of Religion	No. of Person
1	Buddhist	233499
2	Christian	648
3	Hindu	10999
4	Islam	8491
5	Other	-
Township Total		253637

Source: "ပေါင်မြို့နယ်ဒေသဆိုင်ရာအချက်အလက်များ 2017"

c) Population by Foreigner Living

Table 5.5 Population by Foreigner Living in Paung Township

Sr.	Ethnic Race	No. of Person
1	Tamil	176
2	Other	8

Source: "ပေါင်မြို့နယ်ဒေသဆိုင်ရာအချက်အလက်များ2017"

d) Education

Table 5.6 Number of University and Schools in Paung Township

Sr.	Uni/School	Quantity
Basic Education		
1	State High School	9
2	State high school (branch)	11
3	Middle School	5
4	State Middle school (branch)	6
5	State Primary School	104
6	State Primary School (over)	25
7	Kindergarten	39

Source: "ပေါင်မြို့နယ်ဒေသဆိုင်ရာအချက်အလက်များ2017"

e) Status of Religious Organization

Table 5.7 Religious Organization in Paung Township

Sr.	Description	Quantity
1	Pagoda	35
2	Monastery	319
3	Nun dwelling	56
4	Religious Hall	69

Source: "ပေါင်မြို့နယ်ဒေသဆိုင်ရာအချက်အလက်များ2017"

5.1.6 HEALTH

The main diseases in **Paung** Township are diarrhoea-related illnesses and tuberculosis.

Table 5.8 Number of Hospital and Clinic in Paung Township

Sr.	Type	Quantity	Remark
1	Government Hospital	6	130 beds
2	Private Clinic	28	Dental Clinic
3	Department of Health	10	
4	Sub Department of Health (Rural)	43	

5.1.7 NEAREST VILLAGES OF THE PADONMAR FACTORY

5.1.7.1 THEA HPYU KONE VILLAGES TRACT

Padonmar Soap Factory is situated in the southern part of Thea Hpyu Kone villages tract. The location of study area is shown in Figure 5.6. The total populace is over 4,825 comprising over 2,364 male and 2,461female with 714 households comprising 785 families. Bamar and Mon are main race in the village.

Agriculture is significant economic activity. There are 3,206 (2018-19) acres of paddy field. Rubber gardening is also found about 10 acres and vegetables about 58 acres. For animal husbandry, cow (10), pig (80), goat (88) and chicken (15000) are bred in 2018-19. Thera are 7 fish farms in the villages tract.

The villages tract has 4 middle schools with 738 students in total as shown in following table. **Thea Hpyu Kone Village Tract** has a Rural Health Centre and 2 village libraries.

Table 5.9 Number of Schools in Thea Hpyu Kone Village Tract

Sr.	School	Location
1	State Primary School	Thoe Kya Village
2	State Middle school (branch)	Thea Hpyu Kone Village
3	State Primary School	Kan Phyu Village
4	State Primary School	Ye Pyar Kone Village

Source: “သဲဖြူကုန်းကျေးရွာအုပ်စုဆိုင်ရာအချက်အလက်များ”

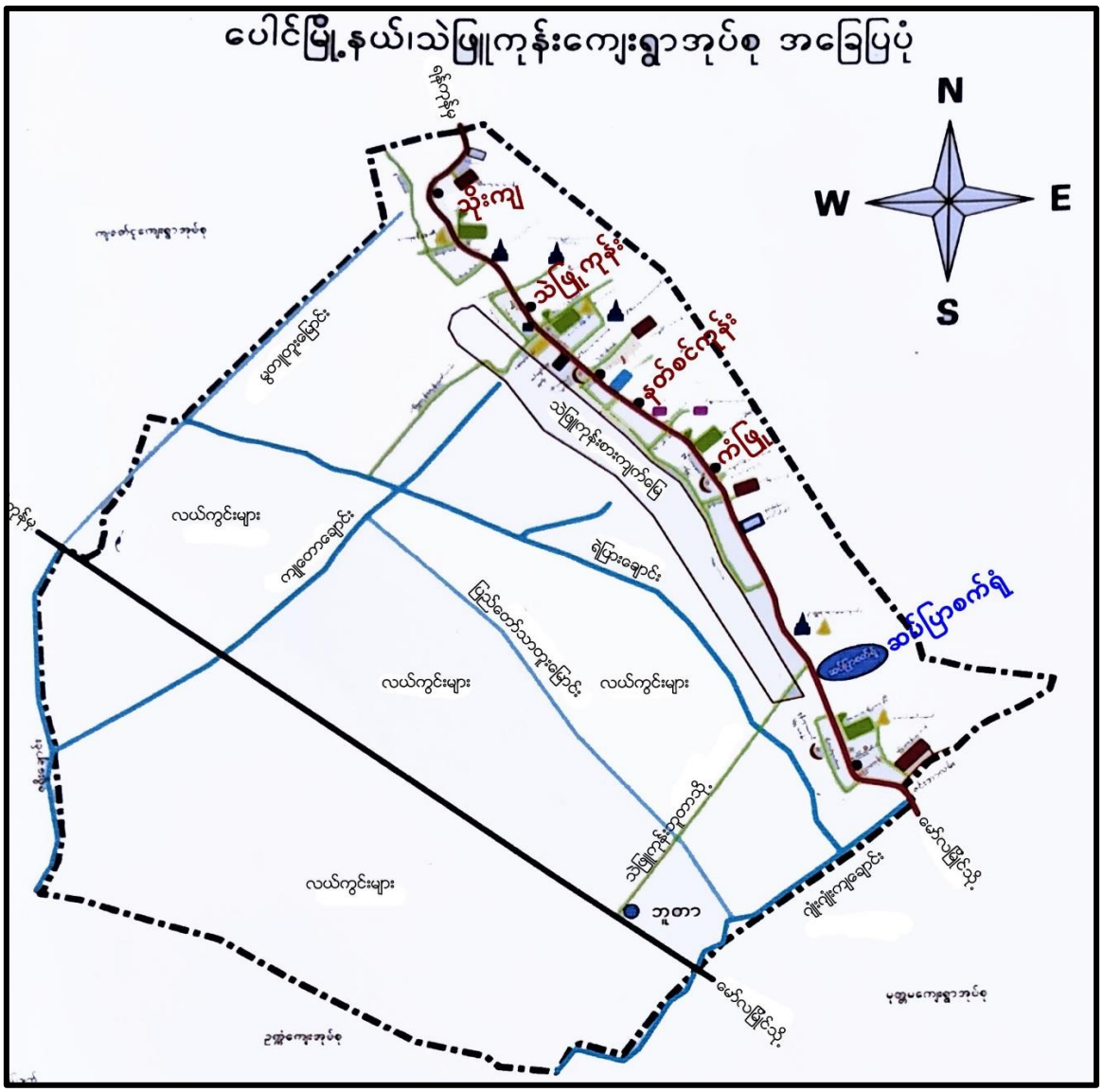


Figure 5.6 Map of Thea Hpyu Kone Village Tract with Padonmar Soap Factory

Figure 5.7 Land Use Map Showing Surrounding Villages of the Factory

Figure 5.8 Photos of Thea Hpyu Kone Village

Figure 5.9 Photos of Pahsu Pine Village

5.1.7.2 KAN HPYU VILLAGE

Having 146 households with 181 families, Kan Hpyu village has 1058 people comprising 497 male and 561 female. Majority of people is Muslim. The village has a mosque and a state primary school with 196 students. There are 6 fish farms and 3 house shop.

Figure 5.10 Photos of Kan Hpyu Village

5.1.7.3 YE PYAR KONE VILLAGE

Ye Pyar Kone village has a population of 1,169 of which 562 are male and 607 are female. There is a total of 152 households living with 187 families in the village. Figure 5.11 shows the conditions in Ye Pyar Kone village. There are 3 home industry and 10 shops. It has a state primary school with 163 students and a library.

Figure 5.11 Photos of Ye Pyar Kone Village

5.1.8 5.1.8 ECONOMIC CONDITION

a) Status of Economic Organization

Table 5.10 Economic Organization in Paung Township

Sr.	Type	Quantity
1	Industrial Zone	-
2	Fish farming pond	40
3	Pwan farming pond	22
4	Fuel station	14
5	Mine (stone for road)	139470/*kyin*
6	Private factory	2
7	Industry and Craft of Domestic	192
8	Resort (Zin kyaik waterfall and resort)	1

9	Motel/ Inn/ Guest house	5
10	Government Major market	5
11	Government Bank	1
12	Private Bank	3
13	Shop house and stores	412

Source: "ပေါင်မြို့နယ်ဒေသဆိုင်ရာအချက်အလက်များ 2017"

5.25.2 ARCHAEOLOGICAL AND CULTURAL RESOURCES

There is no archaeological site or recreational area within the project vicinity. Consequently no impacts to cultural heritage are anticipated.

5.3PHYSICAL ENVIRONMENT AROUND THE PROJECT

5.3.1 TOPOGRAPHY

Around the factory areas, recorded minium elevation is 0 ft, maximum elevation is 2871 ft and 354 ft for average elevation. In general, the surrounding areas of the Factory is considerably flat and covered with shrubs and trees. Detailed topographic descriptions of nearby areas are shown in Figures 5.12 and 5.13.

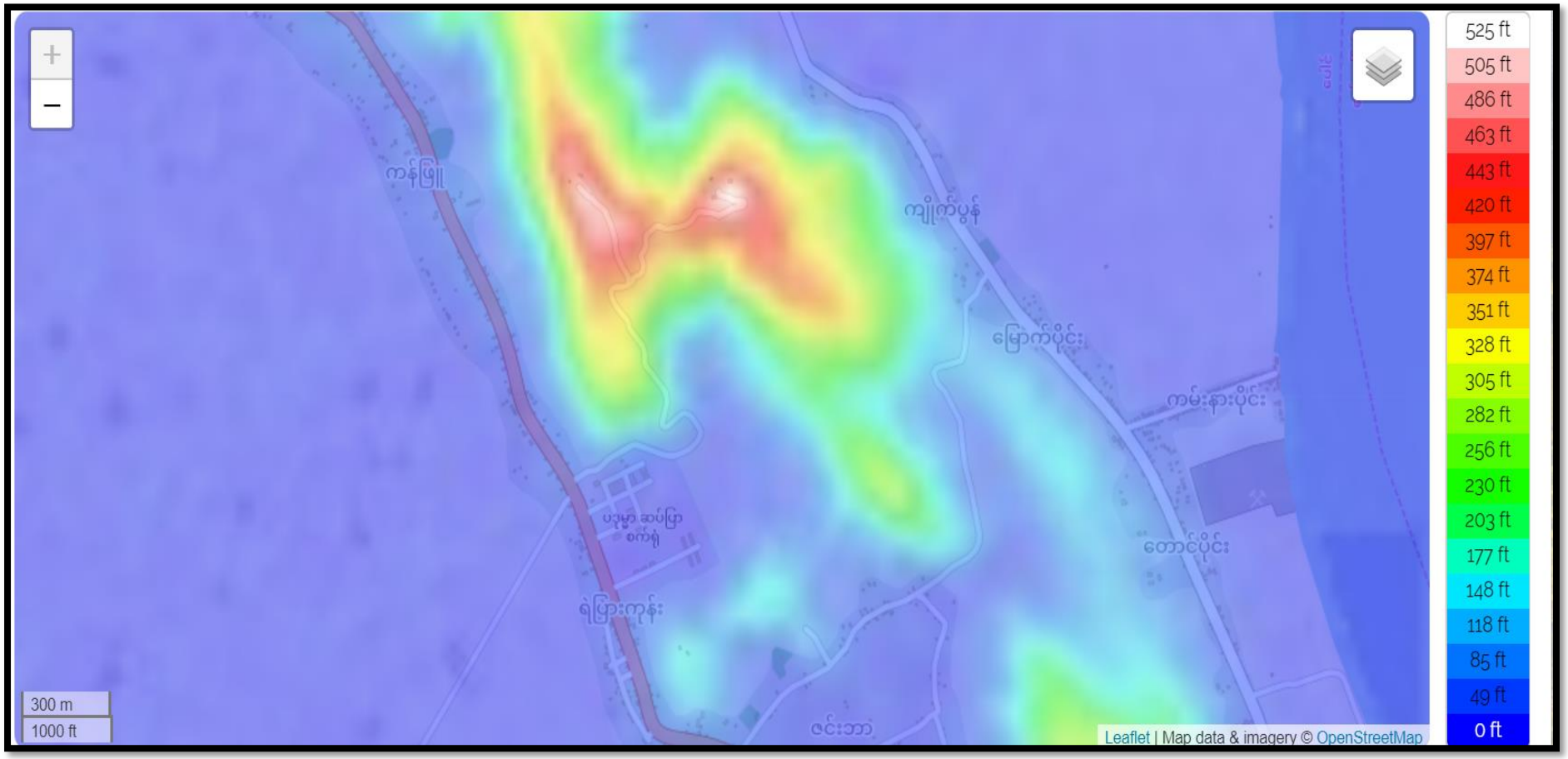


Figure 5.12 Topographic Map of Surrounding Area of the Factory

5.3.2 WATER BODY

Approximately 2.1 km east of the factory is Thanlwin (Salween) River that flows from north to south. It is approximately 2,815 kilometres long that flows from the Tibetan Plateau into the Andaman Sea. The factory is considerably far from the River and the series of of mountain ranges separate the factory from the River. No discharged water from the factory to the River.

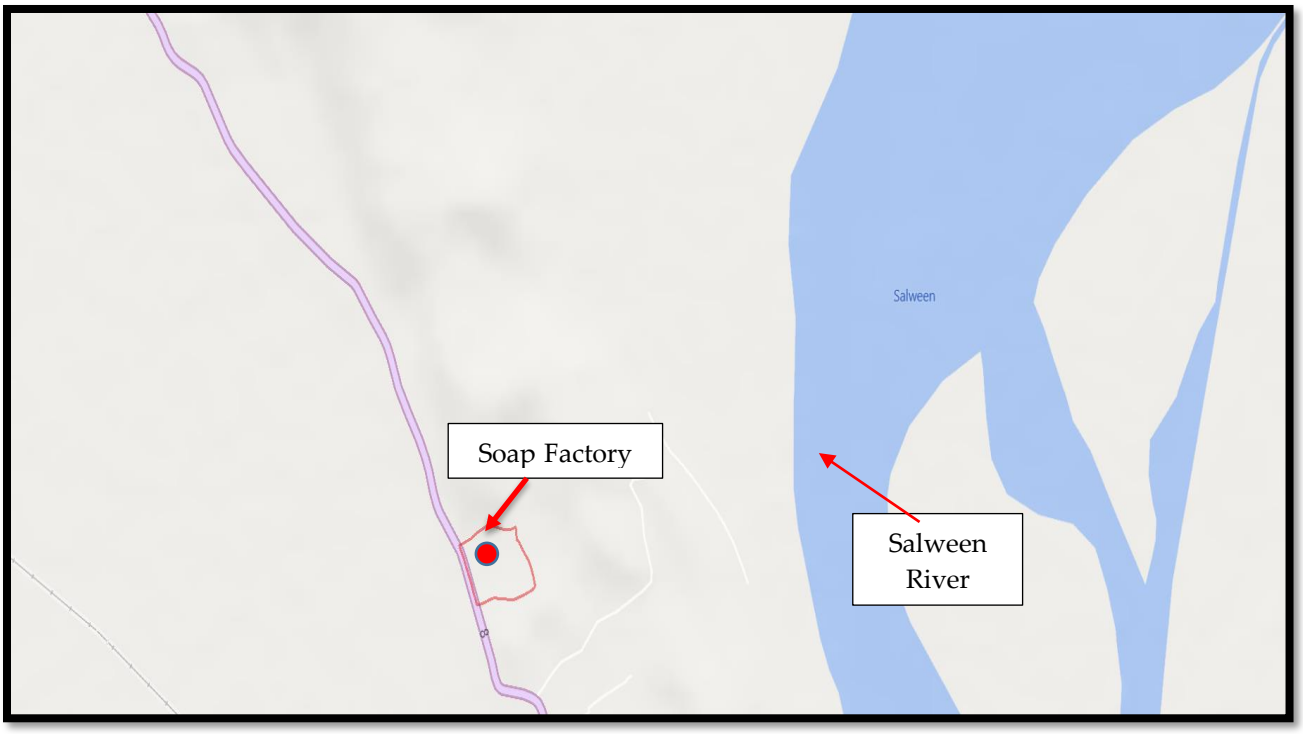


Figure 5.13 Factory Location and the Nearest Water Bodies

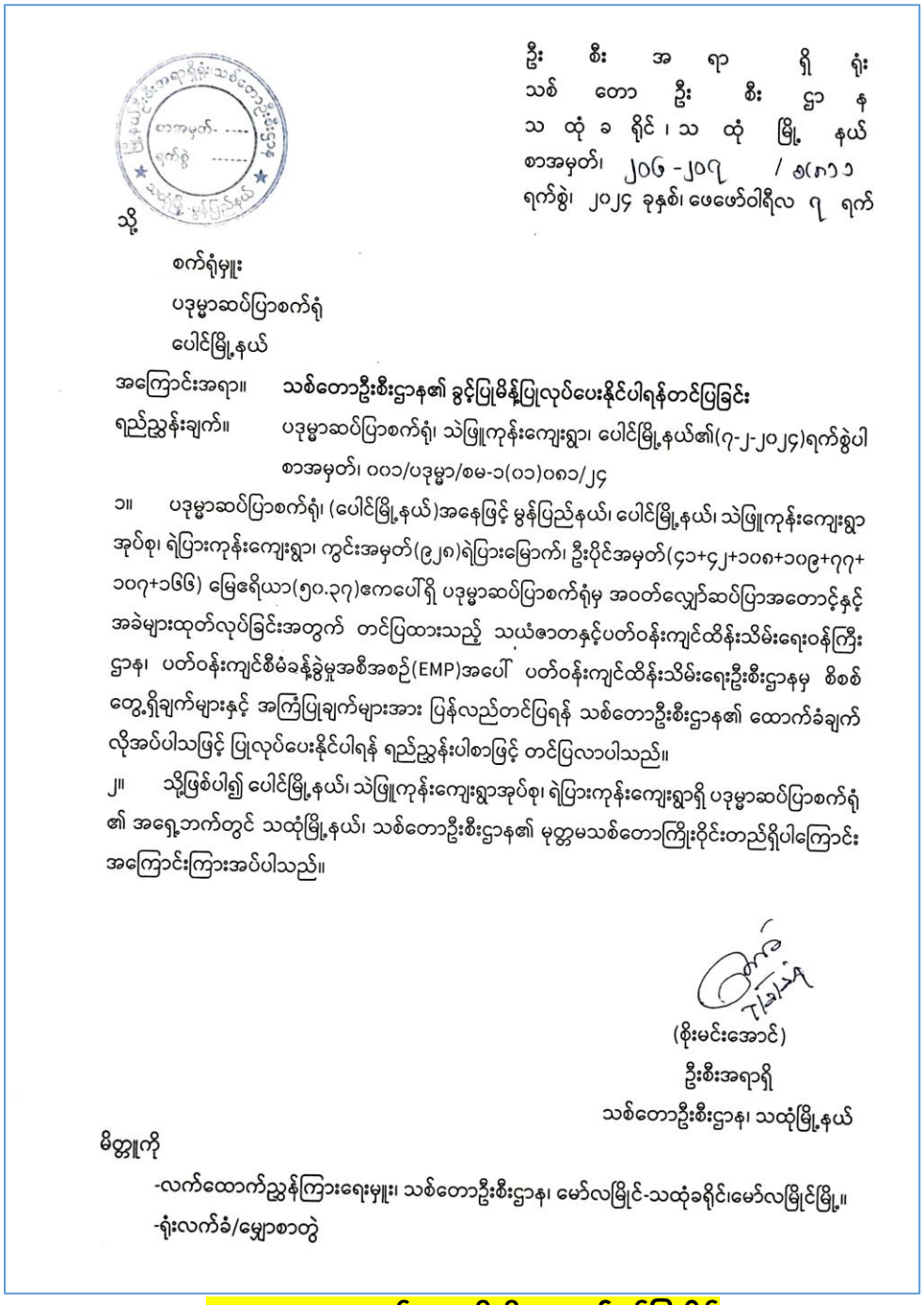
5.3.3 LAND USE

The factory areas is approximately 50.73 acres. The factory is surrounded with the Montama Reserve Forest Sancturies as shown in Figure 5.14.

Few residential areas including Eindayaza village, Kalainaung village are dispersed around the factory. Yangon –Malamyine road is just beside the factory. The east side of the factory is considerably agricultural lands.

သစ်တောဦးစီးဌာန၏ ခွင့်ပြုမိန့်အားပူးတွဲတင်ပြအပ်ပါသည် (Figure 5.15)။

Figure 5.14 Landuse at 2 Km radius of the factory



ဦး စီး အ ရာ ရှိ ရုံး
သစ် တော ဦး စီး ဌာ န
သ ထုံ ခ ရိုင် ၊ သ ထုံ မြို့ နယ်
စာအမှတ်၊ ၂၀၆ - ၂၀၇ / ခ(ဒ၁)၁
ရက်စွဲ၊ ၂၀၂၄ ခုနှစ်၊ ဖေဖော်ဝါရီလ ၇ ရက်

သို့

စက်ရုံမှူး
ပဒုမ္မာဆပ်ပြာစက်ရုံ
ပေါင်မြို့နယ်

အကြောင်းအရာ။ **သစ်တောဦးစီးဌာန၏ ခွင့်ပြုမိန့်ပြုလုပ်ပေးနိုင်ပါရန်တင်ပြခြင်း**

ရည်ညွှန်းချက်။ ပဒုမ္မာဆပ်ပြာစက်ရုံ၊ သဲဖြူကုန်းကျေးရွာ၊ ပေါင်မြို့နယ်၏(၇-၂-၂၀၂၄)ရက်စွဲပါ စာအမှတ်၊ ဝဝဒ/ပဒုမ္မာ/စမ-၁(ဝဒ)ဝ၈၁/၂၄

၁။ ပဒုမ္မာဆပ်ပြာစက်ရုံ၊ (ပေါင်မြို့နယ်)အနေဖြင့် မွန်ပြည်နယ်၊ ပေါင်မြို့နယ်၊ သဲဖြူကုန်းကျေးရွာ အုပ်စု၊ ရဲပြားကုန်းကျေးရွာ၊ ကွင်းအမှတ်(၉၂၈)ရဲပြားမြောက်၊ ဦးပိုင်အမှတ်(၄၁+၄၂+၁၀၈+၁၀၉+၇၇+၁၀၇+၁၆၆) မြေဧရိယာ(၅၀.၃၇)ကေပေါ်ရှိ ပဒုမ္မာဆပ်ပြာစက်ရုံမှ အဝတ်လျှော်ဆပ်ပြာအတောင့်နှင့် အခဲများထုတ်လုပ်ခြင်းအတွက် တင်ပြထားသည့် သယံဇာတနှင့်ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာန၊ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်(EMP)အပေါ် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနမှ စီစစ်တွေ့ရှိချက်များနှင့် အကြံပြုချက်များအား ပြန်လည်တင်ပြရန် သစ်တောဦးစီးဌာန၏ ထောက်ခံချက်လိုအပ်ပါသဖြင့် ပြုလုပ်ပေးနိုင်ပါရန် ရည်ညွှန်းပါစာဖြင့် တင်ပြလာပါသည်။

၂။ သို့ဖြစ်ပါ၍ ပေါင်မြို့နယ်၊ သဲဖြူကုန်းကျေးရွာအုပ်စု၊ ရဲပြားကုန်းကျေးရွာရှိ ပဒုမ္မာဆပ်ပြာစက်ရုံ၏ အရှေ့ဘက်တွင် သထုံမြို့နယ်၊ သစ်တောဦးစီးဌာန၏ မုတ္တမသစ်တောကြိုးဝိုင်းတည်ရှိပါကြောင်း အကြောင်းကြားအပ်ပါသည်။

(စိုးမင်းအောင်)
ဦးစီးအရာရှိ
သစ်တောဦးစီးဌာန၊ သထုံမြို့နယ်

မိတ္တူကို
-လက်ထောက်ညွှန်ကြားရေးမှူး၊ သစ်တောဦးစီးဌာန၊ မော်လမြိုင်-သထုံခရိုင်၊မော်လမြိုင်မြို့။
-ရုံးလက်ခံ/မျှောစာတွဲ

Figure 5.15 သစ်တောဦးစီးဌာန၏ခွင့်ပြုမိန့်

5.3.4 SOIL COMPOSITION OF THE FACTORY AREA

The geological setting around the factory area is predominantly Eutric Gleysols as seen in Figure 5.16. The soil is considered as an alluvial soil and suitable for seasonal crops and annual factoryations such as rice, beans, legumes and maize.

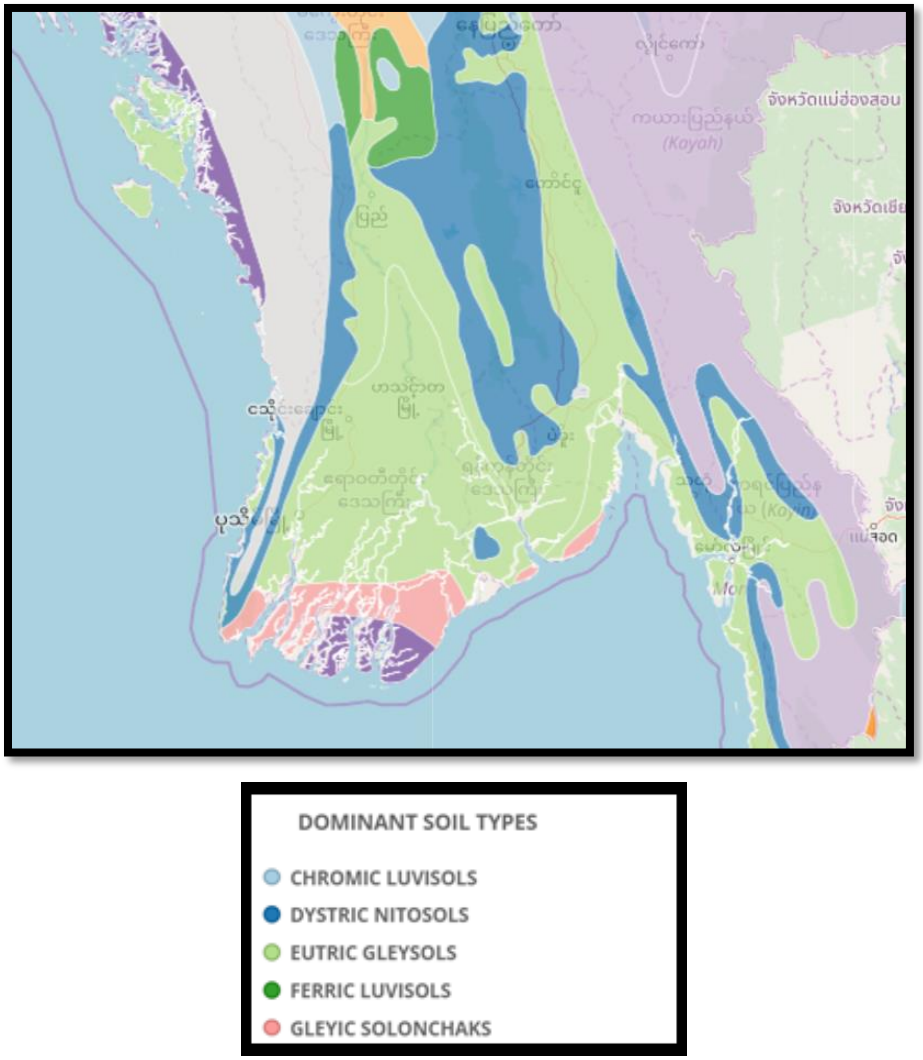


Figure 5.16 Regional Soil Profile and Dominant Soil Types near the factory

5.3.5 CLIMATE

Nearest city of the Factory is Dawei, Tanintharyi Region. The climate of the region has considered as a tropical monsoon climate under the Köppen climate classification system. The climate summary of the Dawei area shows seasonal variation over the course of the

year. During rainy season, the sky is overcast or mostly cloudy 94% of the time. The rainy season is considered from end of February to end of November. The average rainfall throughout the rainy season varies from minimum 0.5 inches to maximum 23 inches.

Over the course of the year, the temperature typically varies from 70°F to 90°F with little variances. Wind direction is most often from the west for 8.4 months from February to October and from the east of 3.3 months from mid of October to end of January from the east.

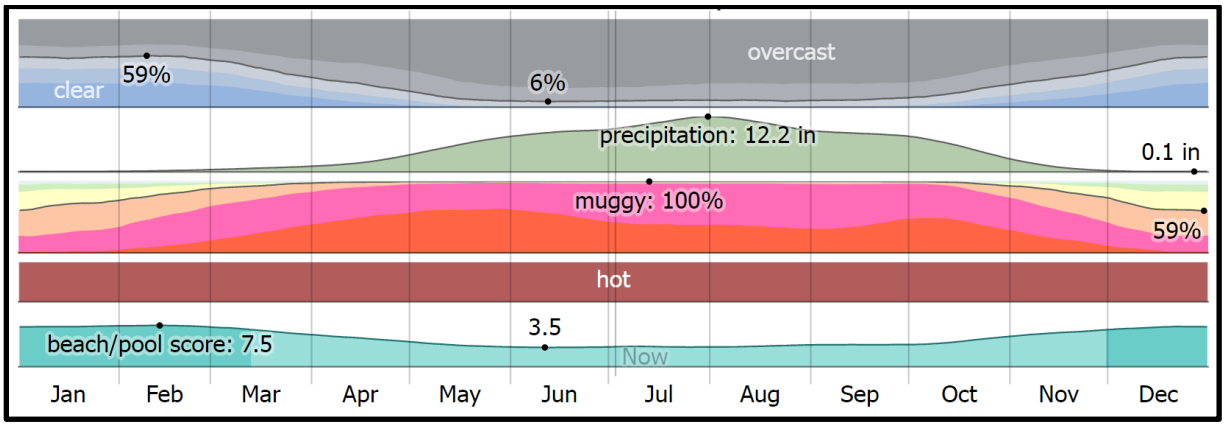


Figure 5.17 Climate Summary of Dawei Region

5.3.6 HAZARD CONSIDERATION

5.3.6.1 FLOODING

Myanmar is prone to various natural hazards that include earthquakes, floods, cyclones, droughts, fires, tsunamis, some of which have the potential to impact large numbers of people.

Since 2002, more than 13 Factoryion people have been affected by natural disasters, including three Category 4 cyclones, several major earthquakes, and in 2015 the country experienced the worst flooding in decades. In 2008, Cyclone Nargis devastated southern Myanmar, killing 140,000 people and causing extensive damage to infrastructure.

The factory area is considerably far and separated by hill ranges from open water source like Thanlwin River, the risk of flooding is assumably low.

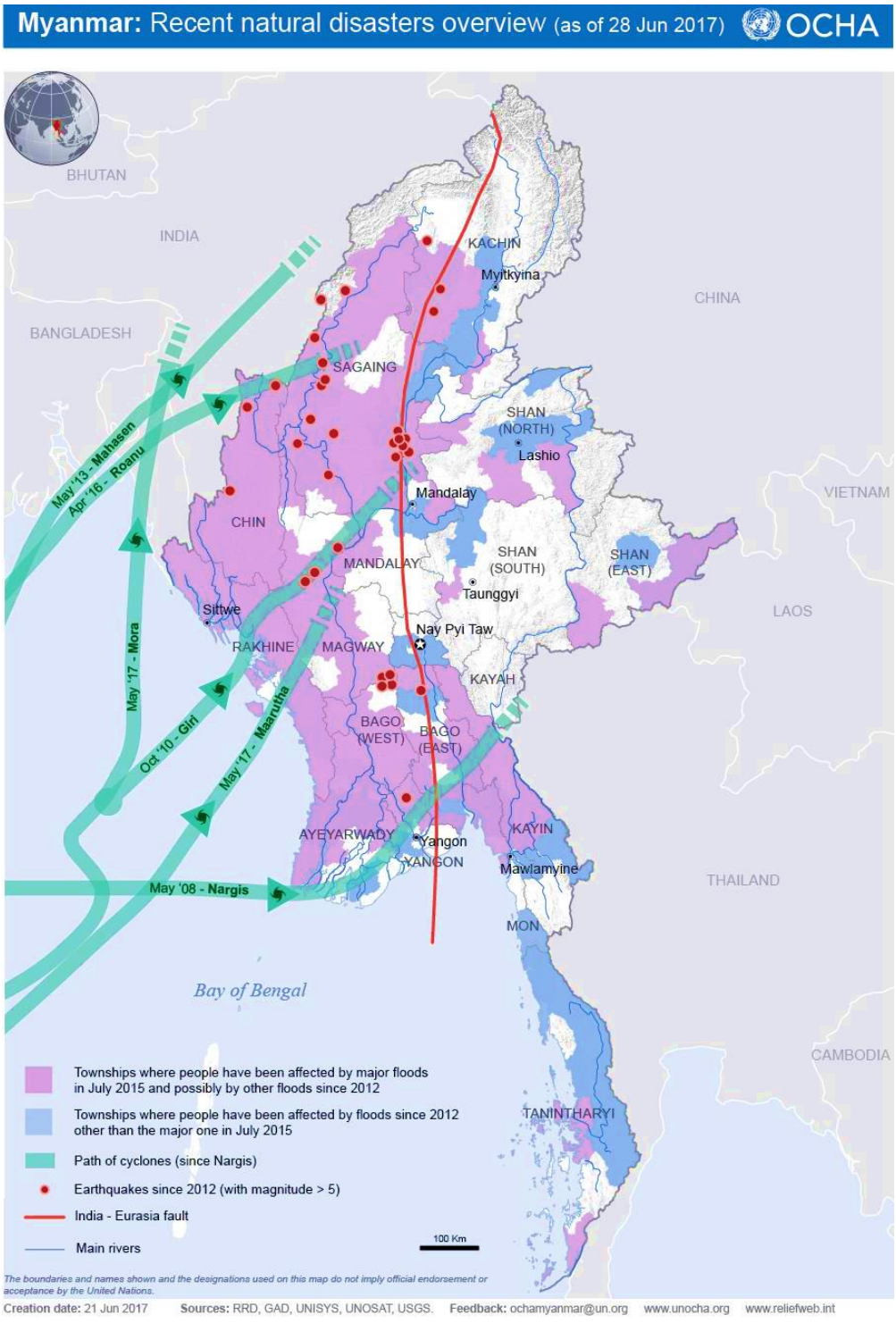


Figure 5.18 Natural Disasters Overview Map of Myanmar

5.4ENVIRONMENTAL QUALITY OF THE PROJECT

5.4.1 PROJECT BOUNDARY AND MONITORING POINTS FOR ENVIRONMENTAL PARAMETERS

The EMP report includes consideration of the spatial boundaries to assess the crucial environmental parameters.

Spatial Boundaries is spatial limitation that is confined to activities associated with Padonmar Soap Factory's manufacturing processes.

The spatial environmental setting of the factory is considered within 500 meters of the factory area based on the following criteria:

- The extent of potential effects arising from noise and atmospheric emissions for those factory activities.
- Lands used for residential, commercial, industrial, recreational, cultural, and aesthetic purposes by communities whose areas include the physical extent of the factory.

စက်ရုံတွင် အသုံးပြုနေသောစက်များသည် အဆင့်မြင့်နည်းပညာဖြင့် အသုံးပြု သည့် စက်များဖြစ်သဖြင့် စက်ရုံအတွင်း၌သာ အသံထွက်ရှိ၍ စက်ရုံပြင်ပ ရောက်ရှိသောအခါ ဆူညံ သံ မကြားရသဖြင့် ဆူညံသံမကြားရပါ။ Boiler မှ အမှုန်များမှာ ခေါင်းတိုင်အမြင့်ပေ ၄၀ ခန့်ရှိခြင်း၊ မီးခိုးခေါင်းတိုင်မှ ထွက်သည့် ပြာမှုန်များကို အုတ်ကန်အတွင်းရေဖြင့် ဖမ်းယူ သည့် စနစ် ပြုလုပ် ထားခြင်း ဖြစ်သဖြင့် ပတ်ဝန်းကျင်သို့ ပြာမှုန်ရောက်ရှိခြင်းမရှိသည့်အပြင် စက်ရုံဧရိယာ ၅၀.၇၃ ဧကရှိပါသဖြင့် ပတ်ဝန်းကျင်အပေါ် ဆိုးကျိုးသက်ရောက်နိုင်ခြင်း လုံး၀ (လုံး၀) မရှိပါသဖြင့် လုံလောက်မှုရှိပါသည်။

Figure 5.19 Spatial Boundary of the Factory

5.4.2 ENVIRONMENTAL PARAMETERS MONITORING POINTS

Within 500 meters, the factory's facilities, some residential areas and agriculatural lands are located. Total 11 monitoring points

are carefully selected based on potential emission sources of air, water, noise and soil pollutants. Geographic positions of the monitoring are described in Table 5.11.

Table 5.11 Geographic Position of Air and Noise Monitoring Points within Padonmar Soap Factory

No.	Direction	North	East	Elevation
1	Stimplex Plodder	16 ° 33.620 ′	097 ° 34.990 ′	53
2	Soap Pan	16 ° 33.627 ′	097 ° 35.012 ′	36
3	Mazzoni	16 ° 33.627 ′	097 ° 35.002 ′	-
4	Virgo	16 °33.621 ′	097 ° 35.003 ′	50
5	Boiler	16 ° 33.630 ′	097 ° 35.012 ′	46
6	Generator	16 ° 33.630 ′	097 ° 35.024 ′	57
7	Waste Water	16 ° 33.556 ′	097 ° 35.147 ′	417
8	Waste Water	16 ° 33.599 ′	097 ° 35.067 ′	14
9	store	16 ° 33.584 ′	097 ° 35.023 ′	135
10	Gate	16 ° 33.588 ′	097 ° 34.959 ′	7
11	Tube Well	16 ° 33.508 ′	097 °35.011 ′	35

Geographic Position of Air and Noise Monitoring Points within Padonmar Soap Factory

5.4.3 AIR QUALITY MONITORING

In accordance with National Air Emission guidelines, baseline ambient air quality was monitored in and around the Factory. Totoal 9 parameters of air quality were measured during the site survey at the factory.

For air quality, the factory ensures to meet the national air quality standard, NEQEG standard is referred as air quality standard. US EPA standard will be removed as NEQEG standard is sufficient to compare the factory's air quality and standard requirements.

Air Quality Standard

The National Emission Standard is used as a standard reference of Air quality standard to ensure the factory's air emission values meet the National standards as required. In general, the air emissions from the factory operations can be considered as below the standard requirements.

Table 5.12 Air Emission Standards

Parameter	National Guideline Value µg/m³ (Averaging Period)
Particular matter PM_{10}[a]	20 (1-year) 50 (24-hour)
Particular matter $PM_{2.5}$[b]	10 (1-year) 25 (24-hour)
Sulphur Dioxide	20 (1-hour) 500 (10-minute)

[a] Particular matter 10 micrometer or less in diameter

[b] Particular matter 2.5 micrometer or less in diameter

a) Methodology

Even though National Emission Standards imposes five crucial parameters for general industry, GREEN EHSS team measured 9 parameters at potential emission sources within the factory including production areas, machines, vehicle garages and generator room. 11 air monitoring points were carefully chose to cover the production. Detailed geographic positionings of the monitoring points are shown in Table .

The air quality monitoring is performed by using Aeroqual Series 500 Air monitoring device from New Zealand and 770-1100 HAZ-DUST I, Aerosol Monitor, 110-240V from USA. The Aerosol Sensor heads for Carbon Monoxide, Nitrogen Oxide and Sulphur Dioxide and H_2S. Aerosol monitor is used to monitor dusts. PM2.5 and PM10 were monitored by using HOLDPEAK 5800D PM2.5/PM10 Monitor Detector.

Carbon dioxide concentration was measured with Carbon Dioxide sensor meter M0198132S.

In order to obtain the precise monitoring results, all parameters were measured 5 times at each point and average concentrations were recorded within 24 hours period.

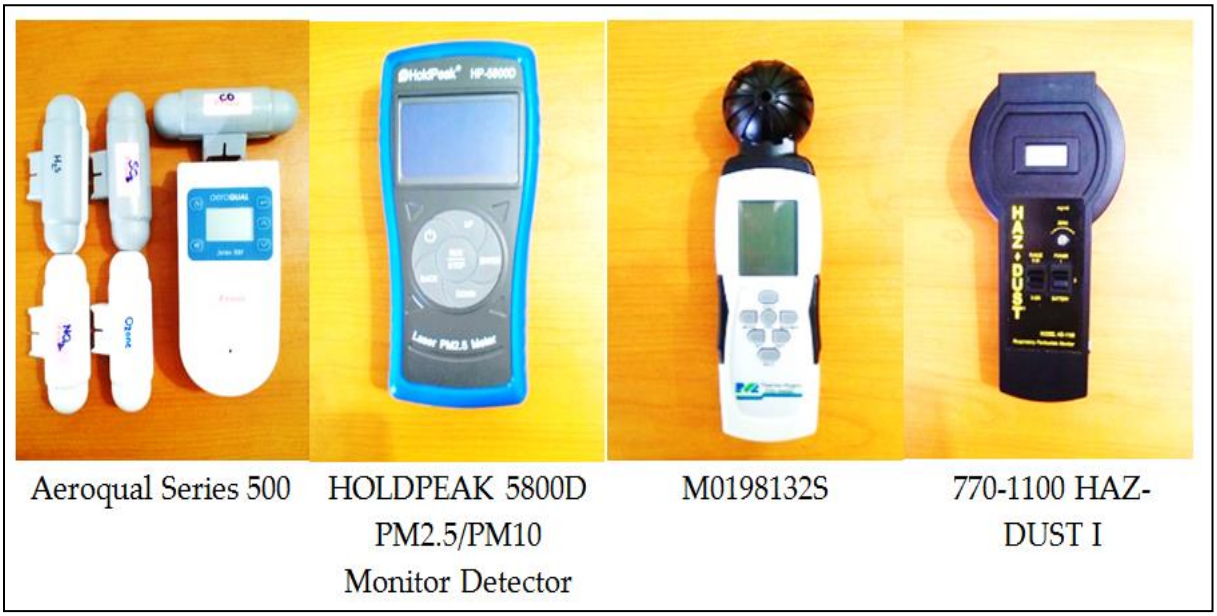


Figure 5.20 Photos of Air Monitoring Devices

b) <u>Results</u>

The air monitoring analysis results were compared with National Environmental Quality (Emission) Guideline.

NO_2 and O_3 concentrations at the potential emission sources and operation areas shwed below tthat of emission guidelines. $PM_{2.5}$ and PM_{10} levels at the boiler, generator and operation areas were slightly higher than values in the National Emission Guidelines. Values of both $PM_{2.5}$ and PM_{10} at Mazzino and Virgo were considerably higher than acceptable levels.

The measured values of PM_{10} are within the range of the US-EPA Standards values.

Table 5.13 Air Quality Parameters Monitoring Results

Area	H_2S ppm	SO_2 ppm	NO_2 ppm	CO ppm	CO_2 ppm	O_3 ppm	PM(2.5) $\mu g/m^3$	PM(10) $\mu g/m^3$	TSP (Dusts) Mg/m^3	Hum/ Tem
Stemplex Plodder	0.0	0.00	0.015	0.00	457	0.004	31.2	55.8	00.3	78.4% 31.9˚C
Soap Pan	0.0	0.00	0.025	0.00	436	0.004	30.3	54.7	00.2	74.7 % 32.9˚C
Mazzoni	0.0	0.00	0.021	0.00	443	0.000	32.4	63.1	00.2	74.6% 33.6˚C
Virgo	0.0	0.00	0.024	0.00	483	0.000	33.0	70.2	00.1	69.4 % 36.1˚C
Boiler	0.1	0.00	0.034	0.00	452	0.000	31.5	60.6	00.1	69.1% 36.3˚C
Generator	0.1	0.00	0.081	2.10	467	0.016	31.0	51.6	00.1	69.5% 35.6˚C
Waste Water Treatment (1)	0.0	0.00	0.028	0.00	452	0.016	24.9	43.2	00.1	66.0% 36.2˚C
Waste Water Treatment (2)	0.1	0.00	0.034	1.11	446	0.019	22.8	42.6	00.1	64.1% 35.5˚C
store	0.0	0.00	0.020	0.00	443	0.013	24.2	47.3	0.01	66.0 % 35.6˚C
Gate	0.0	0.00	0.031	0.12	425	0.010	26.4	49.0	00.1	65.4% 35.3 ˚C
Tube Well	0.0	0.00	0.042	0.24	424	0.010	24.0	43.5	00.1	68.8% 34.2˚C

Table 5.14 Comparison of Air Quality between Ovserved Value at the Boiler and National Emission Guideline Value

Parameter	Unit	Observed Value	Guidelines Value
NO_2	$\mu g/m^3$	0.064	200
O_3	$\mu g/m^3$	0.008	100
$PM_{2.5}$	$\mu g/m^3$	**31.5**	25
PM_{10}	$\mu g/m^3$	**60.6**	50
SO_2	$\mu g/m^3$	00	500

Table 5.15 Comparison of Air Quality between Ovserved Value at the Generator room and National Emission Guideline Value

Parameter	Unit	Observed Value	Guidelines Value
NO_2	$\mu g/m^3$	0.15	200
O_3	$\mu g/m^3$	00	100
$PM_{2.5}$	$\mu g/m^3$	31	25
PM_{10}	$\mu g/m^3$	51.6	50
SO_2	$\mu g/m^3$	00	500

Table 5.16 Comparison of Air Quality between Ovserved Value at the operation areas and National Emission Guideline Value

Parameter	Unit	Observed Value	Guidelines Value
NO_2	$\mu g/m^3$	0.028	200
O_3	$\mu g/m^3$	0.031	100
$PM_{2.5}$	$\mu g/m^3$	31.2	25
PM_{10}	$\mu g/m^3$	51.8	50
SO_2	$\mu g/m^3$	00	500

c) Existing Control Measures

In general, in lines with the measured values of air quality parameters, ambient air quality in and around the factory is within the acceptable and Standards levels except $PM_{2.5}$ and PM_{10} at the operation areas.

The Factory has regularly inspected and maintained the equipment and machine. In addition, the Factory has palnned to upgrade the existing processes upon approval from the principal organization. Boiler is regularly inspected by the township Boiler Inspection Department.

Revised Air Quality Measurements at Operation Areas

Table 5.17 Revised Air Quality Measurements at Operation Areas

Area	PM(2.5) µg/m³	PM(10) µg/m³	Period
Boiler	21.8	48.6	24 hours
Generator	23.2	47.3	24 hours
Stimplex Plodder	23	45.3	24 hours
Soap Pan	20.4	44.7	24 hours
Mazzoni	21.5	42.1	24 hours
Virgo	21.8	48.4	24 hours

The factory has performed maintenance services for the boiler and the generator. After maintenance and servicing of the boiler, $PM_{2.5}$ and PM_{10} value at the boiler area have been monitored at 24 hours periods. The recorded PM concentrations were lower than that of National Standard.
The generator is reserviced and installed an air emission control device. In addition, the generator is also located in the concrete building and away from the operation area. After

reservicing and installing the air emission control device, the concentrations of $PM_{2.5}$ and PM_{10} value have been reduced to below the National Air emission standards.

In the processes of the soap manufacturing, mainly liquid materials such as Palm Fatty Acid Distillate. Crude Palm Oil, Hydrogenated Rice Bran Oil, Tallow oil and solid raw materials Refined Bleached Deodorised Palm Stearine and Hydrogenated Rice Bran Oil have been used. No powder types materials are utilized in the process.

All raw materials are pressed in the materials to alter thick soap liquid and the production is unlikely to emit high concentration of $PM_{2.5}$ and PM_{10} in the operation area.

It can be concluded that the higher concentration of PM levels at some area may be caused by outdoor weather impacts such as high wind flow into the factory during the first monitoring period. The production area is fully surrounded with large, opened doors at all directions.

In order to obtain more accurate date, 24 hours air parameters were measured in February 27 to 28, 2024. The final monitoring results show that PM levels at the monitoring point were below the national standards.

5.4.4 NOISE

a) Methodlogy

Excessive noise produced from any source is considered as negative impact on human health and environment. GREEN EHSS team conducted the noise level measurement inside and outside of the building. In order to assess the noise levels from the potential noise sources, the noise levels are measured at potential sources by using a digital noise level meter, 5T436355.

Figure 5.21 Photos of Noise Monitoring Device

Noise levels were measured at the potential operation areas. National Noise Emission standards is utilized as a reference to assess the occupational noise emission from the operation areas whether the noise levels affect the employees within the operation areas. Since the distance between the operation areas and nearby residential areas are significantly far, there is no environmental noise pollution.

8 hours Occupational noise level is 87 dB and the noise monitoring results showed that only noise level at the generator room was higher than acceptable level of 87dB.
The noise level at the generator room was measured inside the room while running the generator. However, the generator is operated during the city power outrage period. In addition, the generator is placed in a concrete building that is away from the operation areas.
The noise emitted from the generator room is unlikely to cause significant impact on the employees.

Noise level is monitored within 8 hours period. Noise monitoring points and coordinate are shown in Figure 5.22 and Table 5.18.

Table 5.18 Geographic Position of Air and Noise Monitoring Points within Padonmar Soap Factory

No.	Direction	North	East	Elevation
1	Stimplex Plodder	16 ° 33.620 ′	097 ° 34.990 ′	53
2	Soap Pan	16 ° 33.627 ′	097 ° 35.012 ′	36
3	Mazzoni	16 ° 33.627 ′	097 ° 35.002 ′	-
4	Virgo	16 °33.621 ′	097 ° 35.003 ′	50
5	Boiler	16 ° 33.630 ′	097 ° 35.012 ′	46
6	Generator	16 ° 33.630 ′	097 ° 35.024 ′	57
7	Waste Water	16 ° 33.556 ′	097 ° 35.147 ′	417
8	Waste Water	16 ° 33.599 ′	097 ° 35.067 ′	14
9	store	16 ° 33.584 ′	097 ° 35.023 ′	135
10	Gate	16 ° 33.588 ′	097 ° 34.959 ′	7
11	Tube Well	16 ° 33.508 ′	097 °35.011 ′	35

Figure 5.22 Geographic Position of Air and Noise Monitoring Points within Padonmar Soap Factory

Noise emission levels for general industry provided in the National Environmental Quality (Emission) Guidelines is used as a Standard guidelines to assess the noise emitted from the Factory's operations.

Table 5.19 Noise Level Standard

Receptor	**One Hour LAeq (dBA)[a]**	
	Daytime 07:00-22:00 (10:00-22:00 for Public holidays)	**Nighttime 22:00-07:00 (22:00-10:00 for Public holidays)**
Residential, Institutional, educational	55	45
Industrial, commercial	70	70

[a] Equivalent continuous sound level in decibels

b) Results

Baseline noise quality was measured during the site visit on June 11st, 2019 at potential noise sensitive places including factory workplace. Monitored data is shown in Table 5.20.

The factory is considered as an industrial operation, therefore, 70dB (A) is used as a standard noise level for both day and night. Based on the monitoring results mentioned in Table 5.20, noise levels at generator, boiler and Mazzoni areas were higher than acceptable level. The noise levels at other areas are acceptable.

The highest noise level is recorded at the generator room with 98 dB, however, the generator sets are placed in the separated sound proof room.

Factory must provide workers with hearing protectors such as ear plug and ear muff to prevent the high level of noise exposure.

ဆူညံသံ၏ သက်ရောက်မှု အနေဖြင့် စက်ရုံဧရိယာကျယ်ဝန်း၍ စက်ပစ္စည်းများလည်း Auto System ဆောင်ရွက်သဖြင့် အသံထွက်ရှိမှုသည် သက်ဆိုင်ရာလုပ်ငန်းခွင် နေရာမှလွဲ၍ စက်ရုံဝင်းဧရိယာ အတွင်းတွင် ဆူညံသံမထွက်သလောက်ဖြစ်သဖြင့် ပတ်ဝန်းကျင် ကျေးရွာများအပေါ် ဆူညံသံ ထိခိုက်မှု မရှိပါ။

Table 5.20 Monitoring Measurement of Noise (dBA)

Area	Noise level (dB)
Stemplex Plodder	76.8
Soap Pan	75.5
Mazzoni	82.8
Virgo	78.0
Boiler	82.4
Generator	98.6
Waste Water Treatment (1)	48.0
Waste Water Treatment (2)	53.7
store	58.3
Gate	51.0
Tube Well	60.6

Average Noise Level	**69.6**

c) Existing Control Measures

Generators sets are placed in the separated concrete room. Workers do not required to work inside the generator room for long hours. Only short term exposure is created in the generator room. Noisy equipment are regularly inspected and maintained.

5.4.5 WATER QUALITY

5.4.5.1 SURFACE AND GROUND WATER QUALITY

a) Methdology

There is no river or stream near to the Padonmar Soap factory. The Factory uses mainly tube well water for production. For drinking water, the staff consume only drinking water bottles from the suppliers. The stored water from the pond is pumped and transported to the water tanks. The water samples were collected from the tube well, final discharged water pond and drainage within the factory and the outside factory.

WHO quality standard is referred as a drinking water quality standard. The factory does not use the discharged water as a drinking water source, however, using the higher standard, the factory has assumed the discharged water quality is acceptable.

In order to analyze the ground water quality, the water sample was gathered from the tube well licated within the factory.

The sentinized water bottles were used and sent the sample bottles to the lab at Myanmar Water Engineering and Products Co., Ltd. for detailed water quality tests.

Results

Table 5.21,22,23 and 24 indicated the water quality results of collected samples from the factory's tube well, drainages from the inside and outside of the factory and final discharged water from the treatment pond.

According to the results, water sample collected from tube well was higher in total hardness, iron and Calcium incomparison with WHO's drinking water guidelines.

The results of drainage waters from inside and outside the factory and from final treated water were compared with YCDC's Water Quality Targets. Both drainage waters qualities lie within the YDCD's target range.

The results from the final treated water showed slightly higher BOD values of 106 ppm incomparison with the values 20-60 ppm of YCDC target range. Conparasions between sample water qualities and guidelines water quality Standards are shown in Table 5.21,22,23 and 24.

Table 5.21 Surface Water Quality Test Results of the Factory's Tube Well

Parameters	Sample Result	WHO Standard
Temperature		-
pH	7	6.5 – 8.5
Colour	**Slightly Turbid**	Clear
Conductivity	239.06 micro S / cm	-
Total Dissolved Solid	153 mg/l	< 250
Total Hardness	110 mg/l as $CaCO_3$	< 16
Total Alkalinity	120 mg/l as $CaCO_3$	< 250
Sodium (as Na^+)	-	-
Calcium (as Ca^{++})	36.07 mg/l as $CaCO_3$	< 8
Magnesium (as Mg^{++})	4.76 mg/l as $CaCO_3$	< 8
Potassium (as K^+)	--	-
Iron (as Fe^{++})	1.2 mg/l	< 0.3
Chloride (as CL^-)	10 mg/l	< 250
Sulphate (as $SO_4^=$)	--	-
Bicarbonate (as HCO_3^-)	120 mg/l as $CaCO_3$	< 250
Carbonate (as $Co_3^=$)	**ND** mg/l	< 250
Hydroxide (as OH^-)	- - mg/l	< 100

5.4.5.2 DISCHARGED WASTE WATER QUALITY

a) Methodlogy

In order to analyze the treated effluent water quality, the water sample were collected from the final treatment pond and the drainages. The collected water sample were sent to the lab at Myanmar Water Engineering and Products Co., Ltd. to analyze crucial parameters in the final treated water.

The YCDC Target range for the industrial water quality is referred to ensure the factory meets the industrial water quality standard.

b) Results

The results of drainage waters from inside and outside the factory and from final treated water were compared with YCDC's Water Quality Targets. Both drainage waters qualities lie within the YDCD's target range.
The results from the final treated water showed slightly higher BOD values of 106 ppm incomparison with the values 20-60 ppm of YCDC target range. Conparasions between sample water qualities and guidelines water quality Standards are shown in Table 5.22,23 and 5.24.
The EMP team collected the final discharge water during the raining season, the run-off rain water washed out the soil particles and other excessive organic materials such as decomposec leaves, animal wates into the pond, a result, BOD in the pond was higher.

The crucial parameters in the treatment water pond and drainage were analyzed.

Table 5.22 Water Quality Results from the drainange inside the factory

Sr.	Item	Drainage(Inside)	YCDC Target range
1	Dissolved Oxygen (DO)	4.9	>1 ppm
2	Biochemical Oxygen Demand (BOD_5) (5days at 20˚C) (mg/L)	9	20-60 ppm
3	Chemical Oxygen Demand (COD) (Adaptation of the USEPA 410.4 Approved method) (mg/L)	40	<200 ppm
4	pH effluent water	7.55	6<pH<9.6
5	Suspended solids (SS)	27	<500 ppm
6	Nitrate (NO_3^-N)	2.1	N/A
7	Oil and Grease	6.0	N/A

Table 5.23 Water Quality Results from the drainange outside the factory

Sr.	Item	Drainage(Outside)	YCDC Target range
1	Dissolved Oxygen (DO)	5.0	>1 ppm
2	Biochemical Oxygen Demand (BOD_5) (5days at 20˚C) (mg/L)	19.7	20-60 ppm
3	Chemical Oxygen Demand (COD)(Adaptation of the USEPA 410.4 Approved method) (mg/L)	6	<200 ppm
4	pH effluent water	6.49	6<pH<9.6
5	Suspended solids (SS)	9	<500 ppm
6	Nitrate (NO_3^-N)	1.4	N/A
7	Oil and Grease	9.0	N/A

Table 5.24 Water Quality Results from Final Discharged Water Pond

Sr.	Item	Waste Water Pond	YCDC Target range
1	Dissolved Oxygen (DO)	4.2	>1 ppm
2	Biochemical Oxygen Demand (BOD_5) (5days at 20˚C) (mg/L)	106	20-60 ppm
3	Chemical Oxygen Demand (COD)(Adaptation of the USEPA 410.4 Approved method) (mg/L)	20	<200 ppm
4	pH effluent water	7.23	6<pH<9.6
5	Suspended solids (SS)	123	<500 ppm
6	Nitrate (NO_3^-N)	0.0	N/A
7	Oil and Grease	8.0	N/A

c) Existing Control Measures

Two sludge pits and two final effluent treatment ponds exist in the Factory areas. Semi-liquid sludges are boiled to reuse and sell for industrilal uses. The final discharged water in both treatment ponds were dried and small vegetations were recorded in the ponds. The water levels in the treatment ponds were raied during raining season due to rain water.

The factory has engaged a contractor to install HTP linings at the ponds to protect impacts on soil and underground water qualities. HTP lining installation will be managed by Modern Pioneer Industriual Group Co., Ltd. 2 K – Tech Engineering Co., Ltd will be responsible for new waste water treatment factory.

Figure 5.23 Renovations of Waste Water Treatment Ponds

Figure 5.24 Drainage Water and Final Treated Water Samples Collection

5.4.6 SOIL QUALITY

Within factory compound, trees and shrubs are sacattered around. Monitroing of soil pH and moisture were conducted at five locations including wastewater treatment ponds. Operation areas have concrete floorings. The values of soil pH at the monitoring lie from 7 to 8. The results show soil quality is neutral and suitable for cultivation. Detiled results are indicated in Table 5.25.

Figure 5.25 Soil Quality Monitroing

Figure 5.26 Factoryations within the Factory

Table 5.25 Soil pH and Moisture

Direction	PH	Moisture
Generator	7.2	1
Waste Water Treatment (1)	6	1.5
Waste Water Treatment (2)	8	2
store	7	0.2
Tube Well	6.5	0.5

5.5 BIOLOGICAL ENVIRONMENT

The observations on biodiversity show the following features:

Table 5.26 Existing Condition of Ecological Resources

Ecological Resources	Existing condition
Fisheries, aquatic biology	The nearest river is Thanlwin river. Fresh water fish species are residing in the creek.
Wildlife	The existance of the smallscale soap factory does not impose any significant impacts or endanger the existing wildlife.
Forest	As the project is located in Mon State, there are preserve sanctuaries near to the factory. All the flora and fauna is of common category and well adopted to manmade agricultural ecosystem.
Protect areas	The project site and its surroundings, upon investigation, are not classified as protection zone.

5.6 TRANSPORTATION

The factory is located at the urban area near to Mawlamyine township and surrounded with residential areas. The nearest public road is Mawlamyine -Yangon road. The nearest town is Montamma.

Delivery trucks use approximately 10 trucks/ month on Mawlamyine -Yangon road to transport raw materials from and final porducts from the factory to the destinatins. The delivery trucks mainly only use Yangon- Mawlamyine road. The delivery routes to and from the factory are shown in Figure 5.27.

Figure 5.27 Traffic Route

6. ENVIRONMENTAL IMPACT ASSESSMENT AND MITIGATION MEASURE

6.1OVERVIEW OF IMPACTS

Based on the scoping of the factory operations, site survery and literature references, potential impact specific to the factory operation phase is regarded as discharge of operation effluents. With timely and proper implementation of this EMP and application of appropriate mitigation measures, the potential impacts can be prevented or minimised. The social outcomes of the factory are expected to be positive by creating employment opportunity. Table 6.6 provides summary of environmental risks related to the construction, operation and decommission phases of the project.

6.2IMPACT PREDITION METHODOLOGIES

To identify impacts, the methods of description of the environment likely to be affected and description of the likely significant effects are used.

In terms of impact analysis, the following considerations have been applied.

a. Severity

- Magnitude (severity) of impact (will the impact be of high, moderate or low severity?); and
- Scale/extent of impact (will the impact affect the national, regional or local environment, or only that of the site?).

Table 6.1 Evaluation of Severity/ Magnitude of Impacts

Environmental Aspects	Severity of Impact							
	Scale of Impact	Score	Scale of Impact	Score	Scale of Impact	Score	Scale of Impact	Score
	Low	1	Medium	2	Critical	3	High	4
Reversible/ Irreversible	Reversible		Reversible		Irreversible		Irreversible	
Extent	Site		Local		Regional		National	
Duration	Short Term		Medium Term		Long Term		Permanent	
Effluent	Non-toxic pollutant, easily biodegradable (ex: treated		Low toxicity pollutant(e.g., treated		Toxic pollutant, production waters with chemical		High toxicity pollutant	

	domestic waters, clean drainage effluents)	production waters)	content and poor treatment.	
Gaseous emissions (abnormal situation)	Gas pollutant (PM, NOx, SO_2, SO_3, CO_2)	Gas < 1 kg of pollutant. Flaring rate increase of 100 000 m^3 per day)	Gas 1 kg to 300 kg of pollutant Flaring rate increase:100 000 m^3 /d to 3Mm^3/d	Gas > 300kg of pollutant. Increase of flaring rate> 3Mm^3/d
Waste Production	Easily recyclable wastes	Inert wastes	Industrial wastes, low toxicity, available local treatment	Industrial toxic waste requires specific treatment.
Hazardous wastes discharge	Low Quantity and low effect on environment	Average quantity spilled and / or low effect on environment (pollution of soils and surface waters)	Important quantity and impact on environment	Very important quantity and impact on environment (soils and water table pollution)
Soil pollution	Low effect on environment, no remediation required.	Moderate effect on environment	Major damage on land requiring mitigation and remediation.	Immediate planning and action required. International response required
Land Use	Affective use of lands	Somewhat benefit to the locals	Only benefit to the project owner and no benefit to locals	Benefit to no party
Use of natural resources: water, energy, raw materials	Use of renewable resources, use of recyclable resources	Use of resources with sustainable practices Less significant effect of a critical asset	Significant effect of a high asset	Significant loss of critical assets and resources
Impacts on biodiversity	Very small population of non- significant	Significant loss of species and	Major damage on High environmental	Loss of Ecosystem Extinction of

	fauna and flora may be affected.	vegetation at local level	sensitive areas such as primary forest, endangered flora and fauna species	endangered species regionally
Other impacts on ecosystems: noise, vibration, etc.	Insignificant short term disturbance with no environmental 'scarring ' or injuries.	Moderately environmental damages and injuries that can be readily absorbed but management effort is still required to minimize the impact.	Severe damage resulting from a significant event that can be managed under normal procedures.	Catastrophic damage with potential long term consequences affecting the environmental integrity and livelihood of the area.
Public Health & Safety	No nuisance or health effect and safety hazards to human.	Acute or Chronic effect of some sensitive human	Chronic effect of human health	Serious Health impacts or death of a person or people

b. Probability of Occurrence (O)

- Probability of occurrence (how likely is it that the impact may occur?); and
- Duration of occurrence (how long may it last?)

This criterion is corresponding to the frequency of the impact occurrence.

Table 6.2 Evaluation of Probability of Occurrence

Probability of Occurrence	**1**	Annual frequency or never occurred
	2	Monthly Frequency
	3	Weekly Frequency
	4	Daily frequency or chronicle

c. Control (C)

This criterion is used to evaluate the level of control of the aspect, depending on the detection available means, the operating procedures and the precautions taken.

Table 6.3 Evaluation of Level of Existing Controls

Level of Control	**1**	**Highly Control**	Easy detection and control with operating procedures regularly checked and/or important precautions taken to lower impact.
	2	**Medium Control**	Detection and control with operation procedures not regularly checked and/or average precautions taken to lower impact.
	3	**Low control**	Detection without control (operating procedures not adapted) and/or few precautions taken to lower impact.
	4	**No control**	No detection and/or no precaution taken to lower impact.

Table 6.4 Matrix of Significant Level of Environmental Risks

Severity (S)	Probability (P)	Control (C)	Significant Level (S x P x C)	Addition Control
4	4	4	64	Provide alternative
	3	3	36	Must be implemented
	2	2	16	Should be implemented
	1	1	4	Regular Review
3	4	4	48	Must be implemented
	3	3	27	Should be implemented
	2	2	12	Regular Review
	1	1	3	Regular Review
2	4	4	32	Should be implemented
	3	3	18	Should be implemented
	2	2	8	Regular Review
	1	1	2	Regular Review
1	4	4	16	Should be implemented
	3	3	9	Regular Review
	2	2	4	Regular Review
	1	1	1	Regular Review

Table 6.5 Score Evaluation

Risk Score	Significance of Impact	Significance Description	Remark
1-15	**Low**	**No significant impact**	No additional risk control, however, require frequent review.
16-32	**Medium**	**Light impact**, try to improve	Require additional risk control measures and regular review.
33-48	**High**	**Significant impact**, real necessity to improve	Must provide appropriate risk control measures and continuous monitoring the effectiveness of improvement
49-64	**Extreme**	**Unsustainable situation**	Require alternative for the impact defined.

6.3 SUMMARY OF POTENTIAL IMPACTS

The Environmental risk assessment has been developed through assessing Severity/ Magnitude of the impact(s), Occurrence/Probability of the impacts(s) and existing control measures. Table 6.6 stated summary of environmental risks related to the factory construction, operation and decommission phases.

Table 6.6 Environmental Impact Assessment Matrix for Operation

Potential Impact	Project Activities	Existing Control	Probability	Existing Control	Severity	Score	Score Evaluation	Significant	
								Before Mitigation	After Mitigation
Wastewater									
-Industrial Process Wastewater discharge	-Water use during manufacturing of soaps	-Waste water treatment ponds -Regularly checking - HTV sheets will be provided inside the ponds	2	4	1	8	Low	Medium	Low
-Sanitation Waste Water	- Wastewater generated from workers and staff	- Sludge waste from septic tanks is discharge periodically	1	4	1	4	Low	Low	Low
Air Pollution									
-Exhaust gases	-Exhaust gases from diesel generator, boiler	- The factory uses the generator only when	2	2	2	8	Low	Medium	Low

	and vehicles movements	the power supply outage -Regular inspection of boiler -Only diesel is used as boiler fuel -Vehicle maintenance							
- Dust emissions	- Emission of particulate matters, $PM_{2.5}$ and PM_{10} from steam boilers, from raw materials transportation, handling	-Regular maintenance and inspection of boiler - Regular water spraying at the unpaved roads - Raw materials are stored inside secure bags or container	2	2	2	8	Low	Low	Low
Noice and Vibration									
Noise exposure	-Vehicle movement, generator, pumps and boiler -Processed machinery	- Regular maintenance of vehicles and pumps and boiler	1	3	4	12	Low	Medium	Low

		- Boiler is placed inside the separated concrete room -Generator is located inside the concrete building -Oily and regular maintenance of the machines to reduce noise emission. -Provide hearing protector like ear plug to to the workers who involve the noisy operation (generator man, boiler man) or work near to the noise sources.							
Waste									
Disposal of Solid Wastes	- Solid Waste from production activities	- Soaps wastes are reused and recycled.	1	4	1	4	Low	Low	Low

	such as packing and operation.	Other paper and plastic wastes are disposed at the landfill area.							
Disposal of Hazardous Wastes	-Spillage chemicals from storage and processed areas	- Chemicals are stroed at the secured concrete room. - Spillage wastes are disposed at the landfill area.	1	4	1	4	Low	Low	Low
Soil and Water Quality									
Soil Contamination Water pollution	- Solid wastes from the processing activities - Liquid wates from process and treatment ponds -Spillage of diesel and chemicals on the land that can cause underground water	-Waste water treatment ponds will be provided secured HTV as liners. -The factory has engaged Model Pionner Industrial Group Co,. Ltd. for HTV installation.	2	1	4	8	Low	Medium	Low

	contamination in a long run	Spillage are cleared immediately and storage and processed areas are provided with concrete floors.							
Safety and Health Hazards									
Occupational Health and Safety	-Chemical exposure by storing, handling and disposing activities.	-Chemicals are properly stored. -Chemical mixing area is well ventilated. -Workers are provided training. -Workers are provided sufficient PPE.	2	4	1	8	Low	Low	Low
	- Physical hazards and Ergonomic hazards from manual	• Relevant workers are trained to educate occupational health and safety hazards and risks. •	2	1	4	8	Low	Medium	Low

	handling, use of machines and equipment	• Warning signage are provided around the project are. • Sufficient control measures are provided.							
Community Health and Safety	-Waste water effluent. -Traffic accident by delivery activities. -Fire hazards posed by storage of chemical.	-Process water is treated before discharged. - New HTV sheets will be installed inside the treatment ponds. -All truck drivers are trained and licensed. -Chemicals are properly stored. -Chemical storage area is well ventilated and sufficient firefighting equipments are provided.	1	4	2	8	Low	Low	Low

		-Workers are provided fundamental firefighting training.							
Emergency Situation	Emergency situations such as fire, explosion, and collapse of structure and malfunction of processing machine and pipeline	• Trained operators are assigned at the processing areas. • Operators watch and inspect regularly the processed machines. • Fire Safety plan is developed and workers are provided with basic fire fighting knowledge. • Sufficient numbers of fire fighting equipment are provided. • Emergency Response team is organized.	1	2	4	8	Low	Medium	Low

Vehicular movements within the factory and on the public roads	-Movement of the factory vehicles delivery vehicles and private vehicles -Use of public roads	• Speed limit signage are installed. • Ensure that all vehicle drivers are properly trained and licensed.	1	2	4	8	Low	Medium	Low
Social Factor									
Cultural heritage	- There are no historical and cultural monuments located nearby the project site.	--The factory is located in the designated industrial zones.	-	-	-	-	-	-	NA
-In voluntary Resettlement	- No physical resettlement is necessary.	- The factory is located in the designated industrial zones.	-	-	-	-	-	-	NA
-Social integration	-Potential for conflict between people of different backgrounds and cultural beliefs.	-- The factory is located in the designated industrial zones. - The factory complies with laws and	-	-	-	-	-	-	NA

		relevant internal guidelines.							
-Ethnic minorities and indigenous peoples	- There are no indigenous people in the project area.	-The factory is located in the designated industrial zones.	-	-	-	-	-	-	NA
Risks for infectious disease such as AIDS/HIV	-Influx of people may cause negative impact on health condition of local people.	- The significance assigned to this impact for the operation phase is considered to be low with mitigation by knowledge and health care support.	1	1	4	4	Low	Low	Low
Community Development									
Employment	Positive impact for operation phase. It is expected to accept and to be employed in the project's activities with high hopes for	-Employment creation to the locals (more than 1500 factory workers to be recruited from the local areas)	4	4	4	64	+ High	+ High	+ High

	improvement in neighborhood	- Employment creation would bring higher living standard and education status.							
Corporate Social Responsibility	-CSR activities	-CSR budget is allotted as 2% of the annual profit.	1	1	3	3	+Low	+Low	+Low

Nil – Zero Impact, + - Possitive Impact

6.4 GUIDELINE AND STANDARD

Ministry of Natural Resources and Environmental Conservation - MONREC (former Ministry of Environmental Conservation and Forestry - MOECAF) issued National Environmental Quality (Emission) Guidelines, NEQGs, in December 2015 according to the provision of Paragraph (42), Sub-paragraph (b) of the Environmental Conservation Law (2012).

Table 6.7 Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges (General Application)[3]

Parameter	Unit	Guideline Value
5-day Biochemical Oxygen Demand	mg/l	50
Ammonia	mg/l	10
Arsenic	mg/l	0.1
Cadmium	mg/l	0.1
Chemical Oxygen Demand	mg/l	250
Chlorine (Total residual)	mg/l	0.2
Chromium (Hexavalent)	mg/l	0.1
Chromium (Total)	mg/l	0.5
Copper	mg/l	0.5
Cyanide (Free)	mg/l	0.1
Cyanide (Total)	mg/l	1
Fluoride	mg/l	20
Heavy Metals (Total)	mg/l	10
Iron	mg/l	3.5
Lead	mg/l	0.1
Mercury	mg/l	0.01
Nickel	mg/l	0.5
Oil and Grease	mg/l	10
pH	S.U[a]	6~9
Phenols	mg/l	0.5
Selenium	mg/l	0.1
Silver	mg/l	0.5
Sulfide	mg/l	1
Temperature Increase	˚C	<3[b]
Total Coliform Bacteria	100ml	400
Total Phosphorous	mg/l	2
Total Suspended Solids	mg/l	50
Zinc	mg/l	2

[a] Standard Unit

[b] At the edge of a scientifically established mixing zone which takes into account ambient water quality, receiving water use, potential receptors and assimilative capacity; when the zone is not defiend, use 100 meters from the point of discharge

Table 6.8 Air Quality Standards

Parameter	Averaging Period	Guidelines Value µg/m³
Nitrogen Dioxide	1-year 1-hour	400 200
Ozone	8-hours daily maximum	100
Particular matter PM_{10}[a]	1-year 24-hour	20 50
Particular matter $PM_{2.5}$[b]	1-year 24-hour	10 25
Sulphur Dioxide	1-hour 10-minute	20 500

[a] Particular matter 10 micrometer or less in diameter

[b] Particular matter 2.5 micrometer or less in diameter

Source: National Environmental Quality (Emission) Guideline for Myanmar, 2015 Dec 29

Table 6.9 Noise Level Standard

Receptor	One Hour LAeq (dBA)[a]	
	Daytime 07:00-22:00 (10:00-22:00 for Public holidays)	**Nighttime 22:00-07:00 (22:00-10:00 for Public holidays)**
Residential, Institutional, educational	55	45
Industrial, commercial	70	70

[a] Equivalent continuous sound level in decibels

6.5 ENVIRONMENTAL IMPACT AND MITIGATION MEASURES FOR CONSTRUCTION PHASE

Padonmar Soap factory and its associated facilities were already build since 2003. There is no plan to construct new facilities or other infrastructure in near future. Therefore, environmental impacts and mitigation measures for construction is not applicable for this EMP report.

6.6 ENVIRONMENTAL IMPACT AND MITIGATION MEASURES FOR OPERATION PHASE

After evaluating the environment impacts of the **Padonmar Soap factory, Green EHSS** has identified environmental risks and prepared mitigation measures to protect the environmental and comply with Myanmar environmental legislation. Environmental impacts and mitigation measures are divided into three phases, construction phase, operation phase and decommissioning phase.

6.6.1 AIR EMISSIONS

a. Potential Impacts

Based on the baseline assessment and site survey at the Padonmar Soap factory, the following sources are identified as air emission sources.

- Transportation (Diesel emissions)
- Boiler stack emissions
- Generators

i. Impacts of Transportation

The production of palnt is considered as small scale and seasonal. In addition, the transportation route passes through the main road and only small numbers of trucks used the road. Emission from delivery trucks and other traffics during production period create minor impact on the environment and community.

ii. Impacts of Boiler stack emissions

Boiler is used as an energy source. Boiler is also regularly inspected. However, due to potential emission form the process, the impact level is assumed as Medium.

iii. Impact from Use of Generator

The generator room is separated built with concrete and steel structures. The generators are used only during production period. The genrators are regularly maintained and inspected. The impacts form the generator can be assumed as low.

Table 6.10 Assessment of Significant level of Impact on Ambient Air Quality

Project Phases and Activities	Existing Control Measures	Impact Assessment					Significant Level	Requirement of Additional Control
		Nature	Probability	Existing Control	Severity	Score		
Manufacturing								
Emission of particulate matters , dust $PM_{2.5}$ and PM_{10} and gases from boiler, generators and from unpaved access roads	• Regular maintenance and inspection of boiler • Seperated generator room • Regular water spraying at the unpaved roads, coal storage areas	Negative	4	2	2	16	Medium	Yes
Demolition								
Emission of particulate matters and dusts from demolition of structures	• The factory is a small scale factory and emission of dusts are considered temporay.	Negative	3	2	2	12	Low	Yes

6.6.1.1 MITIGATION MEASURES

The following mitigation measures can be applied to manage impacts on air quality impacts.

- Generator is equipped with air pollution control program.
- Install proper filer at the boiler.
- Ensure to conduct regular maintainance to increasing boilers efficiency.
- All the heavy equipment and machinery shall be fitted with air pollution control devices that are operating correctly.
- Use of vehicles having efficient engines and exhaust system.
- More comprehensive cleaning should be carried out as often as necessary to control dust emission from loading and unloading raw materials;

- Use of mask and efficient ventilation system in factory;
- Effective water spraying will be done on the access roads to control dust during dry season (if required); and
- By increasing roadside factoryation, localized air pollution will be reduced due to the blocking effect of foliage through photosynthesis.

ဘွိုင်လာမှထွက်ရှိသည်အခိုးအငွေ့များနှင့် ပတ်သတ်၍ အမှုန့်များလျော့ကျ စေရန် Dust Collector တပ်ဆင်ဖြင်းနှင့် Boiler မှထွက်သောပြာနှင့် မီးခိုးများအား အုတ်ကန်တွင် ရေဖြင့်ဖမ်းယူပြီး အုတ်ကန်အတွင်းသို့ ရောက်ရှိစေပြီး ရေကောဖြင့် စစ်သည်စနစ်ကြုံးယူစွန့်ပစ်ပါသည်။

6.6.2 ENVIRONMENTAL AND OCCUPATIONAL NOISE IMPACT

a. Potential Impacts

In terms of environmental noise pollution, the Factory is located far from residential areas as well as surrounded with dense factoryation. No envieronmental noise is created from this small sacle production.

However, use of machines and noisy processes from the production can emit high level of noise at the operation areas. The potential noise impact is considered as occupational health hazard for workers working near to the noisy machines or processes.

Following activities would result high noise exposure.

- Operation of machines and equipment
- Operation of generator
- Vehicle / traffic movement

Based on the nosie level monitoring at the potential noise sources, exceed noise levels were recorded at certain machines. Generator is placed in the enclosed room and noise exposure from the generator can be considered temporary. It is recommended to provide hearing protectors for the workers who need to enter into the generator room.

Recorded noise levels near to the processed machines were higher than acceptable level. The occupational noise impact to the workers and staff is considered as Medium. It is recommended to inspect and conduct regular maintenance for noisy machines and equipment. Workers must be provided with proper hearing protectors and ensure

to wear the protectors. It is suggested to install silencer at the noisy machine if applicable.

Table 6.11 Assessment of Significant level of Noise Impact

Project Phases and Activities	Existing Control Measures	Impact Assessment					Significant Level	Requirement of Additional Control
		Nature	Probability	Existing Control	Severity	Score		
Manufacturing								
Use of noisy machine and equipment Mazzoin Area	• In termes of environmental noise, the Factory is located away from the residential areas. • So as for occupational nose hazard, the workers are provided with hearing protectors for working near to the noisy machine. • Only authorized person(s) are allowed at the operation areas. • Workiers in high noise area will be provided the ear protecting device.							
Generator	• Generator is used when power outage occurs during the factory operation. It is rarely used and the generator room is separated from the workers' ooperation areas.							

boilor	• Boilor room is away from the working area. The room is constructed with concrete walls and noise emission is insignificant.	Negative	2	3	4	16	Medium	Yes
Demolition								
Noise emission can occur during demolition of structures.	• The noise exposure will be temporary and short period.	Negative	3	2	2	12	Low	Yes

6.6.2.1 MITIGATION MEASURES FOR OCCUPATIONAL NOISE IMPACTS

Mitigation measures for noise will include

- Regular maintenance is practiced for factory machinery and equipment,
- Proper maintenance of generator and engineered noise controls;
- All preventive measures such as regular operation and maintenance of pumps, motors, and compressor should be carried out,
- Monitor the noise level at the processing areas as per the monitoring schedules,
- Installation of noise enclosure or silenser at the noise sources, and
- Provision of hearing protectors such as earplugs, ear mufflers.

6.6.3 IMPACT ON WATER QUALITY DUE TO EFFLUENTS

a. Potential Impacts

Surface water body is Thanlwin River and located at approximately 6.30 kms east of the factory. It is unlikely to cause an impact on Thanlwin river from the production activities of Padonmar Soap factory due to zero discharge ofeffluent from the factory to the river.

The effluents from the process can impact on underground water quality by accumulating high concentration of BOD, COD and suspended solids in a long term. The values of Oil, Greases, BOD, and COD results of drainages and wastewater treatment pond lie within the YCDC' starget range except a slightly higher BOD values at the final discharged pond.

The factory has engaged a contractor to install HTV sheets inside the treatment ponds to prevent any potential impacts on soil and underground water quality. For these reasons, the impact level on the underground water quality is assumed Medium. It is recommended to monitor the underground water quality regularly.

6.6.3.1 MITIGATION MEASURES

The following mitigation measures are recommended for potential impacts on underground water quality.

- Ensure to keep the acceptable level of sludge in the pit to prevent oberflow or leakage from the pit.
- Conduct regular inspection and maintenance of effluent transporting pipes.
- Test and monitor regularly effuent quality from the final pond.
- Monitor water quality before discharge it to the public water course.
- If the final discharged water quality is unacceptable, review and upgrade the treatement system.
- Leakage and spills of engine oils and greses from the maintenance activities must be cleaned immediately.
- Provide a secondary tray at the maintenance workshop.

Table 6.12 Assessment of Significant level of Impact on Water Quality

Project Phases and Activities	Existing Control Measures	Impact Assessment					Significant Level	Requirement of Additional Control
		Nature	Probability	Existing Control	Severity	Score		
Manufacturing								
Processed water from the production of soap	• Proper drainage system is provided. • Treatment system is provided. • HTV sheets will be provided inside the ponds.	Negative	4	2	4	32	Low	Yes

Spillage of diesel and chemicals on the land that can cause underground water contamination in a long run	• Spillage are cleared immediately and storage and processed areas are provided with concrete floors.	Negative	3	2	2	12	Low	Yes
Demolition								
It is less likely to discharge wastewater from demolition.	• The factory will ensure to remove or treate effluents before demolition	Negative	2	2	2	8	Low	Yes

နောက်ဆုံးစီ'ဆင်းရေကန် ရှိ ရေအရည်အသွေးတိုင်းတာမှုရလဒ်၏ BOD တန်ဖိုးမှာ ကျော်လွန်နေသော်လည်း အဆိုပါ ရေကန်မှရေသည် အခြားနေရာများသို့ စီးထွက် ခြင်းမရှိဘဲ နွေရာသီတွင် ခန်းခြောက်ခြင်းဖြစ်သဖြင့် ရေအရည်အသွေးအပေါ် ထိခိုက်နိုင်မှု မဖြစ်နိုင်ပါ။

6.6.4 IMPACTS FROM WASTES

6.6.4.1 NON-HAZARDOUS SOLID WASTES

a. Potential Impacts

The main solid wastes from the manufacturing of soaps are disqualified products, pieces of soaps from the processed machines and plastics and papers from the packing area and small quantity of domestic wastes from office activities.

Soap wastes are mainly reused in the operations. Paper wastes, plastic wastes and other domestic wastes are disposed at the landfill area.

6.6.4.2 MITIGATION MEASURES FOR NON-HAZARDOUS SOLID WASTES

- Domestic waste should be disposed in bins and segregated by types of waste to recycle some wastes such as drinking water bottles.
- Sufficient waste bins for domestic waste will be provided within the factory premises.

Table 6.13 Assessment of Significant level of Impact on soil quality from Solid Wastes

Project Phases and Activities	Existing Control Measures	Impact Assessment					Significant Level	Requirement of Additional Control
		Nature	Probability	Existing Control	Severity	Score		
Manufacturing								
Solid wastes from the processing activities and unused by products	• Soap wastes are reused in the manufacturing. • Small quantity of domestic wastes and packing wastes are disposed in the landfill area.	Negative	3	2	2	12	Low	No
Demolition								
In general, solid wastes from demolition activies are reusable.	• The factory will reuse or recyle the wastes such as timbers, woods, metals and steel structures. • Unusable wastes will be disposed at the designated landfill or by external waste collectors.	Negative	2	2	2	8	Low	No

6.6.4.3 HAZARDOUS WASTE

a. Potential Impacts

The raw materials required in the soap production processes are both organic and inorganic materials. Two chemicals such as Caustic Soad and Sodium Silicate are used

in the production. Both chemicals are regarded as corrosive chemicals which can cause eyes and body irritation, burn and eye damage.

The other hazardous wastes such as spillage and oil, grease and diesel wastes may be discharged from the maintenance areas. The processed area is provided with concrete floor. Potential spillage and oil, grease, lubricants, oily cloths, oil filters and fuel wastes discharged are considerably small amount.

A few quantities of office related hazardous wastes such as used battries and cartridges are disposed. The impact form hazardous wastes of the factory, therefore, is regarded as Low.

6.6.4.4 MITIGATION MEASURES FOR HAZARDOUS WASTE

- Immediate clean of spillage and leakage of oil, grease, lubricants and fuels.
- Direct or indirect reuse/recycling of used oil and empty container;
- Keeping hazardous waste container with clearly marked at isolated storage area.
- Provide secured storage unit for hazardous wastes before disposal.
- Spill control equipment should be kept in the assigned hazardous waste storage areas.
- Train all employees to identify, reduce and properly handle wastes and provide peroper PPE.
- Dispose at only hazardous waste landfill area if applicable.

Table 6.14 Assessment of Significant level of Impact on Soil and Underground water quality from Chemical Wastes

Project Phases and Activities	Existing Control Measures	Impact Assessment					Significant Level	Requirement of Additional Control
		Nature	Probability	Existing Control	Severity	Score		
Manufacturing								
Spillage of Caustic Soda and Sodium Silicate from storage and loading areas.	• The storage and loading area are provided with concrete floor. • Spillages are immediately cleaned.	Negative	3	2	2	12	Low	No
Spillage of diesel and chemicals on the land that can cause underground water contamination	• Spillage are cleared immediately. • Maintainace areas, storage and processed areas are provided with concrete floors.	Negative	3	2	2	12	Low	No
Demolition								
Only small amount of spillage of oil, grease and fules can be released.	• The factory will ensure to clean or dry the spillage immediately. • Spillage try will be provided at fuel fiiling areas.	Negative	2	2	2	8	Low	No

6.6.5 OCCUPATIONAL HEALTH & SAFETY HAZARDS

Padonmar Soap factory is a small scale producer and total workforce is only 37 including 17 daily wage workers.

The factory management including the factory Manager shall conduct regular environmental, health and safety inspections within the factory to maintain and improve environmental, health and safety performances.

The surrounding areas of the factory are covered with trees and factoryations as a buffer zone between the Factory and nearby residential areas.In terms of community health and safety, the residental areas are considerably far from the Factory to have direct health and safety impacts such as noise pollution, air emission, odor emission and degradation of surface water quality.

Factory Manager oversees and ensure the production processes to control or mitigate the potential occupational health and safety hazards and associated risks. The relevant Managers and Supervisors closely manage the workers to perform the assigned tasks safely and healthy.

Workers are trained to handle the machine and equipment properly.

The factory managememt including the Factory Manager conducts regular environmental, health and safety inspections within the factory to maintain and improve environmental, health and safety performances.

Occupational Health and Safety issues that may be specifically associated with the soap manufacturing include the following:

- Physical hazards
- Exposure to chemicals
- Exposure to vapors and steams
- Exposure to heat from boiler use
- Exposure to noise

d. Physical Hazards

The most common risks for accidents in the factory are trips and falls caused by slippery floors, stairs, and elevated platforms, manual handling, lifting and carrying

the heavy items, the incorrect use of equipment, contact with pinch point of machines, accidents involving fruits and kenel delivery conveyor and explosions (boilers).

e. Ergonomic Hazards

Lifting, carrying, and manual handling of heavy items and repetitive works can expose ergonomic hazards during manufacturing.

f. Exposure to chemicals

Workers are exposed to chemicals such as Caustic Soda and Sodium Silicate from use an dhandling of these chemicals.

g. Noise

Noise may result from a variety of sources such as generators and noisy machines.

h. Electrical Hazards

Use of faulty or damaged electrical devices and ground fault can create a serious risk to workers. Overhead wires can also be struck by overhead lifting machines or ladder.

Table 6.15 Assessment of Significant Occupational Health and Safety Risks

Project Phases and Activities	Existing Control Measures	Impact Assessment					Significant Level	Requirement of Additional Control
		Nature	Probability	Existing Control	Severity	Score		
Manufacturing								
Manufacturing activities can expose minor to major occupational health and safety hazards such as physical, electrical, chemical, biological, ergonomic and occupational health.	• Relevant workers are trained to educate occupational health and safety. • Warning signage are provided around the project area • Sufficient control measures are provided.	Negative	2	2	4	16	Medium	Yes

Emergency situations such as fire, explosion, and collapse of structure and malfunction of processing machine and pipeline	• Trained operators are assigned at the processing areas. • Operators watch and inspect regularly the processed machines. • Fire Safety plan is developed and workers are provided with basic fire fighting knowledge. • Sufficient numbers of fire fighting equipment are provided. • Emergency Response team is organized.	Negative	2	2	4	16	Medium	Yes
Movement of the factory vehicles delivery vehicles and private vehicles within the factory and on the public road	• Speed limit signage are installed. • Ensure that all vehicle drivers are properly trained and licensed.	Negative	2	2	4	16	Medium	Yes
Demolition								
During demolition, workers can face safety hazards related to manual handling and carrying heavy materials, working at height and use of electrical and hand tools.	• Provision of proper PPE. • Use of mechanical aids to carry and handle heavy materials. • Use of trained and competent workers for demolition activities.	Negative	2	2	4	16	Low	Yes

1.1.1.1 CONTROL MEASURES FOR OCCUPATIONAL HELATH & SAFETY HAZARDS

- Responsible workers and operators should be educated and trained about the potential occupational health and safety hazards and effective control measures to minimise and control associated with the operation activities.
- The emergency response team including trained fire fighters and first aiders should be formed and emergency response plan should be prepared.
- The emergency response team with contact numbers should be displayed at site.
- Relevant Supervisors, Site Safety and Health personnel should conduct OHS inspection and consult potential OHS hazards to the workers involved.
- All workers should be provided with proper Personal Protective Equipment.
- Prepare Risk Assessments for all high risk activities and communicate the risk assessments to the workers involved.
- Clear and understandable warning signage should be displayed accordingly.
- All chemicals must be labelled. The workers must be educated about potential hazards and risks associated with handling of chemicals.
- Incompatible chemicals must be stored separately.
- Regular inspection of all electrical cords, cables, and hand power tools and earth.
- On-site fire drill should be conducted at least once per year.

6.6.6 COMMUNITY HEALTH AND SAFETY HAZARDS

The surrounding areas of the factory are covered with trees and factoryations as a buffer zone between the Factory and nearby residential areas.In terms of community health and safety, the production processes do not use hazardous chemicals as well as the residental areas are considerably far from the Factory to have direct health and safety impacts such as noise pollution, air emission, odor emission and degradation of surface water quality.

a. Community Water Quality

There is zero effeluent discharge to the surface water from the Padonmar Soap factory. It is considered low impacts to the community surface water quality. The final treated effluent is reused to water the surrounding trees and the remaining organic solid wastes are reused as fertilizers.

It is recommended to monitor the discharged water quality and quantity. It is ensure to meet BOD and COD concentration from discharged water with the applicable national standards.

b. Community Water Consumption

The Factory uses stored water from the retaining ponds and factory own tube well for production. It is unlikely to cause significant impacts on the consumption of community water.

c. Traffic Accident

The factory use public road to delivery of raw materials and final products. Traffic safety along the delivery routes should be planned ahead including assessment of potential hazards and risks and appropriate control measures should be implemented to prevent road traffic accident.

d. Fire Hazards

The factory is developed Fire Safety plans. Fire fighting equipment are sufficiently provided. The Factory Manangent team conducts regular safety, health and fire inspection around the factory areas. Fire drill is conducted. The fire hazards on the community is assumed low. It is recommended to ensure to conduct regular fire drill and inspection on fire fighting appliances.

Table 6.16 Assessment of Significant Community Health and Safety Risks

Project Phases and Activities	Existing Control Measures	Impact Assessment					Significant Level	Requirement of Additional Control
		Nature	Probability	Existing Control	Severity	Score		
Manufacturing								
Impact on community water quality from the processes	• Process water is treated before discharged. • Final effluent is reused to water the surrounding trees and factoryation • Only small quantity of effluent is discharged due to small production.	Negative	3	2	2	16	Medium	
Water consumption for the production	Factory uses stored water from the retaining ponds and own tube well for small scale production.	Negative	2	2	2	8	Low	Yes
Delivery of raw materials and final products on the factory and public roads	• All truck drivers are trained and licensed. • Speed limit is controlled.	Negative	2	2	2	16	Medium	

6.6.6.1 CONTROL MEASURES FOR COMMUNITY HEALTH AND SAFETY HAZARDS

1. Ensure to monitor final discharge water quality before release.
2. Develop extra pnd to divert the overflow effluent during heavy rain or unforseable situation.
3. Monitor and test the underground water quality as per monitoring plan.
4. All delivery truck and vehicles should be regularly inspected and maintained.
5. Potential hazards and risks associated with delivery routes should be identified and communicated with drivers.

6.6.7 TRAFFIC INCREASING AND CONGESTION

Padonmar Soap factory is located beside Yangon-Mawlamyine road. The factory uses this road as a mian transportation route.

Only a few numbers of the delivery trucks use the road during operation season. As a small scale and seasonal use for the deliveries are considerably less impacts on existing public traffics.

6.6.7.1 MITIGATION MEASURES FOR TRAFFIC CONGESTION

- Control speed limit and provide traffic signage in and around the factory area.
- Be sure that trucks and other vehicles are in good working order.
- Follow the established truck routes in the community.
- Driver behaviour, awareness and training should be undertaken.

6.7 ENVIRONMENTAL IMPACT AND MITIGATION MEASURES FOR DECOMMISSIONING PHASE

6.7.1 AIR EMISSIONS

Negative impact on ambient air quality such as dust particles emissions could be expected due to demolition works during the decommission phase of the factory after the lifespan of the project. This nuisance will be temporary in nature and is not expected to affect the surrounding environment since the factory is located far from the residential areas as well as a small scale factory with few infrastructures.

6.7.2 ENVIRONMENTAL NOISE IMPACT

Temporary noise barriers and occupational preventive measure should be applied in this phase. Workers employing in high noise areas should be provided with hearing protective wear such as earplugs, earmuffs.

6.7.3 WATER ENVIRONMENT

It is unlikely to affect the surface water and underground water quality due to decommission pahse of the Padonmar Soap factory.

6.7.4 SOLID WASTE

During demolition, mainly reusable wastes such as timber wastes, steel structures amd metal wastes will be created. These wastes can be sold to outside buyers. Unusable wastes like concretes or other structures will be disposed by external waste collectors.

6.7.5 IMPACT ON SOIL

It is less likely to cause significant impact on the soil due to demolition activities. It is, however, ensure to use spill tray and be available spill kits whenever handling of oils and greases.

6.7.6 OCCUPATIONAL AND COMMUNITY HEALTH AND SAFETY

During decommissioning phase of the factory, it is unlikely to casue significant community health and safety risks due to the location of the factory and small scale infrastructures within the factory.

In terms of occupational health and safety risks, the workers may be exposed hazards related to electrical, physical, ergonomic, chemical, mechanical and vehicle movements. Personal protective equipment (PPE) such as safety harness for working at height, safety gloves, helmet, goggles, earmuffs, etc. should be provided. Trained and competent workers should be used for demolition activities. Close supervision must be provided.

6.7.7 SOCIAL ENVIRONMENT

Loss of jobs of the employees may occur during decommissioning phase and it may reduce by taking responsibility on gradual reducing or transferring of work force.

7. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The environmental management practices, procedures and responsibilities are defined herein to get full compliance with the existing environmental policy, laws, rules and regulations of the Republic of the Union of Myanmar. The main sections in this Environmental Management Plan (EMP) are as follows:

1) Environmental Mitigation Plan
2) Summary of Environmental and Social Management Plan
3) Occupational Health and Safety Plan
4) Emergency Response Plan
5) Monitoring Plan

7.1 OBJECTIVES OF ENVIRONMENTAL MANAGEMENT PLAN

Key objectives of the EMP are as follows:

- To ensure continuing compliance with legal requirement and government policies;
- To provide the initial mechanism for ensuring measures identified in this study to mitigate potentially adverse impacts are implemented;
- To provide a framework for mitigating impacts during project execution;
- To provide assurance to regulators and stakeholders that their requirements with respect to HSE performance will be met;
- To undertake monitoring to demonstrate that predictions made within this EMP are valid; and
- To provide a framework for the compliance with auditing inspection programs.

7.2 DESCRIPTION OF RESPONSIBILITIES AND AUTHORITIES FOR IMPLEMENTATION

Top Management of Padonmar Soap factory is responsibile for implementing environmental management and monitoring plan during operation periods.

Managers, Supervisor are responsible to ensure to manage and control potential environmental impacts, occupational health and safety risks and potential accident.

Emergency Response Team (ERT) is ensure to response any accident and emergency situation effectively and proficiently. All workers have responsibility to assist the management in managing potential environmental impacts, occupational health and safety risks and potential accident.

Table 7.1 Emergency Response Team (ERT)

စဉ်	အမည်	ရာထူး	Position
၁	ဦးဇော်နိုင်ဦး	စက်ရုံမှူး	
၂	ဦးသန့်ဇင်	လက်ထောက်စက်ရုံမှူး	ကုန်ထုတ်လုပ်ရေးဌာန
၃	ဦးခင်မောင်ကြည်	အလုပ်ရုံစုမှူး	စီမံခန့်ခွဲရေးဌာန
၄	ဦးမျိုးမင်းဆွေ	အလုပ်ရုံစုမှူး	ကုန်ထုတ်လုပ်ရေးဌာန
၅	ဦးမျိုးညီညီ	အလုပ်ရုံစုမှူး	ပြုပြင်ထိန်းသိမ်းရေးဌာန
၆	ဦးသန်းကိုထွေး	အလုပ်ရုံစိတ်မှူး	ကုန်ထုတ်လုပ်ရေးဌာန
၇	ဦးဦးလွင်	အလုပ်ရုံစိတ်မှူး	ပြုပြင်ထိန်းသိမ်းရေးဌာန
၈	ဦးအုန်းမြင့်	လုံခြုံရေး(၃)	စီမံခန့်ခွဲရေးဌာန
၉	ဦးကျော်လင်းထွန်း	စက်မှုကျွမ်းကျင်(၄)	ပြုပြင်ထိန်းသိမ်းရေးဌာန
၁၀	ဦးမျိုးဝင်း	ထုတ်/ကျွမ်း(၅)	ကုန်ထုတ်လုပ်ရေးဌာန
၁၁	ဦးစည်သူ	ထုတ်/ကျွမ်း(၅)	ကုန်ထုတ်လုပ်ရေးဌာန
၁၂	ဦးမြတ်သူအောင်	လုံခြုံရေး(၅)	စီမံခန့်ခွဲရေးဌာန

The team members shall have knowledge of or can be trained in responding to emergencies such as emergency plan, firefighting, precautions.

The **ERT** should be on call in case of safety problem that occurs during off-hours/ or Security shall contact the Township Fire Department immediately.

I. Environmental Management Team (EMT)

EMT team is formed with the following memebrs.

Table 7.2 Environemntal Management Team

စဉ်	အမည်	ရာထူး	Position
၁	ဦးဟိန်းထက်အောင်	စက်ရုံမှူး	စီမံခန့် ခွဲရေးဌာန
၂	ဦးအောင်ဇော်မင်း	အလုပ်ရုံခွဲမှူး	ကုန်ထုတ်လုပ်ရေးဌာန
၃	ဦးအောင်ကျော်ဆန်း	အလုပ်ရုံစုမှူး	ကုန်ထုတ်လုပ်ရေးဌာန
၄	ဦးစိုလင်းကျော်	အလုပ်ရုံစိတ်မှူး	ပြုပြင်ထိန်းသိမ်းရေးဌာန
၅	ဦးတင်ကိုလတ်	အလုပ်ရုံစိတ်မှူး	ကုန်ထုတ်လုပ်ရေးဌာန
၆	ဦးနိုင်ဌေးအောင်	ယာဉ်မောင်း	စီမံခန့် ခွဲရေးဌာန
၇	ဦးတုတ်လှ	လုံခြုံရေး(၄)	စီမံခန့် ခွဲရေးဌာန
၈	ဦးဇင်မင်းထွန်း	ထုတ်/ကျွမ်း(၅)	ကုန်ထုတ်လုပ်ရေးဌာန
၉	ဦးမျိုးမင်းအေး	ထုတ်/ကျွမ်း(၅)	ကုန်ထုတ်လုပ်ရေးဌာန

The responsibilities of **EMT** are to control and regularly monitor potential environmental impacts such as water quality, air quality and noise impact, etc., to ensure that the crucial parameters are within acceptable levels.Budget allocation for management plan

The project is in operation phase when this EMP report was prepared. Thus estimated budget was more emphasized for operation phase. The budget in environmental management and monitoring program is estimated to be **10,000,000 kyats** (kyat 100 lakhs) for operation phase. But the project proponent should consider about contingency plans, if the reporting shows certain failures of environmental monitoring program.

7.3 ENVIRONMENTAL MANAGEMENT PLAN FOR THE OPERATION PHASE

Based on information on the project operation and knowledge of the project area, impacts of project operation have been identified in Chapter 5. Environmental issues associated with the operational phase primarily include the following issues:

1) Air and Dust Emission Control
2) Solid Wastes Management
3) Effluent Liquid Wastes Management
4) Occupational Health and Safety
5) Emergency Response Plan

7.3.1 ENVIRONMENTAL MANAGEMENT PLAN FOR AIR AND DUST EMISSION REDUCTION

Padonmar Soap factory is a small-scale producer and the plume from the boiler may generate air pollutants if there is lack of proper management plan. The following table defined the appropriate management plans for potential air emission impacts from the boiler.

Table 7.3 Environmental Management Plan for Boiler Stack Emission Reduction

Key Indicator	Description	Recommended mitigation measure	Time Frame	Responsible Person
Boiler Maintenance	Improve boiler efficiency	• Routine boiler maintenance is done to minimizing emission. • ဘွိုင်လာမှထွက်ရှိသည့် အခိုးအငွေ့များနှင့်ပတ်သတ်၍ အမှုန်မှုန်များလျော့ကျ စေရန် Dust Collector တပ်ဆင်ထားခြင်းနှင့်တစ်ရက်လျှင်တစ်ကြိမ် Maintenance ပြုလုပ်ပြီး တစ်နှစ်လျှင် စက်လည်ပိတ်ရက် ၉၆ ရက်အတွက် ၉၆ ကြိမ်ပြုလုပ် ပါသည်။	The whole operation period	EMT
Boiler Ash	Reducing PM emission	• Continual ash removal is done to ensure optimum performance and reduce ash entrainment like PM emission. • တစ်ပတ်လျှင် တစ်ကြိမ် ပြုလုပ်ပါသည်	The whole operation period	EMT
Boiler Tube	Promoting boiler efficiency	• The boiler tubes are clean pneumatically. The pneumatic	The whole	EMT

		tube cleaning helps to minimize the soot build-up on the heat exchange surfaces of the boiler and therefore helps to maintain the optimum boiler efficiency. • သုံးလလျှင် တစ်ကြိမ် အမြဲ ပြုလုပ်ပါသည်	operation period	
Training	Giving training for boiler man	• The factory provides the boiler operator adequate operator training to compromise boiler availability, emission and efficiency.	The whole operation period	EMT
PM Filter	Reducing PM emission	• Installation of particulate filters to reduce emission of boiler stack • Regular cleaning of filters • ခြောက်လလျှင် တစ်ကြိမ် လဲလှယ်ပါသည်	The whole operation period	EMT

7.3.2 ENVIRONMENTAL MANAGEMENT PLAN FOR EFFLUENT

During operation, semi-liquid wastes such as POME sludges are generated. In additions, other sources such as sterilization, wash off water from cleaning activities and cooling process of boiler can carry pollutants. In Table 7.4 the environmental management plan for the effluents were stated.

စက်ရုံအနေဖြင့် တစ်နှစ်လျှင် ၉၆ ရက်သာ စက်လည်ပတ်ပြီး အညစ်အကြေး စွန့်ပစ်ကန် (၄)ကန်ရှိပါ၍ စက်လည်ပတ်ရက်နည်းသဖြင့် စွန့်ပစ်ကန်အတွင်း၌သာ အငွေ့ပျံ ခြောက်သွေ့သွားခြင်းနှင့် မိုးရာသီတွင် ကန်အတွင်းမိုးရေနှင့် ရောရွဲ ဓါတ် ပြယ်သွားခြင်းကြောင့် HTV Sheet အား ဆောင်ရွက်ထားခြင်းမရှိပါ။

နောက်ဆုံးစီးဆင်းရေကန် ရှိ ရေအရည်အသွေးတိုင်းတာမှုရလဒ်၏ BOD တန်ဖိုးမှာ ကျော်လွန်နေသော် လည်း အဆိုပါ ရေကန်မှရေသည် အခြားနေရာများသို့ စီးထွက် ခြင်းမရှိဘဲ နွေရာသီတွင် ခန်းခြောက်ခြင်းဖြင့် သာစီမံမှုပြုလုပ်ထားပါသည်။

Table 7.4 Environmental Management Plan for Effluent

Key Indicator	Description	Recommended mitigation measure	Time Frame	Responsible Person
Lime waste effluent	Reducing high COD and BOD values.	• Proper HTV sheets must be installed in the wastewater treatment ponds.	The whole	Project Proponent EMT

		• Ensure to conduct regular inspection of HTV sheets.	operation period	
Washing and cleaning water	Reducing water consumption	• Water should be minimised. • Detergent usage should be minimised.	The whole operation period	Production EMT
Cooling water from boiler	Reducing equipment damage. Reducing oil loss through leakage and accident.	• Water should be collected for washing and cleaning with routine collection.	The whole operation period	Utility EMT

7.3.3 ENVIRONMENTAL MANAGEMENT PLAN FOR GENERATED WASTES

Waste management is necessary to carry out during transportation, storage, handling and processing of raw materials and final products and disposal of by-products. Table 7.5 specified the effective management plans for generated wastes

အိမ်သုံးအမှိုက်နှင့် စက်ရုံသုံးအမှိုက်များအား ကျင်း၊ အမှိုက်ပုံးဖြင့် ယာယီ သိုလှောင်ပြီး (၁)ပတ်လျှင် (၃)ကြိမ် မြို့နယ်စည်ပင်အမှိုက်သုံးယာဉ်ဖြင့် လာရောက်သိမ်းဆည်း ပါသည်။

Table 7.5 Environmental Management Plan for Padonmar Soap Factory Waste Reduction

Key Indicator	**Description**	**Recommended mitigation measure**	**Time Frame**	**Responsible Person**
Use of Paper and plasctics for packaging	Recycling and Reused the wastes if applicable. Reducing the usage of plastic.	• Recycle paper wastes. • Proper disposing of plastic wastes.	Operation period	Operation
Disqualified soaps and soap wastes	Recycling soaps	• Ensure to recollect the soap wastes and reused the wastes.	Operation period	Purchasing
Disposing Solid Waste	Factory waste Domestic waste	• Temporary store in waste bins and removed by using township municipal car.	Operation period	EMT

7.3.4 MANAGEMENT PLAN FOR COMMUNITY AND OCCUPATIONAL HEALTH AND SAFETY

7.3.4.1 MANAGEMENT ROLES AND RESPONSIBILITIES

Padonmar Soap factory is a small scale producer and total workforce is only 37 including 17 daily wage workers.

The surrounding areas of th efactory are covered with trees and factoryations as a buffer zone between the Factory and nearby residential areas.In terms of community health and safety, the production processes do not use hazardous chemicals as well as the residental areas are considerably far from the Factory to have direct health and safety impacts such as noise pollution, air emission, odor emission and degradation of surface water quality.

Factory Manager oversees and ensure the production processes to control or mitigate the potential occupational health and safety hazards and associated risks. The relevant Managers and Supervisors closely manage the workers to perform the assigned tasks safely and healthy.

Workers are trained to handle the machine and equipment properly.

The factory managememt including the Factory Manager conducts regular environmental, health and safety inspections within the factory to maintain and improve environmental, health and safety performances.

7.3.4.2 EMERGENCY RESPONSE PLAN

In order to response potential accidents and emergency situation within the factory premises and nearby areas, the Factory forms an Emergency Response Team. The team memebrs are provided basic fire fighting training.

Energency fire water and fire extinguisher are provided within the factory.

The team members shall have knowledge of or can be trained in responding to emergencies such as emergency plan, firefighting, precautions.

The **ERT** should be on call in case of safety problem that occurs during off-hours/ or Security shall contact the Township Fire Department immediately.

Table 7.6 Responsibilities of ERT

Incident Controller	• Commands and control the ERT to response to an emergency. • Communicates with authorities eg. Police/ Township Fire Department in the event of an emergency. • Ensure emergency plan are reviewed regularly and ERT are appropriately trained and equipped to carry out their assigned task. • Crowd control and monitor overall headcount at the Assembly Area. • Initiate drill exercises and post exercise review with ERT on an annual basis.
Dy- Incident Controller	• Conduct head count of all staff, consultants and workers. • Consolidate the headcount list from wardens. • Report evacuation status such as any missing person to the IC .
Member- Fire Fighters	• To be trained in firefighting, and assist in firefighting at no personal risk.
Member- Wardens	• Area combing, to ensure all staff and workers leave the workplace promptly during an evacuation. • Direct staff and workers to the Assembly Area. • Conduct headcount for their workers at the Assembly Area.
Member- First Aiders	• Successfully completed first aid training. To render first aid to any injured during any emergency. • Standby at the Assembly Area with first aid kit during a mass evacuation.

7.4CSR ACTIVITIES

စက်ရုံဧရိယာမှာ (၅၀.၇၃)ကေကျယ်ဝန်း၍ စက်ပစ္စည်းများလည်း Auto System ဆောင် ရွက်သဖြင့် အသံထွက်ရှိမှု မရှိခြင်း၊ စက်ရုံဧရိယာအတွင်းတွင်ပင် ဆူညံသံမထွက်သဖြင့် ပတ်ဝန်း ကျင် ကျေးရွာများ အပေါ် ဆူညံသံထိခိုက်မှုမရှိပါ။ စွန့်ပစ်လိုင်းရည်များ မှာလည်း စက်ရုံဧရိယာအတွင်းတွင် အနည်စစ်ကန် (၁)ကန်၊ လိုင်းရည်စစ်ကန် (၃)ကန်၊ ပေါင်း (၄)ကန်ရှိပြီး အဆင့်ဆင့် အနည်စစ်ခြင်း စနစ်ဖြစ်ပြီး စက်ရုံပြင်ပသို့ လည်း စွန့်ပစ်လိုင်းရည်ထွက်ရှိခြင်းမရှိဘဲ ရေကန်အတွင်း၌ အငွေ့ပြန်ခန်းခြောက် သွားပါသည်။ စက်ရုံအနေဖြင့် ဒေသဖွံ့ဖြိုးရေးအစီအစဉ်အတွက် တစ်လလျှင် ရန်ပုံ ငွေ ၂၀၀,၀၀၀ ကျပ် လျာထားပြီး စာသင်ကျောင်းများ၊ ပတ်ဝန်းကျင်ဒေသများရှိ

အသင်းအဖွဲ့ကိစ္စရပ်များနှင့် အလှူအတန်း၊ လူမှုရေးကိစ္စရပ်များတွင် ဆပ်ပြာများ ထောက်ပံ့ ပေးခြင်းနှင့် လှူဒါန်းခြင်းများဆောင်ရွက်ပေးလျှက်ရှိပါသည်။

7.5 TRAINING, AWARENESS AND COMPETENCY

Assistant Factory Manager will identify potential environmental, occupational health and safety risks and impacts associated with the production processes and implement training needs for the staff.

A training need is to be developed for each position to ensure all personnel receive appropriate training to enable them to competently perform their role.

Individual roles directly associated with significant safety and health risks and environmental impact will be reviewed by respective Manager and training needs identified. Factory Manager is responsible for providing necessary resources for training. The following training should be included in the training list.

- Environmental Monitoring Plan
- First Aiders and Basic Fire Fighting Training
- Basic Safety and Health Training
- In –House trade training

7.6 EMERGENCY AND DISESTER PREPAREDNESS PLAN

Myanmar is prone to various natural hazards that include earthquakes, floods, cyclones, droughts, fires, tsunamis, some of which have the potential to impact large numbers of people.

Padonmar Soap factory has planned, designed and constructed with fixed firefighting installations systematically. The Factory developed Fire Safety Plan. The Factory prepares an Emergency Response Plan in order to prevent potential emergency situation.

7.6.1 FIRE PREVENTION PLANS

Padonmar Soap factory installs the Firefighting System and Equipment as follows:

Firefighting System and Equipment

1) Installation of fire extinguishers.

2) Fire alarm system is installed in the factory building as well as office rooms and staff housing.
3) Assembly point for emergency situation within the factory premise with clear marking.
4) Warning signs shall be displayed at strategic locations in the factory.

Emergency Contact List

Emergency Contact List consisting contact nos. of authorities, hospital, clinic, ERT personnel shall be prepared and displayed at the factory. The list shall be reviewed at least once a year or as and when there is change in personnel or change in contact number.

The contact no. for local authorities below shall be included in the list :

- Township Fire Department – fires, explosions, spills, ambulance, structure collapse
- Police – local emergencies, life threatening situation
- Nearest Hospital – medical emergencies
- Local clinic or on-site doctor/nurse – medical emergencies

Drills

The factory will develop annual fire drill and ensure all levels of staff participate in the drill. During a drill, workers and managers should leave the building, go to an assigned location (assembly area) and remain there until a signal is given to return to the factory. The following exercise shall be conducted at least once a year for the ERT or otherwise stated :

- Fire drill

Figure 7.1 In-House Fire Fighting Equipment and Warning Signage

7.7EMPLOYEE WELFARE PLAN

Padonmar Soap factory provides social welfare sysems to the workers including social security, medical costs for sickness, acommodations and allowable leaves due to the Ministry of Labour's Acts and Regulations. Employees are provided suitable uniforms.(Figure 7.2).

Figure 7.2 Provided Uniforms for Employees

7.8 ENVIRONMENTAL MANAGEMENT PLAN FOR DECOMMISSIONS PHASE

As a small-scaled factory that located within the dense plam oil factoryations, it is unlikely to cause significant environmental impacts due to decommission activities. However, it is crucial to ensure to manage potential impacts during this phase.

Certain potential impacts may be

- Demolishing wastes, electrical cables, electronic device waste generation
- Noise generation from demolishing works
- Traffic movements from demolition

Table 7.7 Environmental and Social Management Plan for Decommissioned Phase

Environ-mental & Social Aspect	Impact	Actions on prevention	Time Frame	Responsible Person
Natural Environment				
Air/ Dust	Chronic respiratory disease and eye complication	• All vehicles used are inspected and done regular maintenance. • Restriction of transport speed on roads. • Installation of temporary cover. • Set up dust barriers at strategic locations: Dust nets will be provided around the demolition area. • Practice dust management techniques, including watering down dust. • Provide PPE against dust (i.e. mask)	Through-out decommi-ssioning phase	Contractor Site Engineer technician
Noise	Long/short term noise nuisance and hearing loss	• Schedule noisy activities during day time period. • Ensure machinery is well maintained to reduce noise generating. • Switching off installations and equipment when they are not used. • Minimization of work during evening/night time. • Provide PPE such as noise defenders, ear plugs and ear muffs to the workers in high noise area.	Through-out decommi-ssioning phase	Contractor Site Engineer technician
Water Environment				

Water Pollution	Contamination of surface and underground water sources	• Ensure sewage system is functional during demolition to prevent pollution of nearby underground and surface water sources. • Proper demolition of the sewage system to prevent pollution by contents into the environment and ground water.	Throughout decommissioning phase	Contractor Site Engineer technician
Waste				
Solid Waste	Pollution of water, air and soil	• Enforce segregation of waste at the source to encourage reuse and recycling. • To store waste temporary in containers, in case of large dimension it is possible to store wastes with waterproof cover. • Disposal of solid waste in compliance with local government policy • Usable infrastructures will be hand over to the township authorities for future community use.	Throughout decommissioning phase	Contractor Site Engineer technician
Social Environment				
Interaction with Public	Safety	• Informing of public on demolition process	Throughout decommissioning phase	Contractor Site Engineer
Health and Safety				
Occupational Health and Safety	Incidents and accidents leading to serious injury or fatalities	• Placing at the site of information and warning signs and fences. • Ensure provision of appropriate PPE for staff such as o earmuffs for ear protection, o helmets for head protection, o dust masks for dust protection for all project works, o goggles with good visibility for eye protection, o overalls and dust coats to protect the skin, o safety shoes for protection of the feet, o gloves of different types according to specific works in relation to: puncture resistance; sharps	Throughout decommissioning phase	Contractor Site Engineer technician

		resistance; cut resistance; flexibility; abrasion resistance; grip.		
Emergency situations	Fires and explosions at the site	• Storage of inflammable and explosive substance and materials at closed warehouses or fenced sites. • Regular territory clearing. • Availability of necessary means for fire prevention and provision of operative access to them.		

7.9 SUMMARY OF ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

လုပ်ငန်းလည်ပတ်စဉ်ကာလတွင် ပတ်ဝန်းကျင်သို့ ဆူညံသံ ၊ ထိခိုက်မှု မရှိခြင်း၊ စွန့်ပစ် လိုင်းရေများကို ည် ဓါတ်ပြယ်သည့်အထိ ဆပ်ပြာချက်ကန်၌သာ ၃/၄ရက် ယာယီသိုလှောင်ပြီး ကွန်ကရစ်မြောင်းမှတဆင့် စွန့်ပစ်ရေကန် (၄)ကန်တွင် ပြင်ပသို့မထွက်ရှိရေသိုလှောင်ထားပါသည်။

Table 7.8 Environmental and Social Management Plan for Operation Phase

Environ-mental & Social Aspect	Impact	Actions on prevention	Time Frame	Responsible Person
Natural Environment				
Global warming potential	Emission of gaseous substances Vehicle Use Machine Use	• All vehicles used in the operation and factory are inspected and done regular maintenance. • Check emission from old vehicles regularly and force ill maintained vehicles to service their automobile. • All the heavy equipment and machinery shall be fitted with air	The whole operation period	EMT

		pollution control devices that are operating correctly.		
	Boiler emission	• Boiler and smoking units should be released through good engineering practiced-designed stacks. • Installing POME biogas capturing equipment (if applicable).		
	Emission of dusts and particiculate matters	• Maintain and clean roads properly. • Replace roadside tree factoryations lost to construction and encourage new afforestation projects. • Provide PPE against dust (i.e. Mask)	The whole operation period	EMT
Acoustic impact	Noise exposure for the workers and people within the factory premises	• Switching off installations and equipment when they are not used. • Use of technologies of power units with low noise and vibration level. • All equipment and machinery will be maintained to manufacturer's specifications to minimize unnecessary noise emission. • Dense layered factoryation to block the noise, or other measures like wooden noise barriers should be considered. • Provide PPE such as noise defenders, ear plugs and ear muffs to the workers in high noise area.	The whole operation period	EMT
Soil Environment				
Liquid Waste	Processed Effluent	• Ensure to apply efficient treatment methods in the treatment process.	The whole operation period	EMT
Solid Waste				
Processed Waste	Formation and allocation of waste	• Use and maintenance in working order of modern technical equipment that allows minimizing formation of waste.	The whole operation period	EMT
Domestic Waste	Littering/ polluting with solid waste	• Awareness campaign for workers education on the waste segregated system.	The whole operation period	EMT

		• Improved notice sign and awareness display board (non-smoking, no-dumping signs).		
Hazardous Waste	Pollution of air, land, groundwater, and waterways.	• Factories must determine the types and amounts of hazardous wastes resulting from production and business activities. • Factories must treat, recycle, or dispose of all hazardous wastes they make by using a qualified hazardous waste contractor, whenever feasible. • All hazardous wastes (including medical waste and used oil) must be handled in a way that minimizes the possibility of exposing workers and contaminating the environment (air, land or water). • Workers who handle hazardous wastes should be trained to avoid personal injury, prevent spills and releases, and to make sure these wastes are disposed of safely.	The whole operation period	EMT
Ecological Resources				
Change in terrestrial ecosystem	Impacts on biodiversity	• Fauna and flora may be affected due to the project activities. • Keep the enterprise premises green by factorying trees and flowers. • In order to avoid the loss of ecological valuable, factory species should be practiced conservation methods as long term conservation. • Shaded factory cultivation had been provided near the boundary of the factory.	The whole operation period	EMT
Social Environment				
Social Sector	Population pressure	• Regulate settlement growth with proper planning/zoning. • Initiate community awareness and assistance programs.	The whole operation period	EMT

		• Put in place appropriate mechanisms for grievance resolution to settle disputes between new squatters and local communities		
	Change in social behaviour	• Facilitate awareness raising programmes to the communities about negative social behaviour like gambling, excess use of alcohol	The whole operation period	EMT
	Impact on cultural and religious activities	• No cultural heritage place is located near to the factory. • Sponsoring and charitable contributions to the local community.	The whole operation period	EMT
Socio-Economic	Impact on local economy	• Providing support to local entrepreneurs. • Promotion of cooperatives and linkage with bank and other financial institutions for setting up business enterprises in local region.	The whole operation period	EMT
	Crop production and use of fertilizers	• Introducing the use of EFB, cake, ash as fertilizers or animal feed ingredient to the farmer. • Promote improved agricultural practices. • Farmers will be more interested to increase agricultural production due to the practicing of fertilizer.	The whole operation period	EMT
	Employment opportunity to local people	• Improvement of agricultural extension services. • Involvement of local people including women and poor people, and providing life skill training for income generation activities and skill development.	The whole operation period	EMT
	Creation of additional workplaces	• Informing of local population on existing vacancies. • Maximum possible involvement of local labour force in view of qualifying requirements.	The whole operation period	EMT

	Enhancement of technical skill	• Providing skill enhancement training. • Additional knowledge in waste management, material handling, and general application of environmental, health and social precautionary measures. • Local people involved in the project will find easier to find jobs in similar nature of projects as a skilled labour.	The whole operation period	EMT
Health and Safety				
Public Health and Safety	Quality of healthcare services	• Fencing in risky areas. • Provide adequate health care for workers and local people if applicable.	The whole operation period	EMT
Awareness on HIV / AIDS and STD	Spread to the community	• All workers will be adequately trained in basic sanitation and health care issues (e.g., how to avoid transmission of sexually transmitted diseases such as HIV / AIDS).	The whole operation period	EMT
Occupation Health and Safety	Dangerous and unhealthy working conditions	• Provision of personnel with primary healthcare (organization of first aid post at the factory). • Placing at the Factory site of information and warning signs and fences. • Conformity of working places to OT requirements. • Application of personal protective equipment. • Ensure labour law and factory law are strictly followed.	The whole operation period	EMT
	Fire Prevention	• Alarms and emergency lighting regularly tested by competent person.	The whole operation period	EMT
	Electricity	• Electrical installation and all equipment are inspected according to a planned schedule and staff report any concerns to shift manager who will take appropriate action.	The whole operation period	EMT

Table 7.9 Summary of Environmental and Social Management Plan for Decommissioned Phase

Environ-mental & Social Aspect	Impact	Actions on prevention	Time Frame	Responsible Person
Natural Environment				
Air/ Dust	Occupational Health hazards	• All vehicles used are inspected and done regular maintenance. • Restriction of transport speed on roads. • Installation of temporary cover. • Set up dust barriers at strategic locations: Dust nets will be provided around the demolition area. • Practice dust management techniques, including watering down dust. • Provide PPE against dust (i.e. mask)	Through-out decommi-ssioning phase	Contractor Site Engineer technician
Noise	Hearing loss	• Schedule noisy activities during day time period. • Ensure machinery is well maintained to reduce noise generating. • Switching off installations and equipment when they are not used. • Minimization of work during evening/night time. • Provide PPE such as noise defenders, ear plugs and ear muffs to the workers in high noise area.	Through-out decommi-ssioning phase	Contractor Site Engineer technician
Water Environment				
Water Pollution	Contamina-tion of underground water sources	• Ensure sewage system is functional during demolition to prevent pollution of nearby underground and surface water sources. • Proper demolition of the sewage system to prevent pollution by contents into the environment and ground water.	Through-out decommi-ssioning phase	Contractor Site Engineer technician
Waste				
Solid Waste	Pollution of water, air and soil	• Enforce segregation of waste at the source to encourage reuse and recycling.	Through-out decommi-ssioning phase	Contractor Site Engineer technician

		• To store waste temporary in containers, in case of large dimension it is possible to store wastes with waterproof cover. • Disposal of solid waste in compliance with local government policy • Usable infrastructures will be hand over to the township authorities for future community use.		
Social Environment				
Interaction with Public	Safety	• Informing of public on demolition process	Through-out phase	Contractor Site Engineer
Health and Safety				
Occupational Health and Safety	Incidents and accidents leading to serious injury or fatalities	• Placing at the site of information and warning signs and fences. • Ensure provision of appropriate PPE for staff such as o earmuffs for ear protection, o helmets for head protection, o dust masks for dust protection for all project works, o goggles with good visibility for eye protection, o overalls and dust coats to protect the skin, o safety shoes for protection of the feet, o gloves of different types according to specific works in relation to: puncture resistance; sharps resistance; cut resistance; flexibility; abrasion resistance; grip.	Through-out decommi-ssioning phase	Contractor Site Engineer technician
Emergency situations	Fires and explosions at the site	• Storage of inflammable and explosive substance and materials at closed warehouses or fenced sites. • Regular territory clearing. • Availability of necessary means for fire prevention and provision of operative access to them.		

7.10 ENVIRONMANTAL MONITORING PLAN

7.10.1 OBJECTIVES

The objective of environmental monitoring is to systematically collect environmental data and support information needed for evaluation of the environmental performance. The frequency and methods of data collection must ensure that the data obtained are reliable and meaningful, i.e. they will adequately reflect the project environmental performance. A proposed environmental monitoring program must be practical, relevant and cost effective.

Environmental monitoring is a very important aspect of environmental management during construction, operation and decommissions stages of the project to safeguard the environment. A chemical or process industry in general produces solid, liquid and gaseous wastes, which are discharged to the environment. The waste product may contain pollutants which may harm environment. It is the responsibility of the industries to prevent or minimize the discharges of waste products by adopting suitable control measures in the factory. The effectiveness of such measures is ascertained by systematic monitoring of discharges at factory level and at receiving level.

7.10.2 REGULATORY REQUIREMENT

a) <u>Environmental Standards</u>

Ministry of Natural Resources and Environmental Conservation - MONREC (former Ministry of Environmental Conservation and Forestry - MOECAF) issued National Environmental Quality (Emission) Guidelines, NEQGs, in December 2015 according to the provision of Paragraph (42), Sub-paragraph (b) of the Environmental Conservation Law (2012).

b) Governing Parameters

Table 7.10 Environmental and Social Monitoring Parameters

Sr.	Items	Parameters
1	Air Quality	SO2, NO2, CO, PM2.5, PM10, dusts and O3 concentrations of National Emission guidelines, 2015 December
2	Noise	Acceptable noise levels of National Emission guidelines, 2015 December
3	Water Quality (factory use water, waste water)	WHO Drinking water Quality Guidelines pH, Colour, Turbidity, Hardness, Iron, Chloride, Conductivity, TSS, BOD,COD, Temperature.
4	Waste	Waste recycle plan, removed from on-site at regular intervals.
5	Health and Safety	Medical kit box, fire evacuation, emergency plan, PPE.
6	Socio-economic situation	Job availability, providing skill enhancement training, CSR

7.10.3 REPORTING MONITORING RESULTS

Environmental Parameters shall be monitored as proposed timelines by the trained factory personal or third party consultant team. Monitoring results must be recorded in files to monitor the continual achievements. Monitoring will be carried out strictly as required by the related national regulations and the monitoring results of required parameters should be reported to local authorities and local ECD.

Report Supported Team is responsible for recording of the monitoring results in files, developing the monitoring report with related documents and to report submission to local Environmental Conservation Department **(ECD),** through the Padonmar Soap factory.

7.10.4 ENVIRONMENTAL MONITORING PLAN FOR OPERATION PHASE

The environmental monitoring plan including monitoring items and locations in the operation is shown in Table 7.11. Monitoring for operation phase will be implemented by the project proponent.

Table 7.11 Proposed Environmental Monitoring Programmes – Operation Phase

Environmental Issues	Monitoring Location and Indicator	Monitoring and Reporting Frequency	Cost Estimate (USD) Per Year	Responsibility Party
Air Pollution				
Ambient Air Quality **Parameter** (H2S,SO2,NO2 CO, CO2, O3, PM(2.5), PM(10), TSP	1.Boilor Stack (916.560415, 97.583854) 2.Site boundary (16.559350, 97.583680) (Measurement of Air Quality) -National Environmental Quality (Emission) Guideline for Air Emission -Check compliance with the Air pollution Mitigation measure	twice a year	1200	EMT
Vehicle exhaust	Within the factory compounds	Twice per year	200	EMT
Noise				
Noise level **Parameter** dB(A)	1. Site boundary (16.559350, 97.583680) (Measurement of Noise)) -National Environmental Quality (Emission) Guidelines -Check compliance with noise mitigation measure	Twice a year	100	EMT
Water Quality				
Surface Water Quality	1.Final Effluent Pond (16.559670, 97.585001) and Drainage (BOD, COD, pH, TSS)	Twice a year Biannual	120 120	EMT EMT

Waste Water Quality **Parameter** (BOD), (COD) pH, (SS) , (NO3 – N), Oil and Grease	-Check compliance with the water pollution mitigation measure			
Solid Waste generation from Production Process				
EFB wastes	Empty EFB disposal areas -bag or ton of ffb	Monthly	No Extra Cost	Utility EMT Agro-technician
Non- Hazardous Waste	- Cleanliness (The Factory compounds) ▪ Waste bags/bins - Inspect waste storage area (Visual check and record amount)	Daily Daily Weekly	No Extra Cost No Extra Cost No Extra Cost	EMT EMT EMT
Hazardous Waste (eg. Spent/waste oils and solvent waste and etc.)	-Inspect potential areas such as workshop, maintenance (Visual check and record amount)	Weekly	No Extra Cost	EMT
Waste Disposal	-Normal Waste (Disposal point in factory campus) -Nonhazardous Waste (disposed of at a qualified facility –see section 9.5.2)	Weekly Monthly	No Extra Cost 100	EMT EMT
Health and Safety				
Working Condition (Room temperature and humidity)		Daily	No Extra Cost	EMT ERT

Safety Measures for Health Status	-Statistic of accidents, injuries and infectious diseases -Inspection of compliance with Occupational Health and Safety measure (eg. medical kit box)	Monthly inspection for health and safety at work place	500	EMT ERT
Fire Safety Measures	-	Once a year	500	EMT ERT
Emergency Safety Measure	-Firefighting training and drill -Inspection of compliance with Occupational Health and Safety measure (eg. Fire extinguisher, signboard on safety, mask, glove)	Twice a year	1000	EMT ERT

7.10.5 ENVIRONMENTAL MONITORING PLAN FOR DECOMMISSIONING PHASE

The environmental monitoring plan including monitoring items and locations in the decommissioning phases is shown in Table 7.12. Monitoring for the decommissioning phase will be implemented by project proponent and the contractors.

Table 7.12 Proposed Environmental Monitoring Programmes – Decommissioning Phase

Environmental Issues	Monitoring Location and Indicator	Monitoring and Reporting Frequency	Cost Estimate (USD) Per Year	Responsibility Party
Air Pollution				
Ambient air quality	Suitable points on site	Once after the decommissioning activities	500	Site Engineer Contractor
Noise				
Noise level dB(A)	Sensitive spots	Monthly	1000	Site Engineer Contractor
Water Quality				
Solid Waste				

Demolition debris including concrete, metal, drywall, wood, glass, adhesives, sealants and fasteners	Disposal sites	Weekly	500	Site Engineer Contractor

8. STAKEHOLDER ENGAGEMENTS AND INFORMATION DISCLOSURE

The aim of the public consultation is to ensure that all stakeholders interested in a proposed project (including project beneficiaries and the general public in the vicinity of the proposed project) be identified and their opinion considered during project planning, design, construction, operation, and decommission phase.

Public consultation and information disclosure ensures that communities and stakeholders are part and parcel of the proposed developments and in so doing assure the sustainable use of resources. Public consultations form a useful component for gathering, understanding and establishing likely impacts of projects determining community and individual preferences and selecting alternatives.

Green EHSS has organized meetings with the represntatives from Padonmar Soap Factory. The objectives of the meeting was to collect up-to-date and precise information on the project activities. The outcome of the meeting will help in the assessment of the anticipated impacts.

Padonmar Soap Factory is situated in Thea Hpyu Kone village, Paung Township, Mon State. Green EHSS and Padonmar Soap Factory had conducted stakeholder engagement with local residents near the factory to inform the local administration on the project, to collect the views, and to obtain the input into the impact and mitigation measures to be included in the EMPs.

Figure 8.1 Surrounding Villages of the Factory

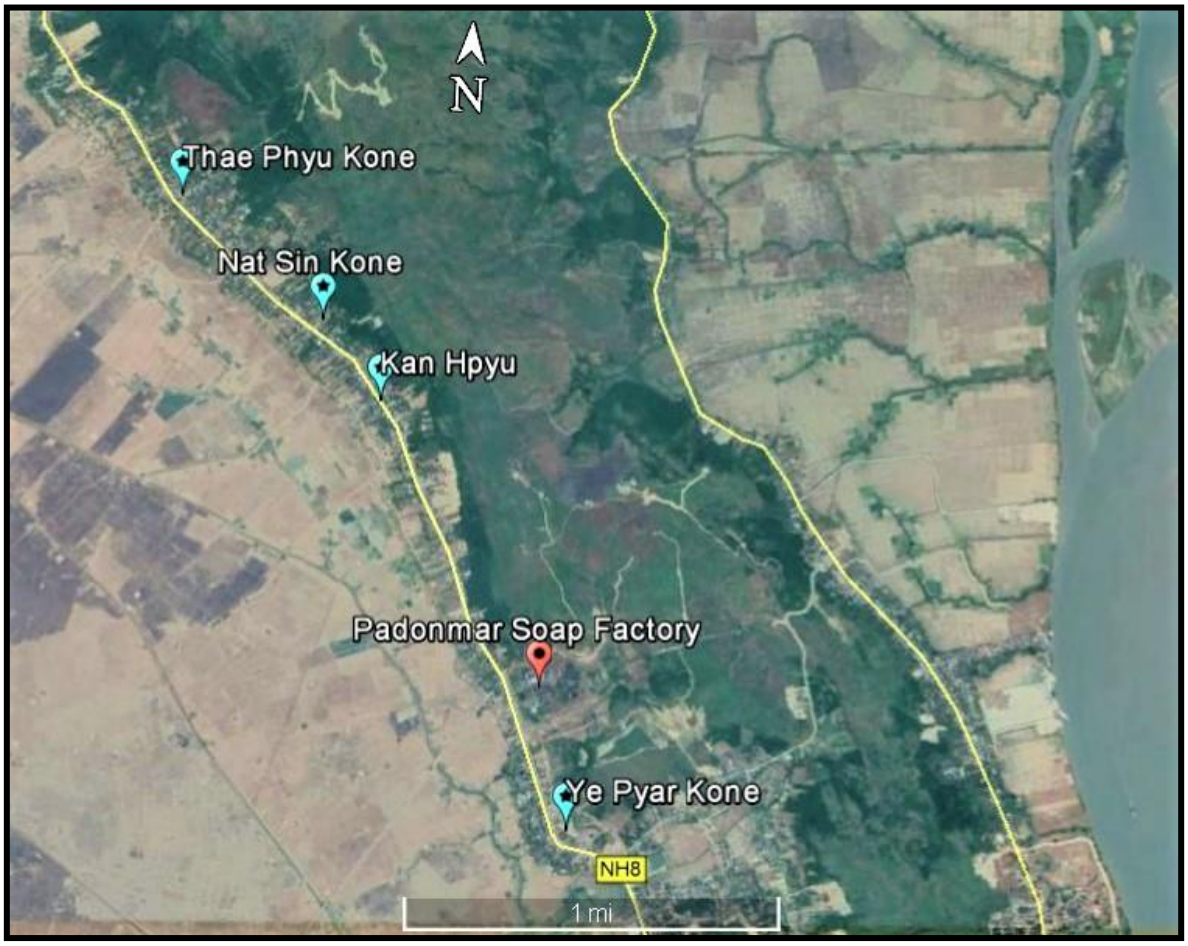


Figure 8.2 Surrounding Villages of the Project Site with Satellite View

8.1METHODOLOGY

The public consultations for the project were conducted simultaneously with the field work targeting the various groups of stakeholders. The consultations were conducted through use of questionnaire, interviews and public meetings. The consultants developed several formats of questionnaires to target the various groups of stakeholders which included the community members, the local administration and departmental heads and factory employees.

8.2ENGAGEMENT TECHNIQUES

Padonmar Soap Factory has implemented a comprehensive range of engagement activities using varied techniques to ensure that the project effectively involves stakeholders. The using techniques for aforementioned discussions, meetings and survey are showed in following table.

Table 8.1 Engagement Methods and Techniques

Engagement Technique	Description
Company address, Factory address,	Padonmar Soap Factory provides factory location. This is relevant tactics in easily way of accessibility for all kinds of stakeholders.
Hot line number	Padonmar Soap Factory operates a hot line number which is available during business hours.
Pamphlet	Padonmar Soap Factory has produced pamphlet available in community meetings for general information related with factory activities, environmental management, safety and community development.
Face to face meetings	Padonmar Soap Factory engages directly with a range of stakeholders as required.
Questionnaires and surveys	Padonmar Soap Factory conducted opinion survey in the vicinity of the factory location, to evaluate the effectiveness of engagement mechanisms and gain an understanding of community perception, interests and issues.
Public Meetings	Padonmar Soap Factory has conducted public meeting to generate more in-depth information around issues and concerns raised by stakeholders. These were giving stakeholders an opportunity to directly obtain information and ask questions concerned with the project.

8.3 CONSULTATION PROCESS

Key issues and concerns were identified through:

- **Discussions with Padonmar Soap Factory Authority Persons**
  Discussions and information sharing with factory throughout the EMP process.

- **Face to face meeting**
  Key informant interviews were conducted with **Villages Tract Administrator**. One of the strategies was to collect the perceptions of village authority persons.

- **Socio-Economic and Opinion Surveys**
  Detailed socio economic, and opinion surveys were also conducted during October 2019.

- **Public Meeting**
  Public Consultations was conducted in October 2019.

8.3.1 FACE TO FACE MEETING

In October 2019, two face to face meetings were conducted.

3) Face to face meeting with Thea Hpyu Kone Villages Tract Administrator.
4) Face to face meeting with Zin Bar Villages Administrator (Moke Ta Ma Villages Tract).

They were informed of the Project activities and face to face meetings were conducted for the commencement of baseline studies and household survey. The key stakeholders were informed of the project activities, environmental management, safety and community development. Face to face meeting was conducted by GREEN EHSS social consultant.

Figure 8.3 Discussion with Thea Hpyu Kone Villages Tract Administrator

Figure 8.4 Discussion with Zin Bar Village Administrator of Moke Ta Ma Village Tract

8.3.2 SOCIO-ECONOMIC AND OPINION SURVEY

The purpose of the socio economic and opinion questionnaire was to collect general socio economic and opinion information in this area and to obtain opinions and understanding of the activities of the factory in Paung Township.

The household interviews were conducted inform of **socio-economic survey** through the use of predefined questionnaires targeting the PAP. The interviewers targeted the general public residing in the vicinity of the Padonmar Soap Factory (Figure 8.5).

During October 2019, household surveys were conducted with 15 respondents from Thea Hpyu Kone Village Tract of Paung Township. The household leaders were consulted with the objective of understanding the existing socio-economic conditions of the area of influence and the immediate surroundings of the project. Data collected

during the survey included data on the particulars of the community members and their opinion on the project.

Figure 8.6 Socio-Economic Surveys in Thea Hpyu Kone Villages Tract

8.3.3 PUBLIC CONSULTATIONS

On 16th October 2019, public consultation and participation was conducted by Green EHSS Social consultants. with representatives of Padonmar Soap Factory. It was held at Briefing Hall of Padonmar Soap Factory with 34 attendees (22 attendees from the surrounding villages of Thea Hpyu Kone Village, Ye Pyar Kone Village, Zin Bar Village, Pathein Kwin Village, Kan Hpyu Village and Nat Sin Kone Village and 12 employees from Padonmar Soap Factory including Factory Manager, Dy. Manager). Public meeting conducted to collect the ideas and opinions of village leaders, village elders, local residents and factory employees with questionnaires to give their perceptions and the potential impacts in order to influence project design, implementation and follow-up.

In an open-ended question, the respondents were asked to identify the negative and positive impacts they expect this project to have on the local community. Moreover, respondents were given an opportunity at the end of the questionnaire to provide any additional comments they wanted recorded. Their suggestion and comments are shown in Appendix.

During the meeting, Padonmar Soap Factory's employees had a chance to provide their concerns and suggestions also. 12 employees attended the consultation meeting and Green EHSS's consultant team received 8 assessments and these are revealed in Appendix.

Figure 8.7 Photo of Meeting Hall of Padonmar Soap Factory

Table 8.2 List of Participants from Surrounding Villages to the Meeting

Green EHSS Consultancy

GREEN ENVIRONMENTAL, HEALTH, SAFETY & SOCIAL CONSULTANCY CO., LTD
1112/C2 (A), Time Square Home, Merchant Road, Botataung Township, Yangon
Ph: 095026245, 09425353553, Email: catherine@greenehss.com, green.sweaung@gmail.com

မြန်မာ့စီးပွားရေးဦးပိုင်အများနှင့်သက်ဆိုင်သော ကုမ္ပဏီလီမိတက်
ပဒုမ္မာဆပ်ပြာစက်ရုံလုပ်ငန်း (ပေါင်မြို့နယ်) နှင့်စပ်လျဉ်း၍ အကြံပြုဆွေးနွေးမှုများ
ဆွေးနွေးပွဲသို့တက်ရောက်သူဒေသခံစာရင်း

Public Consultation Meeting

Date of Meeting : ၁၆ . ၁၀ . ၂၀၁၉ .
Venue for Meeting: စက်ရုံဝင်းလမ်းခေါင်း
Meeting Time : ၁၀ : ၃၀

Sr. စဉ်	Name အမည်	Position ရာထူး	Address နေရပ်လိပ်စာ	Tel. Number ဖုန်းနံပါတ်	Signature လက်မှတ်
1	ဦးမောင်ငယ်	ရာအိမ်မှူး	[illegible]		[signature]
2	[illegible]	ဆယ်အိမ်မှူး	,,		[signature]
3	ဒေါ်မြင့်ရွှေ	ဒေသခံ	ပုသိမ်ကွင်း		[signature]
4	ဦးကျော်ရွှေ	ဒေသခံ	ဂဇီးဘာ		[signature]
5	ဦးခင်မောင်ဝင်း	ဆယ်အိမ်မှူး	ရဲပြားကွင်း	09-420273434	[signature]
6	ဦးကံမြင့်	ရပ်ကွက်အုပ်ချုပ်ရေးမှူး	ဂဇီးဘာ	09-764713810	[signature]
7	ဦးမြင့်အောင်	ရာအိမ်မှူး	သဲပြင်ကွင်း	09-793024327	[signature]
8	ဦးသိန်းလှိုင်	ရပ်ကွက်မှူး	ကံပြင်	09-255712026	[signature]
9	ဦးသန်းကြိုင်	ဒေသခံ	ရဲပြားကွင်း		[signature]
10	ဦးထွန်းမြတ်	ဒေသခံ	ရဲပြားကွင်း	09-769138250	[signature]

GREEN ENVIRONMENTAL, HEALTH, SAFETY & SOCIAL CONSULTANCY CO., LTD
1112/C2 (A), Time Square Home, Merchant Road, Botataung Township, Yangon
Ph: 095026245, 09425353553, Email: catherine@greenehss.com, green.sweaung@gmail.com

Sr. စဉ်	Name အမည်	Position ရာထူး	Address နေရပ်လိပ်စာ	Tel. Number ဖုန်းနံပါတ်	Signature လက်မှတ်
11	ဦးအေးမင်း	ဆယ်အိမ်မှူး	ရဲမှားကုန်း	09-796080848	
12	ဦးမောင်မွတ်	ဆယ်အိမ်မှူး	ရဲမှားကုန်း		
13	ဦးအောင်ငြိမ်း	ဒေသခံ	ရဲမှားကုန်း	09-771278250	
14	ဦးလှရွှေ	ကျေးရွာအုပ်ချုပ်	ရဲမှားကုန်း	09-890868656	
15	ဒေါ်ယင်ယင်	ဒေသခံ	ရဲမှားကုန်း		
16	ဒေါ်ကြိုင်သွပ်	ဒေသခံ	ရဲမှားကုန်း		
17	ဒေါ်ကင်မော	ဒေသခံ	ရဲမှားကုန်း		
18	ဒေါ်အေးသိန်း	ဒေသခံ	ရဲမှားကုန်း		
19	ဒေါ်ခင်မောလှိုင်	ဒေသခံ	ရဲမှားကုန်း		
20	ဒေါ်သိန်းမြင့်	ဒေသခံ	ရဲမှားကုန်း		
21	ဦးဟာဆင်	ဆယ်အိမ်မှူး	ရဲမှားကုန်း		
22	ဦးနေဝင်း	ရာအိမ်မှူး	ဇွတ်ခုံကုန်း	09-763012775	
23					

Table 8.3 List of Employees from Padonmar Soap Factory to the Meeting

Green EHSS Consultancy

GREEN ENVIRONMENTAL, HEALTH, SAFETY & SOCIAL CONSULTANCY CO., LTD
1112/C2 (A), Time Square Home, Merchant Road, Botataung Township, Yangon
Ph: 095026245, 09425353553, Email: catherine@greenehss.com, green.sweaung@gmail.com

မြန်မာ့စီးပွားရေးဦးပိုင်အများနှင့်သက်ဆိုင်သော ကုမ္ပဏီလီမိတက်
ပဒုမ္မာဆပ်ပြာစက်ရုံလုပ်ငန်း (ပေါင်မြို့နယ်) နှင့်စပ်လျဉ်း၍ အကြံပြုဆွေးနွေးမှုများ
ဆွေးနွေးပွဲသို့တက်ရောက်သူဝန်ထမ်းများစာရင်း

Public Consultation Meeting

Date of Meeting : ၁၆ . ၁၀ . ၂၀၁၇ .

Venue for Meeting: စက်ရုံရုံးလင်းဆောင်

Meeting Time : ၁၀:၃၀

Sr. စဉ်	Name အမည်	Position ရာထူး	Address နေရပ်လိပ်စာ	Tel. Number ဖုန်းနံပါတ်	Signature လက်မှတ်
1	ဒေါ်ခိုင်ဖြိုး	စက်ရုံမှူး	ပဒုမ္မာဆပ်ပြာစက်ရုံ	09791093945	[signature]
2	ဦးဝင်းထက်အောင်	ဒုတိယစက်ရုံမှူး	ပဒုမ္မာဆပ်ပြာစက်ရုံ	09781848654	[signature]
3	ဒေါ်နွယ်နီဝင်း	ထုတ်၊ကျွမ်း(၃)	ပဒုမ္မာဆပ်ပြာစက်ရုံ	09-792407621	[signature]
4	ဒေါ်မြင့်မြင့်ထား	ထုတ်ကျွမ်း(၃)	"	09792407607	[signature]
5	ဒေါ်ဇင်သူရိုး	ထုတ်ကျွမ်း(၄)	"	09425340467	[signature]
6	ဦးကြည်တင့်အောင်	ဝန်.ထမ်း	"	09766356901	[signature]
7	ဒေါ်ကြည်ကြည်ဝင်း	ဝန်.ထမ်း	"	09779227582	[signature]
8	ဒေါ်သဇင်လှိုင်	ဝန်.ထမ်း	"	09768978085	[signature]
9	ဦးမြတ်သူအောင်	ဝန်ထမ်းရေး(၅)	"	0967-84690485	Aug.
10	ဦး.အောင်ဆွေလင်း	ဝန်.ထမ်း	"	09777522931	[signature]

Green EHSS Consultancy

GREEN ENVIRONMENTAL, HEALTH, SAFETY & SOCIAL CONSULTANCY CO., LTD
1112/C2 (A), Time Square Home, Merchant Road, Botataung Township, Yangon
Ph: 095026245, 09425353553, Email: catherine@greenehss.com, green.sweaung@gmail.com

Sr. စဉ်	Name အမည်	Position ရာထူး	Address နေရပ်လိပ်စာ	Tel. Number ဖုန်းနံပါတ်	Signature လက်မှတ်
11	ဦးသန့်လင်း	[illegible]	[illegible]	09.777276771	[signature]
12	ဦးမြနိုင်ကျော်	[illegible]	[illegible]	09 26014448 5	[signature]
13					
14					
15					
16					
17					
18					
19					
20					

Figure 8.8 Photos of Stakeholder Meeting at Meeting Hall of Padonmar Soap Factory

Figure 8.9 Photo Record of Employees Assessment Session

8.4 COMMENTS AND SUGGESTIONS FROM THE PUBLIC CONSULTATIONS AND SOCIO-ECONOMIC SURVEY

Consultation with communities affected by the project as well as one by one meeting with local government and ward leaders, socio-economic survey and stakeholder meeting highlighted the environmental issues. Several of these are issues directly related to the factory activities and facilities during operation.

Public consultation and socio-economic survey were conducted with 34 respondents in total. The views are presented as issues requiring clarification, the anticipated benefits of the project, its negative impacts and proposed recommendations to abate the negative impacts or enhance the project benefits.

In an open-ended question, the respondents were asked to identify the negative and positive impacts they expect this project to have on the local community. They were also asked to indicate if they expected the impact to occur during the operation phase of the project. Respondents were also given an opportunity at the end of the questionnaire to provide any additional comments they wanted recorded.

The results of public consultation and socio-economic survey show that respondents were positive on the project for the operation of Padonmar Soap Factory. Only 30% of local attendees exposed about the impact on waste water generated by the factory. Their concerns are related with the waste water situation in 2018. In 2019, the meeting attendees indicated that the impact of waste water on the local community become decrease due to the renovation of waste water controlling system by the factory. 6

attendees provided no comments on the operation of the factory. The views are presented in a tabular form (Table 8.4).

Local residents also stated that Padonmar Soap Factory can create local employment opportunities (over 80% of factory employees is local residents) and the positive impacts of decreasing price of soap with good quality in local area due to the establishment of Padonmar Soap Factory in the region.

Table 8.4 Types of Issues Raised by Local Residents

No	Questions	Thea Hpyu Kone Village	Zin Bar Village	Ye Pyar Kone Village	Kan Hpyu Village	Nat Sin Kone Village
1	To manage the factory waste water by using treatment methods for the purpose of controlling environment.	✓			✓	
2	To continue the controlling of waste water and other negative impact on surrounding villages.		✓	✓		✓
3	To collaborate the factory employee with local people in the activities.	✓				
4	Wishing the factory to have success.		✓			

8.5RESPONSES AND IMPLEMENTATION ACTION FOR COMMENTS

During the discussion process the issues raised are reviewed, and actions for resolution are agreed by the parties. Some issues were agreed at the time of consultation meeting. Responses and action plan of the Padonmar Soap Factory are shown in Table 8.5.

Table 8.5 Responses of the Factory for the Comment and Suggestion Received

ပဒုမ္မာဆပ်ပြာစက်ရုံ အနေဖြင့် အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးခြင်း နှင့် သတင်းအချက်အလက်များ ထုတ်ဖော် တင်ပြခြင်း အစည်းအဝေးတွင် ရပ်မိရပ်ဖ ပြည်သူများ နှင့် တွေ့ဆုံဆွေးနွေး အကြံပြုချက်များ နှင့် ပက်သက်၍ ဆောင်ရွက်ပေးမည့် အစီအစဉ်

စဉ်	သဘောထား အကြံပြုချက်များ	ရှင်းလင်း ဆောင်ရွက်ချက်
၁	စွန့်ပစ်ရေကို နည်းပညာ အသုံးပြု၍ ကောင်းမွန်စွာ ထိန်းသိမ်းထားရန် နှင့် ပတ်ဝန်းကျင် မပျက်စီးစေရန်	-စွန့်ပစ်ရေကို စက်ရုံစတင်လည်ပတ်စဉ်ကတည်းက (အလျား ၁၅၀ ပေ x အနံ ၁၀၀ ပေ x အနက် ၁၅ပေ) ရှိ အညစ်အကြေးစွန့်ကန် နှင့် (အလျား ၁၀၀ ပေ x အနံ ၁၀၀ ပေ x အနက် ၁၅ပေ) ရှိရေစစ်ကန် ၂ကန် ထားရှိ၍ စွန့်ပစ် ရေများအား ပြင်ပသို့ထွက်ရှိမှု မရှိစေရန် စနစ်တကျ ထိန်းသိမ်း သိုလှောင်ထားရှိပါသည်။ -၁၄-၂-၂၁၉ ရက်နေ့တွင် ထပ်မံ၍ (အလျား ၁၀၀ ပေ x အနံ ၄၀ ပေ x အနက် ၁၀ပေ) နှင့် (အလျား ၇၀ ပေ x အနံ ၄၀ ပေ x အနက် ၁၀ပေ) ရှိ စွန့်ပစ်ရေစစ်ကန် (၂)ကန် အသစ်တူးဖော်ပြီး ထွက်ရှိလာသော စွန့်ပစ်ရေ များအားအဆင့်ဆင့် အနည်ထိုင် အင်္ဂေ့ပုံစနစ်ဖြင့် ဆောင်ရွက် လျှက် ရှိပါသည်။ -စွန့်ပစ်ရေများ မြေအောက်သို့စိမ့်ဝင်မှု မရှိစေရေးအတွက် အသစ် တူးဖော် ထားသော ကန် ၂ကန်အား HDPE Lining ခင်းရန်အတွက် Modern Pioneer Industrial Group Co., Ltd. နှင့် လုပ်ငန်းဆောင် ရွက် လျှက်ရှိပြီး နည်းပညာအသုံးပြုခြင်းဖြင့် စွန့်ပစ်ရေအား ကောင်းမွန် စွာ ထိန်းသိမ်းထားရှိနိုင်မည် ဖြစ်ပါသည်။ -မြေဆီလွှာ မပျက်စီးစေရန်နှင့် မြေအောက်ရေ နှင့် လေထုသန့်ရှင်းမှုရှိ စေရန်အတွက် ပတ်ဝန်းကျင် ပျက်စီးမှု မရှိအောင် စက်ရုံဧရိယာ အတွင်း နှင့် အနီးတဝိုက်တွင် နှစ်ရှည်သစ်ပင်များဖြစ်သည့် မလေးရှားပိတောက် ပင်များ၊ သရက်ပင်များ၊ မယ်ဇ
		လီပင်များ၊ ပိတောက်ပင်များ၊ ပျဉ်းမ ပင်များ၊ ဆီအုန်းပင်များ နှင့် ရာဘာပင်များ စိုက်ပျိုးထားရှိပြီး ပတ်ဝန်း ကျင်ပျက်ဆီးမှု မရှိအောင်ထိန်းသိမ်းဆောင်ရွက် လျှက် ရှိပါသည်။
၂	ဘေးပတ်ဝန်းကျင်ကျေးရွာများကို ရေဆိုးမပြန့်အောင် အခြားဆိုးကျိုး မရှိအောင် ဆက်လက်ထိန်း သိမ်းပေးရန်။	ဘေးပတ်ဝန်းကျင်ကျေးရွာများကို ရေဆိုးမပြန့်အောင် အခြားဆိုးကျိုး မရှိအောင် စက်ရုံ အနေဖြင့် စွန့်ပစ်ရေအား အညစ်အကြေးစွန့်ကန် (၁) ကန် ရေစစ်ကန် (၃) ကန် ထားရှိ၍ စနစ်တကျ ထိန်းသိမ်းဆောင်ရွက် လျှက်ရှိပါသည်။
၃	စက်ရုံဝန်ထမ်း နှင့် ကျေးရွာလူထု ဒေသခံများနှင့် ပူးပေါင်း ဆောင်ရွက်ရန်။	-စက်ရုံဝန်ထမ်းနှင့် ကျေးရွာလူထု ဒေသခံများ နှင့်ပူးပေါင်း ဆောင်ရွက်မှု အနေဖြင့် စက်ရုံတွင် ဝန်ထမ်း(၅၂)ဦး၊ နေ့စား (၂၈)ဦး၊ ပေါင်း (၈၀)ဦးရှိပြီး ဒေသတွင်း အလုပ်အကိုင် အခွင့်အလမ်း ရရှိစေရန်အတွက် ဝန်ထမ်း နှင့် နေ့စားများအား ပတ်ဝန်းကျင် ကျေးရွာများမှ ဒေသခံများအား ခန့်ထား၍ လုပ်ငန်းဆောင်ရွက်လျှက် ရှိပါသည်။ -ကျေးရွာလူထုနှင့် ပူးပေါင်းဆောင်ရွက်မှု အနေဖြင့် စက်ရုံအထိမ်းအမှတ် ပွဲများ၊ အခမ်းအနားများနှင့် ပျော်ပွဲရွှင်ပွဲများ တွင် ကျေးရွာအုပ်ချုပ်ရေးမှူးနှင့် ရပ်မိ ရပ်ဖ များအား ဖိတ် ကြား၍ တွေ့ဆုံမှု များ ဆောင်ရွက်လျက်ရှိပြီး ကျေးရွာအတွင်း ကျင်းပသည့် ဘာသာရေးပွဲ များနှင့် ပျော်ပွဲရွှင်ပွဲများတွင်လည်း စက်ရုံမှ တာဝန်ရှိသူများမှ သွားရောက်တွေ့ဆုံ၍ ပူးပေါင်းဆောင်ရွက်လျက်ရှိပါသည်။

8.6FUTURE PLAN FOR STAKEHOLDER ENGAGEMENT

Padonmar Soap Factory provides an opportunity to all the stakeholders and communities in the surrounding area as well as all employees to raise issues and concerns pertaining to the factory.

The ongoing consultation process will handle through mechanisms as follows:

a) Neighbouring community/stakeholders can directly inform their perception to the Factory Office.
b) They can give their suggestions to the factory through the village administration office.
c) Padonmar Soap Factory will continue to engage the relevant government departments annually for receiving required permit and license.
d) Conduct discussions with village leaders both informally through phone conversation and formally through face to face meetings whenever necessary.

The required contact information from both sides of Padonmar Soap Factory as well as community contacts had been already disclosure.

8.7 APPENDIX

Green EHSS Consultancy

GREEN ENVIRONMENTAL, HEALTH, SAFETY & SOCIAL CONSULTANCY CO., LTD
1112/C2 (A), Time Square Home, Merchant Road, Botataung Township, Yangon
Ph: 095026245, 09425353553, Email: catherine@greenehss.com, green.sweaung@gmail.com

မြန်မာ့စီးပွားရေးဦးပိုင်အများနှင့်သက်ဆိုင်သော ကုမ္ပဏီလီမိတက် ပဒုမ္မာဆပ်ပြာစက်ရုံ (ပေါင်မြို့နယ်) လည်ပတ်ခြင်းနှင့်စပ်လျဉ်း၍ အကြံပြုဆွေးနွေးမှုများ

အကြံပြုချက်များ
စွန့်ပစ်ရေကို နည်းပညာအသုံးပြု၍ - ကောင်းမွန် စွာ စီမံ၊ သိမ်းထားပါနှင့် ပတ်ဝန်းကျင် မပျက်စီးစေပါ

(လက်မှတ်)

အမည် ဦးဝင်းဇော်

ရာထူး အုပ်ချုပ်ရေးမှူး

စက်ရုံ ၁၁ ပြန့်ကျန်းမာရေးဌာနအုပ်ချုပ်

လိပ်စာ ၊ ကျုံမျိုးကျေးရွာ

ဖုန်းနံပါတ် 09 777771944

GREEN ENVIRONMENTAL, HEALTH, SAFETY & SOCIAL CONSULTANCY CO., LTD
1112/C2 (A), Time Square Home, Merchant Road, Botataung Township, Yangon
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မြန်မာ့စီးပွားရေးဦးပိုင်အများနှင့်သက်ဆိုင်သော ကုမ္ပဏီလိမိတက်

ပဒုမ္မာဆပ်ပြာစက်ရုံ (ပေါင်မြို့နယ်) လည်ပတ်ခြင်းနှင့်စပ်လျဉ်း၍ အကြံပြုဆွေးနွေးမှုများ

အကြံပြုချက်များ

(လက်မှတ်)

အမည် ဦးကံဖြိုး

ရာထူး ကုမ္ပဏီဥက္ကဋ္ဌ (ကိုယ်စား)

စက်ရုံ ပဒုမ္မာဆပ်ပြာစက်ရုံ

လိပ်စာ

ဖုန်းနံပါတ် 09764713810

အကြံပြုချက်များ

ဆေး ပတ်ဝန်းကျင် ကျေးရွာ များကို ရေဆိုး - [illegible]
[illegible] ဆိုးကျိုး မဖြစ်အောင် အကောင်းဆုံး ထိန်းသိမ်းပေးပါရန်။

(လက်မှတ်)

အမည် ---- နိုးနေဝင်း ----

ရာထူး ---- [illegible] ----

စက်ရုံ ---------------

လိပ်စာ ---- နတ်စင်ကုန်း ----

အကြံပြုချက်များ

ရေဆိုး များကို ယခုကဲ့သို့ အကောင်းဆုံး ထိန်းသိမ်းပေးပါရန်။

(ရေဆိုး များ ဖြစ်ပေါ်လာမှု အတွက်)

(လက်မှတ်)

အမည် ---- ကိုသန်းဇော်ဦး ----

ရာထူး ---- ကျေးရွာသား ----

စက်ရုံ ---------------

လိပ်စာ ---- [illegible] ----

အကြံပြုချက်များ

ရေဆိုး ရေနုတ် မြောင်းကို ထိန်း သိမ်း

စက်ရုံ နှင့် ကျေးရွာ [illegible] ပေါင်း ဆောင်ရွက်ရန်

(လက်မှတ်)

အမည် ဦး[illegible]

ရာထူး ကျေးရွာ [illegible]

စက်ရုံ

လိပ်စာ [illegible]

အကြံပြုချက်များ

စက်ရုံ ဝန်ထမ်း နှင့် ကျေးရွာ [illegible] များ နှင့် ပူး ပေါင်း

ဆောင်ရွက်စေလိုပါ။

(လက်မှတ်)

အမည် ဦး မြင့် အောင်

ရာထူး ရာအိမ်မှူး

စက်ရုံ

လိပ်စာ [illegible] ကျေးရွာ

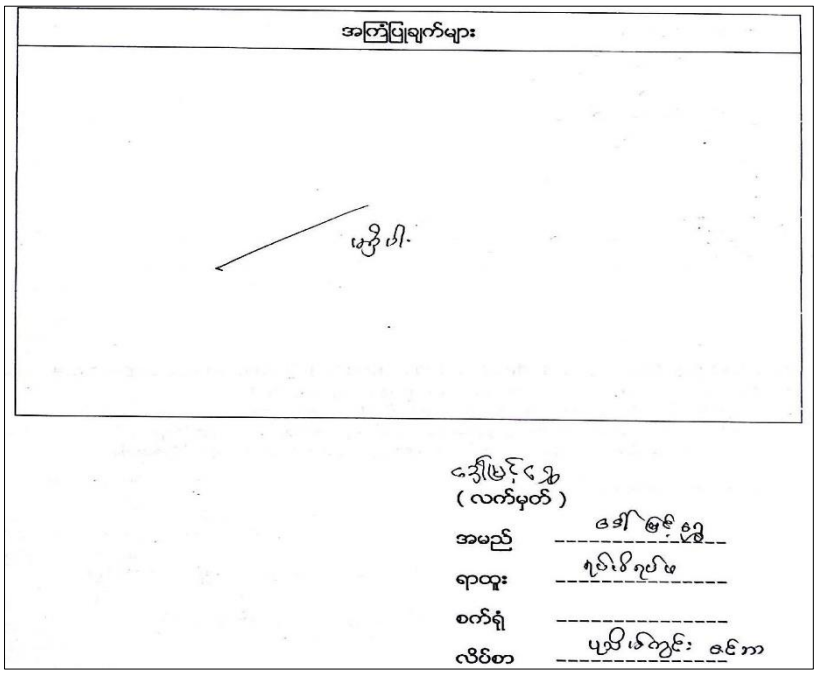
စက်ရုံလည်ပတ်နေချိန်	မူလက တဆိုးထွက်လာပါသည်။ ယခုစက်ရုံမှ မှုန်လည်း မမြင်လောက်ပါသည်။

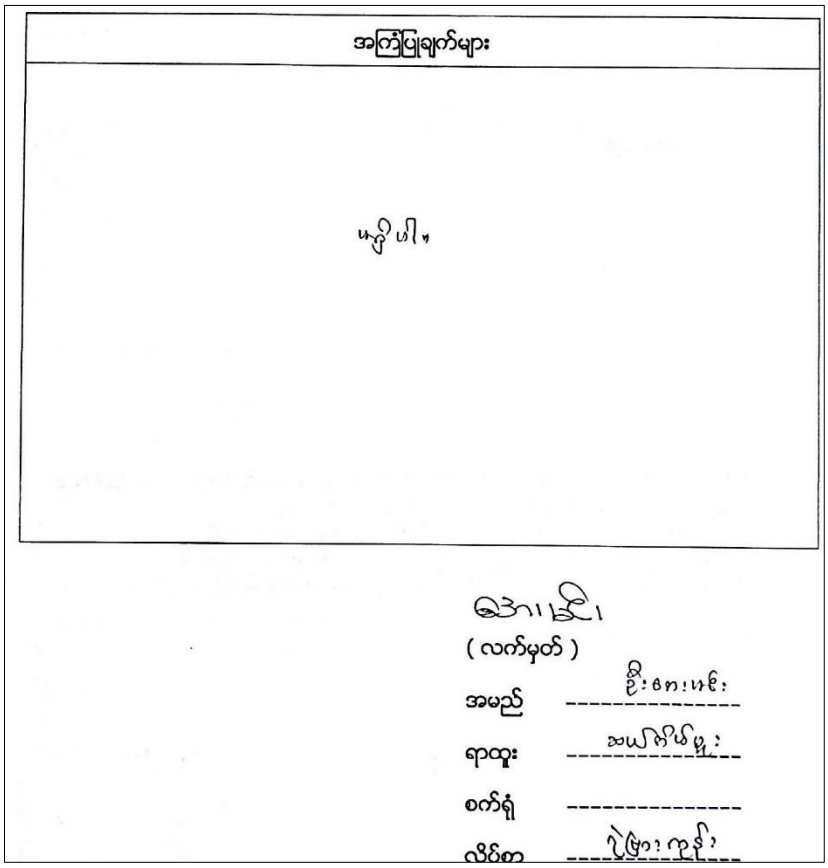
စက်ရုံလည်ပတ်နေချိန်	ယမန်နှစ် (2018) က အနံ့ဆိုးများထွက်ခဲ့ ယခု (2019) တွင် မထွက်တော့ပါ။

စက်ရုံလည်ပတ်နေချိန်	ဆပ်ပြာများကို ဈေးနှုန်း သင့်တင့်စွာ ဝယ်ယူ သုံးစွဲနိုင်ပါသည်။ အလုပ်အကိုင် ရရှိပါသည်။

စက်ရုံလည်ပတ်နေချိန်	အလုပ်အကိုင်အခွင့်အလမ်းများ ရရှိ။

စက်ရုံလည်ပတ်နေချိန်	- ဆပ်ပြာကို လွယ်ကူစွာ သုံးစွဲနိုင် ၊ ဈေးနှုန်းချို သာခြင်း . - အလုပ်အကိုင်အခွင့်အလမ်းများ ရ


အကြံပြုချက်များ
မရှိပါ။
(လက်မှတ်)
အမည်
ရာထူး
စက်ရုံ
လိပ်စာ


အကြံပြုချက်များ
မရှိပါ။
(လက်မှတ်)
အမည်
ရာထူး
စက်ရုံ
လိပ်စာ

၈။ လုပ်ငန်းခွင်ဆက်ဆံရေး နှင့်ပက်သက်၍ အကြံပြုချက်

ဆက်ဆံရေးပြေပြစ်	☑	ကောင်းမွန်ခြင်းမရှိ	☐
အခြား			

၉။ သီးခြားအကြံပြုချက်များ

မရှိပါ။

(လက်မှတ်)

အမည် ဒေါ်ဇင်သူရှိန်း

ရာထူး ထုတ်ကျွမ်း (၄)

ဌာန [illegible]

လုပ်သက် ၁၄ နှစ်

စက်ရုံ ပဒုမ္မာဆပ်ပြာစက်ရုံ

လိပ်စာ [illegible]

ဖုန်းနံပါတ် [illegible]

၉။ သီးခြားအကြံပြုချက်များ

မရှိပါ။

(လက်မှတ်)

အမည် [illegible]

ရာထူး ထုတ်ကျွမ်း (၃)

ဌာန [illegible]

လုပ်သက် ၁၇ နှစ်

စက်ရုံ ပဒုမ္မာဆပ်ပြာစက်ရုံ

လိပ်စာ [illegible]

ဖုန်းနံပါတ် 09 792407607

၈။ လုပ်ငန်းခွင်ဆက်ဆံရေး နှင့်ပက်သက်၍ အကြံပြုချက်

ဆက်ဆံရေးပြေပြစ်	☑	ကောင်းမွန်ခြင်းမရှိ	☐
အခြား			

၉။ သီးခြားအကြံပြုချက်များ

မရှိပါ။

(လက်မှတ်)

အမည် [illegible]

ရာထူး ထုတ်ကျွမ်း (၃)

ဌာန [illegible]

လုပ်သက် ၁၇ နှစ်

စက်ရုံ ပဒုမ္မာဆပ်ပြာစက်ရုံ

လိပ်စာ [illegible]

ဖုန်းနံပါတ် 09-792407621

၉။ သီးခြားအကြံပြုချက်များ

မရှိပါ။

(လက်မှတ်)

အမည် [illegible]

ရာထူး ထုတ်ကျွမ်း (၃)

ဌာန [illegible]

လုပ်သက် ၁၇ နှစ်

စက်ရုံ ပဒုမ္မာဆပ်ပြာစက်ရုံ

လိပ်စာ [illegible]

ဖုန်းနံပါတ် 09 792407607

9. CONCLUSION

Padonmar Soap factory is considered as a small- scaled soap producer. The production processes are run with only 54 permanent staff and 28 daily wages workers. The factory's average operation days per year is only 96 days. Maintenance activities, cleaning activities and other nonoperational tasks are performed during remaining half of the year.

A few potential environmental impacts are identified in this Environmental Management Plan (EMP) report. The effluent wastewater are treated with sedimentation process within the ponds. The factory has engaged a contractor to install HTP linings at the ponds to protect impacts on soil and underground water qualities. HTP lining installation will be managed by Modern Pioneer Industriual Group Co., Ltd. 2 K – Tech Engineering Co., Ltd will be responsible for new waste water treatment factory.

In general, small or zero quantity of liquid were accumulated in the ponds in the dry season.

Baseline monitoring of ambient air quality, underground water quality, soil pH, demonstrated that all monitoring results are within the National Emission Standards and acceptable levels. Noise levels from some machines exceeded the acceptable level.

In accordance with the assessment data, the impacts on ambient air quality, surface water and underground water quality, soil quality, occupational health and safety hazards and risks to the workers and community, traffic congestion and odor emission were identified and evaluated as medium to low impacts.

During public consultation, although residents near the factory were concerned about waste water associated with the factory operation, the meeting attendees indicated that the impact of waste water on the local community become decrease due to the renovation of waste water controlling system by the factory in 2019, Local residents also stated that Padonmar Soap Factory can create local employment opportunities (over 80% of factory employees is local residents) and the positive impacts of decreasing price of soap with good quality in local area due to the establishment of Padonmar Soap Factory in the region.

The provision of effective environmental management and monitoring plans by the Factory will mitigate the potential environmental and social impacts. It is crucial to make sure that mitigation and monitoring measures are undertaken as defined in this EMP report.

It can be concluded that the exiting control measures are likely to be adequate; however, it is required to monitor the impacts continuously and obtain the stakeholder feedbacks as necessarily.

10. LIST OF COMMITMENT

Project proponent is commitment to comply with the existing environmental rules and regulations and criteria laid down by the Ministry of Natural Resources and Environmental Conservation.

Table 10.1 Project Key Commitments

ကတိကဝတ်၏အတိုချုပ်	အမှတ်စဉ်	ကတိကဝတ်အား ရှင်းလင်း ဖော်ပြချက်	အစီရင်ခံစာပါ ညွှန်းချက် (အခန်း)
Project Description (SOLID WASTE)	1	Factory practises reducing and recycling of waste management.	Chapter 3.0 Section 3.11.1
Project Description (Occupation)	2	Basic Fire Fighting training, Boiler operator training, Boiler inspection and machine operator training will provide to the relevant workers.	Chapter 3.0 Section 3.11.4
Legal Requirement	3	The National laws and regulations for the environmental protection applicable to the project are compiled and presented.	Chapter 4.0 Section 4.3
	4	the Plants ensures to meet the Requirements of Applicable Licenses and Permits.	Chapter 4.0 Section 4.3
	5	**The** Factory also abides the relevant regulations and guidelines issued by the Regional Government, Tanintharyi Region Government.	Chapter 4.0 Section 4.4
Environmental and Social Impact Assessment and Mitigation Measures (OCCUPATIONAL HAZARDS)	6	The factory management including the factory Manager shall conduct regular environmental, health and safety inspections within the factory to maintain and improve environmental, health and safety performances.	Chapter 6.0 Section 6.5.5
ll	7	The factory managememt including the Factory Manager conducts regular	ii

		environmental, health and safety inspections within the factory to maintain and improve environmental, health and safety performances.	
Environmental and Social Management Plan (EMERGENCY AND DISESTER PREPAREDNESS PLAN)	8	The Factory prepares an Emergency Response Plan in order to prevent potential emergency situation.	Chapter 7.0 Section 7.5
Monitoring Plan	9	Environmental Parameters shall be monitored as proposed timelines by the trained factory personal or third party consultant team.	Chapter 7.0 Section 7.9.3
Stakeholder Engagements and Information Disclosure (STAKEHOLDER ENGAGEMENT)	10	Padonmar Soap Factory provides an opportunity to all the stakeholders and communities in the surrounding area as well as all employees to raise issues and concerns pertaining to the factory.	Chapter 8.0 Section 8.6

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12. APPENDIX

APPENDIX A UNDERGROUND WATER QUALITY TESTS RESULTS

MWEP

MYANMAR WATER ENGINEERING & PRODUCTS CO., LTD.

OFF : NO.(15), THUMINGALAR LANE 1,
THUMINGALAR HOUSING ESTATE.
THINGANGYUN Tsp. YANGON.

PHONE : 571694, 8564547, 573532
FAX : 573532
E mail. : mwepmyanmar@gmail.com

WATER ANALYSIS RESULT FORM

Analysis Ref. No : WR550819
Client : Green EHSS Co., Ltd.
Address : Padonama Soap (Paung Tsp.)

Source of Water : Tube Well
Receiving Date : 27.08.2019
Analysis Date : 30.08.2019

Parameters	Sample Result	WHO Standard
Temperature		- -
pH	7	6.5 - 8.5
Colour	Slightly Turbid	Clear
Conductivity	239.06 micro S / cm	
Total Dissolved Solid	153 mg/l	< 250
Total Hardness	110 mg /l as $CaCO_3$	<16
Total Alkalinity	120 mg /l as $CaCO_3$	<250
Sodium (as Na^+)	-	-
Calcium (as Ca^{++})	36.07 mg /l as $CaCO_3$	<8
Magnesium (as Mg^{++})	4.76 mg /l as $CaCO_3$	<8
Potassium (as K^+)	- -	-
Iron (as Fe^{++})	1.2 mg /l	<0.3
Chloride (as Cl^-)	10 mg /l	<250
Sulphate (as $SO_4^=$)	- -	-
Bicarbonate (as HCO_3^-)	120 mg /l as $CaCO_3$	<250
Carbonate (as $CO_3^=$)	ND mg /l	<250
Hydroxide (as OH^-)	- - mg /l	<100
Remarks	HIGH TOTAL HARDNESS & IRON CONTENT	

Analysis By : Thi Dar Soe

Approved By : Win Kalaya

APPENDIX B FINAL EFFLUENT AND DRAINAGE WATER QUALITY TESTS RESULTS

Advanced Medical & Diagnostics Trading Ltd.
Yangon Office: No. 20-A Ywar Lae Lane, Za-North Ward, Thingangyun Tsp, Yangon
Phone: 01 571656, 01 565797, 09 73176248, 09 73112672
Mandalay Office: No. MA 28, 59th street, Bt. 41st and 42nd street, Ye' Mon Taung Ward, Ma Har Aung Myay Tsp, Mandalay
Website & Email: www.amdmyanmar.com & amd@amdmyanmar.com

WATER & WASTE WATER TREATMENT DIVISION

Attention To	GREEN EHSS Consultancy Co., Ltd. No.172, Building C-2 A, 11th Floor, Room (A/1112) Botahtaung Township, Yangon.

Source of Water	:	Padonma Soap Factory, Paung Township
Analysis	:	Waste Water Test
Date Attended to Lab	:	27.8.2019

Sr.	Item	Outside	YCDC Target range
1.	Dissolved Oxygen (DO)	5.0	> 1 ppm
2.	Biochemical Oxygen Demand (BOD_5) (5days at 20°C) (mg/L)	19.7	20-60 ppm
3.	Chemical Oxygen Demand (COD) **(Adaptation of the USEPA 410.4 approved method)** (mg/L)	6	< 200 ppm
4.	pH effluent water	6.49	6<pH<9.6
5.	Suspended solids (SS)	9	< 500 ppm
6.	Nitrate (NO_3^-N)	1.4	N/A
7.	Oil and Grease	9.0	N/A

Remarks: : Results valid for the received sample only.

for Advanced Medical & Diagnostics Amd

Win Pyae Pyae Aung
Laboratory In-Charge
Water Treatment Division
Amd Trading Co.,Ltd

Advanced Medical & Diagnostics Trading Ltd.
Yangon Office: No. 20-A Ywar Lae Lane, Za-North Ward, Thingangyun Tsp, Yangon
Phone: 01 571656, 01 565797, 09 73176248, 09 73112672
Mandalay Office: No. MA 28, 59th street, Bt. 41st and 42nd street, Ye' Mon Taung Ward, Ma Har Aung Myay Tsp, Mandalay
Website & Email: www.amdmyanmar.com & amd@amdmyanmar.com

WATER & WASTE WATER TREATMENT DIVISION

Attention To	GREEN EHSS Consultancy Co., Ltd. No.172, Building C-2 A, 11th Floor, Room (A/1112) Botahtaung Township, Yangon.

Source of Water : Padonma Soap Factory, Paung Township

Analysis : Waste Water Test

Date Attended to Lab : 27.8.2019

Sr.	Item	Inside	YCDC Target range
1.	Dissolved Oxygen (DO)	4.9	> 1 ppm
2.	Biochemical Oxygen Demand (BOD_5) (5days at 20°C) (mg/L)	9	20-60 ppm
3.	Chemical Oxygen Demand (COD) (**Adaptation of the USEPA 410.4 approved method**) (mg/L)	40	< 200 ppm
4.	pH effluent water	7.55	6<pH<9.6
5.	Suspended solids (SS)	27	< 500 ppm
6.	Nitrate (NO_3^-N)	2.1	N/A
7.	Oil and Grease	6.0	N/A

Remarks: : Results valid for the received sample only.

Win Pyae Pyae Aung
Laboratory In-Charge
Water Treatment Division
Amd Trading Co.,Ltd

Advanced Medical & Diagnostics Trading Ltd.
Yangon Office: No. 20-A Ywar Lae Lane, Za-North Ward, Thingangyun Tsp, Yangon
Phone: 01 571656, 01 565797, 09 73176248, 09 73112672
Mandalay Office: No. MA 28, 59th street, Bt. 41st and 42nd street, Ye' Mon Taung Ward, Ma Har Aung Myay Tsp, Mandalay
Website & Email: www.amdmyanmar.com & amd@amdmyanmar.com

WATER & WASTE WATER TREATMENT DIVISION

Attention To	GREEN EHSS Consultancy Co., Ltd. No.172, Building C-2 A, 11th Floor, Room (A/1112) Botahtaung Township, Yangon.

Source of Water	: Padonma Soap Factory, Paung Township
Analysis	: Waste Water Test
Date Attended to Lab	: 27.8.2019

Sr.	Item	Pond	YCDC Target range
1.	Dissolved Oxygen (DO)	4.2	> 1 ppm
2.	Biochemical Oxygen Demand (BOD_5) (5days at 20°C) (mg/L)	106	20-60 ppm
3.	Chemical Oxygen Demand (COD) **(Adaptation of the USEPA 410.4 approved method)** (mg/L)	20	< 200 ppm
4.	pH effluent water	7.23	6<pH<9.6
5.	Suspended solids (SS)	123	< 500 ppm
6.	Nitrate (NO_3^-N)	0.0	N/A
7.	Oil and Grease	8.0	N/A

Remarks: : Results valid for the received sample only.

for Advanced Medical & Diagnostics Amd

Win Pyae Pyae Aung
Laboratory In-Charge
Water Treatment Division
Amd Trading Co.,Ltd

APPENDIX C MATERIAL SAFETY DATA SHEET -MSDS

SPECIFICATION SHEET **CAUSTIC SODA FLAKE**

ADITYA BIRLA GRASIM

GRASIM INDUSTRIES LIMITED
(CHEMICAL DIVISION)
Birlagram Nagda 456331 (M.P.) INDIA

SPECIFICATION SHEET

PRODUCT: CAUSTIC SODA FLAKE

Description: Free from foreign matter, dirt or other visible impurities

S.NO.	CHARACTERISTICS	SPECIFICATIONS
1	Sodium Hydroxide as NaOH, % by mass on dry basis, Min	99.50
2	Chlorides as Cl, percent by mass, Max.	0.03
3	Sodium Carbonate as Na_2CO_3, percent by mass, Max.	0.40
4	Sulphate as SO_4, percent by mass, Max.	0.03
5	Silicates as SiO_2, percent by mass, Max.	0.02
6	Iron as Fe, ppm, Max	20
7	Copper as Cu, ppm, Max	2
8	Manganese as Mn, ppm, Max	1
9	Chlorates and perchlorates as $NaClO_3$, ppm, Max	10
10	Matter insoluble in water, percent by mass, Max.	0.05

Note: Mercury content is not applicable due to caustic soda produced by membrane cell technology.

GRASIM INDUSTRIES LIMITED
(CHEMICAL DIVISION)
An ISO 9001, 14001, SA 8000 and OHSAS 18001 Certified Company
Birlagram Nagda 456331 (M.P.) INDIA
Tel.: 0091-7366-246760-66 Fax: 0091-246767
E-Mail:grasimchem@adityabirla.com Website: www.grasim.com

ADITYA BIRLA
GRASIM

GRASIM INDUSTRIES LIMITED
(CHEMICAL DIVISION)

SAFETY DATA SHEET

CAUSTIC SODA FLAKES

SODIUM HYDROXIDE, ANHYDROUS

Ref: SDS/GRCD/NAD/CSF
Revision Date: Rev-0/Feb 2017

1. IDENTIFICATION OF SUBTANCE

Trade Marks and Synonyms (if any)	Caustic Soda Flakes, Sodium Hydroxide Anhydrous
Chemical Names and Synonyms	Sodium Hydroxide Anhydrous
Physical Form	Solid, White flakes, odourless
Molecular weight	40.0
Manufacturer Name & Address	Grasim Industries Ltd. (Chemical Division) Birlagram, Nagda, Dist. Ujjain (MP) 456331, INDIA www.adityabirlachemicals.com
Information department	Marketing Department, Grasim Chemical Division, Birlagram, Nagda
Emergency Telephone number	Telephone: +91-7366-245848/248080

2. INFORMATION OF MAJOR INGREDIENTS

Chemical Name	Sodium hydroxide , Anhydrous
CAS No	1310-73-2
Formula	NaOH
Percentage Purity	Min. 99.5 % on dry basis

3. HAZARD IDENTIFICATION

3.1 Classification of the substance or mixture

Classification:-

Corrosive to metals	Category 1
Skin Corrosion/irritation	Category 1 A
Serious Eye Damage/Eye Irritation	Category 1
Specific target organ toxicity (single exposure) Target Organs - Respiratory system.	Category 3

3.2 Label Element

Signal Word DANGER

Hazard Pictogram

GHS05

GHS07

Hazard Statements
H290- May be corrosive to metal
H312- Harmful in contact with Skin
H314-Cauese severe skin burns and eye damage
H335- May cause respiratory irritation.

Precautionary Statements

Prevention
P260 - Do not breathe dust, vapours
P264 - Wash exposed skin thoroughly after handling
P273 - Avoid release to the environment
P280 - Wear eye protection, face protection, protective clothing, protective gloves

Response
P301+P330+P331 - IF SWALLOWED: Rinse mouth. Do NOT induce vomiting
P303+P361+P353 - IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
P304+P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing
P305+P351+P338 - If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing

P310 - Immediately call a POISON CENTER/doctor/...
P363 - Wash contaminated clothing before reuse

Storage P405 - Store locked up
P406 - Store in corrosive resistant container with a resistant inner liner.

Disposal P501 - Dispose of contents/container to Comply with applicable regulations

3.3 Other Hazards Reactions with the following materials may generate heat: Strong acids. Water

4. PHYSICAL AND CHEMICAL PROPERTIES

Appearance and Odour	Solid, White flakes, odourless
pH	Not Applicable
Specific Gravity	0.7 – 0.8 gm/cc at 25 °C
Melting Point	318 °C
Boiling Point	1390 °C
Flash Point	Not pertinent
Auto ignition	Not pertinent
Flammable Limit	Not pertinent
Vapour Pressure (mm Hg)	Not pertinent
Solubility in Water	100 % soluble
Solubility in Organic Solvents	Soluble in alcohol, Methanol and Glycerol
Oxidizing /Explosive Properties	No

5. STABILITY AND REACTIVITY

Stability	As supplied it is stable at normal temperature & pressure. When exposed to air, it absorbs moisture.
Conditions to avoid	Avoid contact with water. Direct contact with water may cause exothermic reaction. Carbon monoxide gas may form upon contact with reducing sugars, food and beverage products in enclosed spaces.
Material to avoid	Water, Acids, Halogenated compounds, prolonged contact with aluminium, brass, bronze, copper, lead, tin, zinc or other alkali sensitive metals or alloys, Nitro methane & Nitro compounds.

Reactivity	
Air	Reactive
Water	Highly hygroscopic
Acids	Reactive
Alkalis	Reactive
Hazardous Decomposition Products	Not Known

6 TOXICITY DATA

Short term effects when:-	
In contact with skin	Severe Irritation, burns
In contact with eyes	Severe Irritation, burns, eye damage , blindness
Inhalation	Severe Irritation, burns, pulmonary edema
Ingestion	Severe Irritation, burns , nausea , vomiting
Long term effects when:-	
In contact with skin	Dermatitis
In contact with eyes	Visual disturbances
Inhalation	No effects are known.
Ingestion	No effects are known.
Acute Toxicity	LD_{50} (Dermal - Rabbit) 1350 mg/ kg LD_{50} (50 % solution Oral - Rat) 220 mg/ kg
Chronic Toxicity	Chronic effects are due to long – term irritation. Dermatitis on the skin or recurrent corneal ulceration and visual disturbances. In rare cases reports have noted long-term inhalation causes bronchial inflammatory reaction or obstructive airway dysfunction
Carcinogenic Toxicity	No Data available
Mutagenic Toxicity	No
Reproductive Toxicity	No information is available

7 FIRST AID MEASURES

Skin Contact	Remove affected person from source of contamination. Remove contaminated clothing. Wash skin thoroughly with soap and water. Get medical attention immediately. Continue to rinse for at least 15 minutes.

Eye Contact	Rinse immediately with plenty of water. Remove any contact lenses and open eyelids wide apart. Continue to rinse for at least 15 minutes. Get medical attention immediately. Continue to rinse.
Inhalation	Remove the victim from exposure. Support respiration, gives oxygen if necessary. Get medical attention if any discomfort continues
Ingestion	Give water or milk followed by dilute vinegar or fruit juice. Never give anything by mouth to an unconscious person. Do not induce vomiting. Do not induce vomiting. Rinse mouth thoroughly with water. Give plenty of water to drink. Get medical attention immediately.

8. FIRE FIGHTING MEASURES

Extinguishing media	
Suitable extinguishing media:	Regular dry chemical, carbon dioxide, fine water spray, regular foam
Unsuitable extinguishing media:	High volume water jet.
Special hazards arising from the substance or mixture	Not combustible, but contact with moisture or water may generate sufficient heat to ignite combustible materials. Forms flammable and explosive hydrogen through Corrosion of metals. Generates dense black smoke and
Special protective actions for firefighters:	Do not breathe fumes. Respirator with independent air-supply and airtight garment is required. Fight fire in early stages if safe to do so. Containers close to fire should be removed immediately or cooled with water. Do not allow contaminated extinguishing water to enter the soil, groundwater or surface waters.

9. EXPOSURE CONTROLS AND PROTECTION

Control parameters	
Exposure limits	2 mg / m^3 OSHA TWA 2 mg / m^3 OSHA ceiling 2 mg / m^3 ACGIH ceiling 2 mg / m^3 MEXICO peak
Exposure Controls	
Appropriate engineering controls	Provide sufficient ventilation to keep airborne levels below the exposure limits

Personal protective equipment	Maintain eye wash fountain and quick-drench facilities in work area. Final choice of appropriate protection will vary according to methods of handling, engineering controls and risk assessments undertaken
Respiratory protection	Wear gas mask with filter type B if conc. in air > exposure limit. Wear appropriate mask
Skin and body protection	Appropriate protective clothing to protect against possible skin contact. Corrosion-proof clothing.
Eye protection	Chemical goggles or face shield. Face shield.
Hand protection	Wear protective gloves. Nitrile, butyl rubber, polyvinyl chloride (PVC), or neoprene gloves with long sleeves.

10 HANDLING AND STORAGE

Handling	Store in a cool, dry and well-ventilated place. Keep containers closed. Keep away from heat, sparks and flames. Use only with adequate ventilation. Avoid contact with eyes, skin or clothing.
Storage	Store and handle in accordance with all current regulations and standards. Keep container tightly closed and properly labeled. Do not store in Aluminium container or use Aluminium fittings or transfer lines, as flammable hydrogen gas may be generated. Keep separated from incompatible substances. The filled container is kept on wooden pallets.

11 SPILLAGE/ACCIDENTAL RELEASE

Spillage	Do not touch spilled material. Prevent it entering sewers. Dry manual lifting of the spilled material is suggested without making dust Wash the surface with plenty of water and soap.
Personal Precautions	Avoid generation of dust. Avoid eyes & skin contact. Avoid inhalation. Avoid ingestion. Wear appropriate personal protective equipment's.
Environmental Precautions	Prevent contamination of soil and water.

12 WASTE DISPOSAL

Waste Disposal	Seal all waste in airtight plastic bags for eventual disposal as per the guidelines of National/Regional Regulations. Packing materials gets contaminated. Before disposal wash thoroughly with water and then dispose off by appropriate methods in accordance with National/ Regional requirement.

13. ENVIRONMENTAL INFORMATION

Bio - Accumulation	No bio-accumulation
Biodegradability	This material is inorganic and not subject to biodegradation.
Persistence	This material will exist in the dissociated state
Toxicity	This material has exhibited slight toxicity to terrestrial organisms and moderate toxicity to aquatic flora & fauna.
Mobility	If released in water the product is highly soluble and contaminates the water resources.

14. REGULATORY INFORMATION

14.1 Safety, Health And Environmental Regulations / Legislation Specific For The Substance:-

Substance is found on the following regulatory lists;;

- European Union - European Inventory of Existing Commercial Chemical Substances (EINECS) (English)"
- OSHA Regulatory Status:-This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200)
- TSCA (TOXIC SUBSTANCE CONTROL ACT) -TSCA INVENTORY STATUS (40 CFR 710):- All components are listed or exempt
- WHMIS (WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM):- This product has been classified in accordance with the hazard criteria of the Controlled Product Regulations

14.2 Chemical Safety Assessment

No data available

14.2.1 Hazards:-

CLP classification according to Annex VI of CLP (Regulation (EC) No 1272/2008)

- May be corrosive to metals
- Causes serious eye damage

14.2.2 Risks

- Risk of serious damage to eyes & burn

15. TRANSPORT INFORMATION

UN Number UN 1823

Label

Land Transport (ADR/RID)

UN Number	UN 1823
UN proper shipping Name	SODIUM HYDROXIDE, SOLID
Hazard class:	8
Hazard label:	8
Packaging group	II
Environmental Hazard	None

Inland Waterway Transport (ADNR)

UN Number	UN 1823
UN proper shipping Name	SODIUM HYDROXIDE, SOLID
Hazard class:	8
Hazard label:	8
Packaging group	II
Environmental Hazard	None

Sea Transport (IMDG)

UN Number	UN 1823
UN proper shipping Name	SODIUM HYDROXIDE, SOLID
Hazard class:	8
Hazard label:	8
Packaging group	II
Environmental Hazard	None
Marine Pollutant	None
EmS No.	F-A, S-B
Limited Quantities	1 kg
Expected Quantities	E2

Air transport (ICAO/IATA)

UN Number	UN 1823
UN proper shipping Name	SODIUM HYDROXIDE, SOLID
Hazard class:	8
Hazard label:	8
Packaging group	II
Environmental Hazard	None

16 OTHER INFORMATION

Disclaimer:

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process unless specified in the text.

The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release, and neither it is to be considered a warranty or quality specification, nor as a binding statement on contractually agreed product qualities. Grasim Industries Ltd., (Chemical Division) does not take any guarantee or legal liability expressed or implied under any circumstances in respect of the adequacy of this document for any particular purpose.

Palm Biodiesel: Gearing Towards Malaysian Biodiesel Standards

Cheng Sit Foon*; Choo Yuen May*; Yung Chee Liang*; Ma Ah Ngan* and Yusof Basiron*

INTRODUCTION

As biodiesel is gaining considerable global attention and market, standards are vital for its commercialization and market introduction. It is necessary for the authorities to evaluate the safety risks and environmental impact, while giving quality assurance to the users. Vehicle manufacturers would also need a standard to approve vehicles to be operated using biodiesel. Therefore, an approved biodiesel standard is important to the producers, suppliers and users.

According to International Standard Organization (ISO), a standard is a written document approved by a recognized body (Nicolas and Repussard, 1994). Besides that, a standard is also available to the public and drawn up by consensus from all the parties concerned and to the benefit of all. It is intended for repeated or continuous application and normally not mandatory, except for being explicitly referred to in regulations.

There are two major biodiesel standards that are most referred to, namely, the European Standard for Biodiesel (EN 14214) and the American Standard Specifications for Biodiesel Fuel (B100) Blend Stock for Distillate Fuels (ASTM 6751) (*Tables 1* and *2*). The European EN 14214 includes most of the parameters specified in the US ASTM D6751 and the limits in both standards are the same or very close. The major differences between these standards are their intended applications and the preferred test methods.

The European EN 14214 sets the specifications and test methods for fatty acid methyl esters to be used neat as automotive fuel for diesel engines, or as an extender for automotive fuel for diesel engines, in conformation with the European Automotive Diesel Standard (EN 590). The US ASTM D6751 specifies the standards for biodiesel (100%, or denoted as B100) for use as a blend component with diesel fuels. The other major difference between these standards is the preferred testing methods. The testing methods preferred are the standard methods published by European Committee for Standardization (CEN) and American Society for Testing and Materials (ASTM), respectively.

* Malaysian Palm Oil Board,
P. O. Box 10620,
50720 Kuala Lumpur,
Malaysia.
E-mail: sfcheng@mpob.gov.my

FUEL PROPERTIES OF NORMAL AND LOW POUR POINT PALM DIESEL vis-à-vis EUROPEAN AND AMERICAN STANDARDS ON BIODIESEL

The properties of biodiesel depend very much on the nature of its raw material as well as the technology or process used for its production. In this respect, the aforementioned standards have specified relevant parameters to govern the quality of biodiesel. Inherent properties from vegetable oils or animal fats that have an effect on the performance of biodiesel as diesel substitute, such as iodine value (I.V.), density, viscosity, cetane number, copper strip corrosion, linolenic acid methyl esters content, polyunsaturated (more or having four double bonds) methyl esters content and phosphorus content, have been included. On the other hand, the properties of biodiesel related to the production technology are, namely, the contents of ester, sulphated ash, water, partial glycerides (mono-, di- and tri-glycerides), alkali, free and total glycerol, flash point and the acid value.

The fuel properties of all palm diesels, namely, normal palm diesel and low pour point palm diesel (*Figures 1* and *2*), were evaluated vis-à-vis EN14214 and

TABLE 1. EUROPEAN STANDARD FOR BIODIESEL (EN 14214)

Property	Unit	Limits		Test method
		Minimum	Maximum	
Ester content	% (m m^{-1})	96.5	-	pr EN 14103
Density at 15°C	kg m^{-3}	860	900	EN ISO 3675 EN ISO 12185
Viscosity at 40°C	mm^2 s^{-1}	3.5	5.0	EN ISO 3104
Flash point	°C	120	-	ISO/CD 3679
Carbon residue (on 10% distillation residue)	% (m m^{-1})	-	0.3	EN ISO 10370
Acid value	mg KOH g^{-1}	-	0.5	pr EN 14104
Cetane index	-	51.0	-	EN ISO 5165
Sulphur content	mg kg^{-1}	-	10	-
Sulphated ash content	% (m m^{-1})	-	0.02	ISO 3987
Water content	mg kg^{-1}	-	500	EN ISO 12937
Total contamination	mg kg^{-1}	-	24	EN 12662
Copper strip corrosion (3 hr at 50°C)	Rating	1	-	EN ISO 2160
Oxidation stability, 110°C	hr	6.0	-	pr EN 14112
Iodine value	-	-	120	pr EN 14111
Linolenic acid methyl ester	% (m m^{-1})	-	12	pr EN 14103
Polyunsaturated (≥4 double bonds) methyl esters	% (m m^{-1})	-	1	-
Methanol content	% (m m^{-1})	-	0.2	pr EN 14110
Monoglyceride content	% (m m^{-1})	-	0.8	pr EN 14105
Diglyceride content	% (m m^{-1})	-	0.2	pr EN 14105
Triglyceride content	% (m m^{-1})	-	0.2	pr EN 14105
Free glycerol	% (m m^{-1})	-	0.02	pr EN 14105 pr EN 14106
Total glycerol	% (m m^{-1})	-	0.25	pr EN14105
Alkaline content (Na + K)	mg kg^{-1}	-	5	pr EN 14108 pr EN 14109
Phosphorus content	mg kg^{-1}	-	10	pr EN14107

Source: European Committee for Standardization (CEN) (2003).

ASTM D6751. Laboratory evaluations were conducted using ASTM standard methods as practiced in this country. Generally, these palm biodiesels met the respective limits in the aforementioned standards (*Table 3*).

The flash point and methanol content in biodiesel are interrelated. The flash point is set at above 120°C and 130°C in the respective EN14214 and ASTM D6571 to ensure that the manufacturers have removed excess methanol used in the production. Residual methanol is a safety issue as even a very small amount will reduce the flash point greatly. Besides, methanol can also affect fuel pumps, seals and elastomers. All palm diesels have a flash point of about 150°C, well above the specified maximum in the standards.

An upper limit of 0.02% sulphated ash was set in both standards to ensure total removal of the catalyst used in the production. High sulphated ash may cause deposits and filter plugging while high acid number is normally associated with fuel system deposits on pumps and filters. In this respect, palm diesels have sulphated ash contents of not more than 0.01%.

The adverse effect of sulphur on diesel engines has resulted specified maximums of 10 and 15 ppm in EN14214 and ASTM D6751, respectively. Sulphur oxides produced from combustion of the fuel react with moisture present in the combustion chamber to form sulphuric acid which corrodes the cylinder liner and piston. Besides a negative effect on diesel engines, the sulphur content in fuel is also a concern towards the environment as it contributes to air pollution by forming acid rain. Palm diesel including low pour point palm diesel are derived from palm oil, a renewable resource of plant origin, the concerns of sulphur content in them should not arise and results have shown that they have negligible levels of sulphur (<0.001%).

TABLE 2. STANDARD SPECIFICATIONS FOR BIODIESEL FUEL (B100) BLEND STOCK FOR DISTILLATE FUELS (ASTM D6751)

Property	Unit	Grade S15 Limits	Grade S500 Limits	Test method
Kinematic viscosity at 40°C	$mm^2 s^{-1}$	1.9-6.0	1.9-6.0	ASTM D445
Flash point (closed cup)	°C	130.0 min	130.0 min	ASTM D93
Sulphur content	% mass (ppm)	0.0015 max (15)	0.05 max (500)	ASTM D5453
Carbon residue (on 100% distillation residue)	% mass	0.050 max	0.050 max	ASTM D4530
Acid number	mg KOH g^{-1}	0.80 max	0.8 max	ASTM D664
Cloud point	°C	Report*	Report*	ASTM D2500
Cetane number	-	47 min	47 min	ASTM D613
Sulphated ash content	% mass	0.020 max	0.020 max	ASTM D874
Water and sediment	% volume	0.050 max	0.050 max	ASTM D1796
Copper strip corrosion (3 hr at 50°C)	rating	No. 3 max	No. 3 max	ASTM D130
Free glycerol	% mass	0.020	0.020	ASTM D6584
Total glycerol	% mass	0.240	0.240	ASTM D6584
Phosphorus	% mass	0.001 max	0.001 max	ASTM D4951
Distillation temperature (90% recovered)	°C	360 max	360 max	ASTM D1160

Note: * The cloud point of biodiesel is generally higher than that of petroleum-based diesel fuel and should be taken into consideration when blending.

Source: ASTM International (2003).

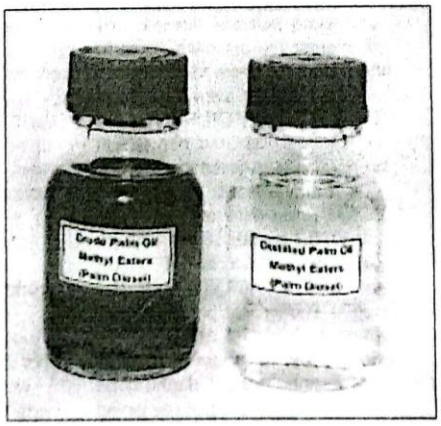

Figure 1. Normal palm diesel (crude/distilled palm oil methyl esters).

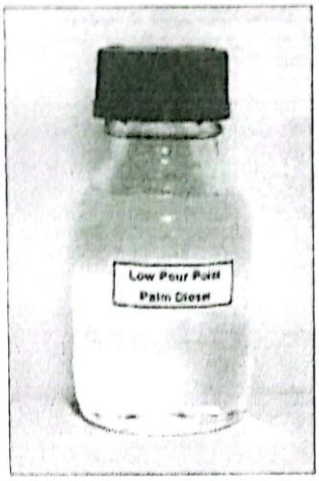

Figure 2. Low pour point palm diesel.

The presence of acids or sulphur containing compounds can cause corrosion to the fuel system as certain parts of diesel engines are made of brass or bronze while a high acid number will cause deposits. In view of these, parameters such as the acid value and copper strip corrosion have been included. Both normal and low pour point palm diesel have acid and copper strip corrosion values that meet the specified limits in EN14214 (0.5%) and ASTM D6751 (0.8%).

Properties such as the methanol, monoglycerides, diglycerides, triglycerides, free glycerol and total glycerol contents are mainly related to the production technology used to produce the methyl esters. The methanol content is measured to ensure total removal of the excess methanol used in the production of methyl esters, while the contents of monoglycerides, diglycerides and triglycerides indicate the degree of conversion from oil to methyl esters or completion of the esterification/ transesterification process. In these respects, both normal and low pour point palm diesel meet the specifications in both standards.

In summary, both type of palm diesel (normal and low pour point palm diesel) meet all the specifications in EN14214 and ASTM D6751.

FUEL PROPERTIES OF PROCESSED LIQUID PALM OIL/PETROLEUM DIESEL BLENDS vis-à-vis MALAYSIAN STANDARD ON DIESEL FUEL

Besides research and development in palm diesel, MPOB's palm biofuel programme also includes using processed liquid palm oil (PLPO) and its blends with petroleum diesel (PD) (*Figure 3*). The physical and fuel properties of these palm biofuel samples in various ratios were evaluated and the results have shown that blends of PLPO/PD (up to 10% PLPO) can be used directly, without chemical modification, in conventional diesel engines. Actual engine trials using MPOB vehicles on B2, B5 and B10 of PLPO/PD blends (denoting 2%, 5% and 10% PLPO in PD) have been ongoing since 2002 (*Figure 4*). So far, no technical problems have been reported and the long-term effects on the engines are being studied.

As the global development of biodiesel is mostly focussed on the methyl esters of vegetable oil, there is currently no biodiesel standard for vegetable oil/diesel blends. Both the European and American Standards on Biodiesel are intended for methyl esters and, are thus, not suitable for evaluation of PLPO/PD blends. In addition, it was found that the fuel properties of these blends are very similar to the fuel properties of petroleum diesel from our evaluation of PLPO/PD blends (B2, B5 and B10). Thus, it is appropriate to use the Malaysian Standard for Diesel Fuel (MS123:1993) as the reference standard.

Generally, the fuel properties of PLPO/PD blends are very similar to those of petroleum diesel. Blending PLPO up to 10% in petroleum diesel does not change the fuel properties of petroleum diesel much with the resultant fuel properties of the blends still heavily dependent on the fuel properties of petroleum diesel. *Table 4* depicts the fuel properties of the blends from a study conducted using PLPO from different palm oil refineries in Malaysia. From this study, B2 and B5 of the PLPO/PD blends can meet all the requirements of MS123:1993.

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TABLE 3. FUEL PRC

Property	Unit
Ester content	% mass
Density at 15°C	kg litre^{-1}
Viscosity at 40°C	mm^2 s^{-1}
Flash point	°C
Cloud point	°C
Pour point	°C
Cold filter plugging point	°C
Sulphur content	% mass
Carbon residue (on 10% distillation residue)	% mass
Acid value	mg KOH g^{-1}
Sulphated ash content	% mass
Basic sediment and water	% mass
Cetane number	-
Copper strip corrosion (3 hr at 50°C)	rating
Iodine value	-
Content of linolenic acid methyl esters	% mass
Content of polyunsaturated fatty acid methyl esters (more than 3 double bonds)	% mass
Methanol content	% mass
Monoglycerides content	% mass
Diglycerides content	% mass
Triglycerides content	% mass
Free glycerol content	% mass
Total glycerol content	% mass

Notes: ASTM D6751: Standard Specifications for Biodiesel Fuel (B10
EN14214: European Standard for Biodiesel.

Copper strip corrosion (3 hr at 100°C)	rating	1a	1a	1a	-	1
Distillation temperature at 90% recovery	°C	365.4 - 369.0	363.7 - 367.8	365.4 - 365.9	-	370
Water by distillation	% volume	< 0.05	< 0.05	< 0.05	-	0.05
Colour	-	1.0 - L1.5	1.0	L1.0 - 1.5	-	2.5
Gross calorific value	MJ kg^{-1}	45 - 47	44 - 47	45 - 47	-	-

Notes:
B2: 2% processed liquid palm oil + 98% petroleum diesel.
B5: 5% processed liquid palm oil + 95% petroleum diesel.
MS123:1993: Malaysian Standard for Diesel Fuel.

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TABLE 3 FUEL PROPERTIES OF NORMAL AND LOW POUR POINT PALM DIESEL

Property	Unit	Normal palm diesel	Low pour point palm diesel	EN14214	ASTM D6751
Ester content	% mass	98.5	98.0 to 99.5	96.5 (min.)	-
Density at 15°C	kg litre^{-1}	0.8783	0.87 to 0.89	0.86 to 0.90	-
Viscosity at 40°C	mm^2 s^{-1}	4.415	4 to 5	3.5 to 5.0	1.9 to 6.0
Flash point	°C	182	150 to 200	120 (min.)	130 (min.)
Cloud point	°C	15.2	-18 to 0	-	Report
Pour point	°C	15	-21 to 0	-	-
Cold filter plugging point	°C	15	-18 to 3	-	-
Sulphur content	% mass	<0.001	<0.001	0.001 (max.)	0.0015 (min) (Grade S15) 0.05 (min.) (Grade S500)
Carbon residue (on 10% distillation residue)	% mass	0.02	0.02 to 0.03	0.3 (max.)	0.05 (max.)
Acid value	mg KOH g^{-1}	0.08	<0.3	0.5 (max.)	0.8 (max.)
Total glycerol ash content	% mass	<0.01	<0.01	0.02 (max.)	0.02 (max.)
Basic sediment and water	% mass	<0.05	<0.05	0.05 (max.)	0.05 (max.)
Cetane number	-	58.3	53.0-59.0	51 (min.)	47 (min.)
Copper strip corrosion (3 hr at 50°C)	rating	1a	1a	1	3 (max.)
Iodine value	-	52	56 to 83	120 (max.)	-
Content of linolenic acid methyl esters	% mass	<0.5	<0.5	12 (max.)	-
Content of polyunsaturated fatty acid methyl esters (more than 3 double bonds)	% mass	<0.1	<0.1	1 (max.)	-
Methanol content	% mass	<0.2	<0.2	0.2 (max.)	-
Monoglycerides content	% mass	<0.4	<0.4	0.8 (max.)	-
Diglycerides content	% mass	<0.2	<0.2	0.2 (max.)	-
Triglycerides content	% mass	<0.1	<0.1	0.2 (max.)	-
Free glycerol content	% mass	<0.01	<0.01	0.02 (max.)	0.02 (max.)
Total glycerol content	% mass	<0.01	<0.01	0.25 (max.)	0.24 (max.)

Notes: ASTM D6751 Standard Specifications for Biodiesel Fuel (B100) Blend Stock for Distillate Fuels.
EN14214 European Standard for Biodiesel.

LUKEM

Material Safety Data Sheet

Sodium Silicate

DATE OF ISSUE: 2016.09.22

Section 1 - Chemical Product and Company Identification

MSDS Name: Sodium Silicate
Other names: Sodium Silicate Solid, Sodium Silicate Lumps, Sodium Silicate liquid, Water Glass
Chemical formula: Na2O.mSiO2
Company indentification: LUKEM (Nanjing) Co., Ltd.
For information, call: 0086-25 85552309
Emergency Number: 0086-25-85552709
For CHEMTREC assistance, call: 00386 1 244 3293
For International CHEMTREC assistance, call: 00386 1 244 3291

Section 2 - Composition, Information on Ingredients

Solid Form: (Solid, lumps, water glass):

CAS#	Chemical Name	Percent
1344-09-8	Sodium Silicate	Cca. 99.0-100

Liquid Form: (Sodium silicate solution, sodium silicate liquid):

CAS#	Chemical Name	Percent
1344-09-8	Sodium Silicate	Cca. 40
7732-18-5	Water	Cca. 60

Toxicological Data on Ingredients:
Sodium Silicate: ORAL (LD50): Not available [Rat]: Not Available

Section 3 - Hazards Identification

Figure 4. One of the MPOB Pajero participating in the exhaustive field trial using B5 processed liquid palm oil/petroleum diesel blend.

CONCLUSION

In view of the positive results obtained from the evaluation of palm biodiesels, namely, palm diesel, low pour point palm diesel and PLPO/PD blends, it is rational to establish individual standards for each of the palm biofuels that is acceptable to diesel engine manufacturers. It is important to have the standards to regulate the quality and give assurance to the engine manufacturers and end-users. The European and American Standards on Biodiesel are good references for palm biodiesel based on palm oil methyl esters while the Malaysian Standard for Diesel Fuel can be used as a close reference for the PLPO/PD blends in our effort in working towards Malaysian Biodiesel Standards.

It is timely for Malaysia to set-up its national biodiesel standards which harmonize with the European and American standards and which, at the same time, is practical for their intended applications. Due consideration should also be given on factors such as optimum vehicle performance, environmental impact, marketing as well as quality analysis infrastructure, in establishing the national biodiesel standards.

REFERENCES

ASTM INTERNATIONAL (2003). *Standard Specification for Biodiesel Fuel (B100) Blend Stock for Distillate Fuels (ASTM D6751).*

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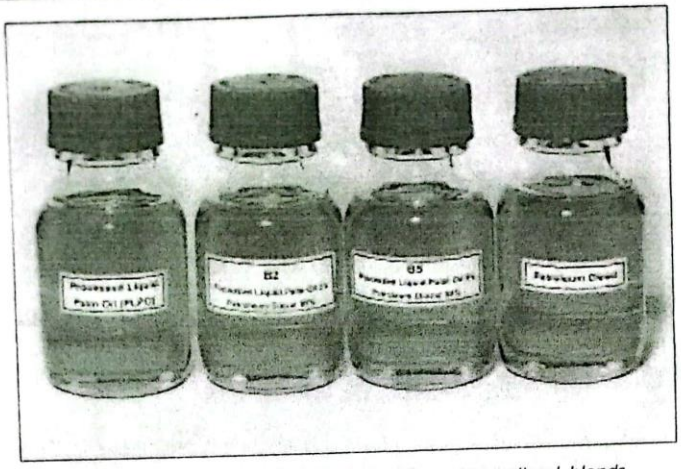

Figure 3. Processed liquid palm oil/petroleum diesel blends.

TABLE 4. FUEL PROPERTIES OF PROCESSED LIQUID PALM OIL (PLPO)/MALAYSIAN PETROLEUM DIESEL (PD) BLENDS

Property	Unit	PLPO/PD blends		Malaysian petroleum diesel	MS123:1993	
		B2	B5		Min.	Max.
Density at 15°C	kg litre^{-1}	0.8395 - 0.8448	0.8419 - 0.8459	0.8380 - 0.8420	-	-
Viscosity at 40°C	mm^2 s^{-1}	3.974 - 4.184	4.136 - 4.549	3.918 - 3.974	1.5	5.8
Flash point	°C	77.0 - 81.0	75.0 - 81.0	77.0	60	-
Cloud point	°C	14 - 16	14 - 16	14 - 16	-	18
Pour point	°C	9 - 12	9 - 12	12	-	15
Sulphur content	mg kg^{-1}	0.18 - 0.19	0.17 - 0.18	0.19 - 0.21	-	0.5
Carbon residue (on 10% distillation residue)	% mass	< 0.1 - 0.1	0.2	< 0.1	-	0.2
Cetane number	-	50.6 – 61.8	54.8 – 61.5	55.2 – 61.2	45	-
Cetane index	-	51 - 57	55 - 56	51 - 57	47	-
Ash content	% mass	0.001 - 0.007	<0.001 - 0.006	0.001 - 0.005	-	0.01
Basic sediment and water	mg kg^{-1}	< 0.01	< 0.01	< 0.01	-	0.01
Copper strip corrosion (3 hr at 100°C)	rating	1a	1a	1a	-	1
Distillation temperature at 90% recovery	°C	365.4 - 369.0	363.7 - 367.8	365.4 - 365.9	-	370
Water by distillation	% volume	< 0.05	< 0.05	< 0.05	-	0.05
Colour	-	1.0 - L1.5	1.0	L1.0 - 1.5	-	2.5
Gross calorific value	MJ kg^{-1}	45 - 47	44 - 47	45 - 47	-	-

Notes:
B2: 2% processed liquid palm oil + 98% petroleum diesel.
B5: 5% processed liquid palm oil + 95% petroleum diesel.
MS123:1993: Malaysian Standard for Diesel Fuel.

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Material Safety Data Sheet

Potential Acute Health Effects:
Extremely hazardous in case of skin contact (corrosive, irritant), of eye contact (irritant), of ingestion, of inhalation. Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
Extremely hazardous in case of skin contact (corrosive, irritant), of eye contact (irritant), of ingestion, of inhalation. Nonsensitizer for skin. Non-permeator by skin. CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated or prolonged inhalation of vapors may lead to chronic respiratory irritation.

Section 4 - First Aid Measures

Eye Contact:
Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:
If the chemical got onto the clothed portion of the body, remove the contaminated clothes as quickly as possible, protecting your own hands and body. Place the victim under a deluge shower. If the chemical got on the victim's exposed skin, such as the hands : Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cold water may be used. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation: Not available.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5 - Fire Fighting Measures

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.
Flash Points: Not applicable.
Flammable Limits: Not applicable.
Products of Combustion: Not available.
Fire Hazards in Presence of Various Substances: Not applicable.
Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.
Fire Fighting Media and Instructions: Not applicable.
Special Remarks on Fire Hazards: Not available.
Special Remarks on Explosion Hazards: Not available.

Section 6 - Accidental Release Measures

Small Spill:
Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: Neutralize the residue with a dilute solution of acetic acid. Finish cleaning by spreading water on the contaminatedsurface and dispose of according to local and regional authority requirements.
Large Spill:
Corrosive liquid. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of acetic acid. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary System.

Section 7 - Handling and Storage

Precautions:
Keep container dry. Do not breathe gas/fumes/ vapour/spray. Never add water to this product in case of insufficient ventilation, wear suitable respiratory equipment If you feel unwell, seek medical attention and show the label when possible. Avoid contact with skin and eyes Keep away from incompatibles such as oxidizing agents, acids.
Storage: Corrosive materials should be stored in a separate safety storage cabinet or room.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value.

Personal Protection:

Face shield. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves. Boots.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9 - Physical and Chemical Properties

Physical state and appearance: Solid (light greenish lumps) or Liquid. (Oily liquid.)

Odor: Odorless.

Taste: Not available.

Molecular Weight: Not applicable.

Color: Clear Colorless for liquid, slightly greenish for solid forms

pH (1% soln/water): Basic.

Boiling Point: The lowest known value is 100°C (212°F) (Water).

Melting Point: Not available.

Critical Temperature: Not available.

Specific Gravity: Weighted average: 1.15 (Water = 1)

Vapor Pressure: The highest known value is 17.535 mm of Hg (@ 20°C) (Water).

Vapor Density: The highest known value is 0.62 (Air = 1) (Water).

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, methanol, diethyl ether.

Solubility: Easily soluble in cold water, hot water. Partially soluble in methanol, diethyl ether.

Section 10 - Stability and Reactivity

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances:

Highly reactive with acids. Reactive with oxidizing agents.

Corrosivity:

Slightly corrosive to corrosive in presence of steel, of aluminum, of zinc, of copper. Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.
Polymerization: No.

Section 11 - Toxicological Information

Routes of Entry: Eye contact. Inhalation. Ingestion.
Toxicity to Animals:
LD50: Not available. LC50: Not available.
Chronic Effects on Humans: Not available.
Other Toxic Effects on Humans: Extremely hazardous in case of skin contact (corrosive, irritant), of ingestion, of inhalation.
Special Remarks on Toxicity to Animals: Not available.
Special Remarks on Chronic Effects on Humans: Not available.
Special Remarks on other Toxic Effects on Humans: Not available.

Section 12 - Ecological Information

Ecotoxicity: Not available.
BOD5 and COD: Not available.
Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.
Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.
Special Remarks on the Products of Biodegradation: Not available.

Section 13 - Disposal Considerations

Waste from residues/unused Products: In accordance with local and national regulations.
Contaminated package: Rinse empty containers with water and use rinse water to prepare the working solution. Can be landfilled or incinerated, when in compliance with local regulations.

Section 14 - Transport Information

Road and Rail Transport
Not classified as Dangerous Goods by the criteria of the Australian Dangerous Goods Code (ADG Code) for transport by Road and Rail; NON-DANGEROUS GOODS.

Marine Transport

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Not classified as Dangerous Goods by the criteria of the International Maritime Dangerous Goods Code (IMDG Code) for transport by sea; NON-DANGEROUS GOODS.

Air Transport

Not classified as Dangerous Goods by the criteria of the International Air Transport Association (IATA) Dangerous Goods Regulations for transport by air; NON-DANGEROUS GOODS.

Section 15 - Regulatory Information

Federal and State Regulations: TSCA 8(b) inventory: Sodium silicate; Water
Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).
Other Classifications:
WHMIS (Canada): CLASS D-2B: Material causing other toxic effects (TOXIC).
DSCL (EEC): R35- Causes severe burns.
HMIS (U.S.A.):
Health Hazard: 3
Fire Hazard: 0
Reactivity: 0
Personal Protection:
National Fire Protection Association (U.S.A.):
Health: 3
Flammability: 0
Reactivity: 0
Specific hazard:
Protective Equipment:
Gloves. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Face shield.

Section 16 - Additional Information

MSDS Creation Date: 19/05/2014
Disclaimer:
The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall LUKEM be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if LUKEM has been advised of the possibility of such damages.

Vikram Since 1985
THERMO (INDIA) LTD.
CIN NO. L24296GJ1994PLC021524

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: DIPHENYL OXIDE
MSDS Number: 000101848
Chemical Name: benzene, 1,1'-oxybis
Synonyms: Diphenyl ether, phenoxybenzene, DPO, phenyl ether

MANUFACTURERS/SUPPLIERS DATA

NAME OF FIRM: VIKRAM THERMO (INDIA) LIMITED
MAILING ADDRESS: 101,Classic Avenue,
Ashram Road,
Ahmedabad-380 009.
TELEPHONE NO.: 0091-079- 27542659, 27543745
FAX NUMNER: 0091-079-27540562
STANDARD PKG.: 220 Kgs Nett.Wt.
CONTACT PERSON: Mr D.K.PATEL in Emergency

2. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS No.	% By weight
Diphenyl Oxide	101-84-8	100

3. HAZARDS INDENTIFICATION

EMERGENCY OVERVIEW
Appearance and Odor: white crystalline solid or colorless liquid with a characteristic aromatic odor.
WARNING!
CAUSES EYE AND RESPIRATORY TRACT IRRITATION

POTENTIAL HEALTH EFFECTS
Likely Routes of Exposure: Inhalation and skin contact

EYE CONTACT: This product may cause irritation based on toxicity Studies.
SKIN CONTACT: This product is no more than slightly irritating based on toxicity testing.

INHALATION: This product may cause irritation to the nose and Upper respiratory tract based on toxicity studies.

INGESTION: No more than slightly toxic based on toxicity studies. No significant adverse health effects are likely to develop if only small amounts (less than a mouthful) are swallowed. Refer to Section 11 for toxicological information.

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: 2 :

4. FIRST AID MEASURES

IF IN EYES: immediately flush with plenty of water for at least 15 minutes. If easy to do remove any contact lenses. Get medical attention. Remove material from skin and clothing.

IF ON SKIN: immediately flush with plenty of water. Remove contaminated clothing. Get medical attention. Wash clothing before reuse.

IN INHALED: remove to fresh air. If not breathing, five artificial respirations. If breathing is difficult, five oxygen. Get medical attention.

IF SWALLOWED: immediate first aid is not likely to be required. A Physician or Poison control Center can be confected for advice. Wash heavily contaminated clothing before reuse.

5. FIRE FIGHTING MEASURES

Flash Point: 240 degrees F (115 degrees C) Method: Cleveland Open Cup
Auto ignition Temperature: 1,144 degrees F (617 degrees C) Method : ASTM D-2155
Flammability Limits: Lower: 0.8% by volume, Upper: 1.5% by volume

Unusual Fire and Explosion Hazards: This product is a combustible Solid and can release toxic vapors on burning. Vapor aired mixtures may be explosive.

Fire Fighting Equipment: Fire fighters and others exposed to products of combustion should wear self-contained breathing Apparatus. Equipment should be thoroughly decontaminated after use.

6. ACCIDENTAL RELEASE MEASURES

For solid: In case of spill, sweep, scoop or vacuum and remove.
For liquid: Contain large spills with dikes and transfer the Material to appropriate containers for reclamation or disposal. Absorb remaining material or small spills with an inert material and then place in a chemical waste container.

Refer to Section 13 for disposal information

7. HANDLING AND STORAGE

Avoid contact with eyes.
Avoid breathing dust or vapor.
Keep container closed.
Use with adequate ventilation.
Wash thoroughly after handling

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Emptied container retains vapor and product reside. Observe all labeled safeguards until container is cleaned, reconditioned, or destroyed. The reuse of this material's container for non-Industrial purposes is prohibited and any reuse must be in consideration of the data provided in the MSDS.

Storage: Product is stable under normal conditions of storage and handling.

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8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Eye protection: Where there is significant potential for eye Contact, wear chemical goggles and have eye-flushing equipment available.

Skin Protection: Wear appropriate clothing and chemical resistant gloves to prevent skin contact. Consult glove manufacturer to determine appropriate type glove for given application. Wear face shield and chemical resistant clothing such as rubber apron when splashing is likely. Wash contaminated skin promptly. Launder contaminated clothing and clean protective equipment before reuse. Wash thoroughly after handling.

Respiratory Protection: Avoid breathing vapor. Use IOSH/MSHA approved respiratory protection equipment (full-face piece recommended) when airborne exposure limits are exceeded (see below). If used, full-face piece replaces need for face shield and/or chemical goggles. Consult respirator manufacturer to determine appropriate type equipment for given application. Observe respirator use limitations specified by IOSH/MSHA or the manufacturer. Respiratory protection programs must comply with 29CFR 1910.134.

Ventilation: Provide natural or mechanical ventilation to control exposure levels below airborne exposure limits (see below). If practical, use local mechanical exhaust ventilation at sources of air contamination such as open process equipment.

Airborne Exposure Limits:
Product: phenyl ether

OSHA PEL: 1 ppm (7 mg/m3) 8-hour time-weighted average
ACGIH TLV: 1 ppm (7 mg/m3) 8-hour time-weighted average
ACGIH STEL: 2 ppm (14 mg/m3) short-term exposure limit

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9. PHYSICAL AND CHEMICAL PROPERTIES

Chemical Formula: $(C_6H_5)_2O$

Appearance:	white crystalline solid or colorless liquid
Odor:	Characteristic aromatic
Solubility in Water:	14 ppm@25 degrees C
Boiling Point:	496 degrees F (258 degrees C) @760 mm Hg
Melting Point:	80 degrees F (26 degrees C)
Density:	1.07 g/ml (super cooled liquid)

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For, VIKRAM THERMO (INDIA) LTD.

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Regd. Off. A/704 - 714, THE CAPITAL, Science City Road, Ahmedabad - 380060, Gujarat, India.
Phone: +91-79-48481010/11/12
E-mail: exports@vikramthermo.com
Web.: www.vikramthermo.com

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NOTE: These physical data are typical values based on material tested but may vary from sample to sample Typical values should not be construed as a guaranteed analysis of any specific lot or as specifications for the product.

10. STABILITY AND REACTIVITY

Stability: Product is stable under normal conditions of storage and handling.
Materials to Avoid: strong oxidizers

Hazardous Decomposition Products. No uniquely hazardous decomposition products are expected. If product is burned, complete combustion produces carbon dioxide and water; partial combustion produces carbon monoxide, smoke, soot, and low molecular weight hydrocarbons.

Hazardous Polymerization: Will not occur

11. TOXICOLOGICAL INFORMATION

Data from laboratory studied conducted by Solutia and from the scientific literatures are summarized below.

Single exposure (acute) studied indicates.

Oral-Slightly Toxic, (Rat LD50 2,450 mg/kg)
Dermal-Practically Nontoxic, (Rabbit LD50>7,940 mg/kg)
Eye Irritation-Slightly Irritating.(Rabbit,6.1/110.0)
Skin Irritation-Slightly irritating,(Rabbit,24-hr exposure,1.6/8.0)

Inhalation:(Rats were exposed to a stream of air which passed through Diphenyl Oxide and led directly into the experimental chamber. Due to its low volatility, there was essentially no vaporization of the test material and the animals survived both the 6-hour exposure and subsequent 14-day observation period without observable effects.)

No skin allergy was reported in hymens following repeated exposured to 4% Diphenyl Oxide in petrolatum in controlled skin contact studies.

Following repeated inhalation (20 exposures) of Diphenyl-Oxide, The only adverse effects reported for rats and rabbits were eye and nasal irritation; no treatment-related effects were noted in dogs. Diphenyl Oxide produced no genetic changes in standard tests using animal or bacterial cells.

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CIN NO. L24296GJ1994PLC021524

12. ECOLOGICAL INFORMATION

The following data have been classified using the criteria adopted by the European Economic Community (EEC) for aquatic organism toxicity.

48-hr EC50 Daphia magna: 1.7 mg/L; Toxic
96-hr LC50 Fathead minnow: 24mg/L: Harmful
96-hr LC50 Rainbow trout: 4.2 mg/L: Toxic
96-hr EC50 Algae (chlorophyll): 2.5 mg/L. Toxic

The following data have been classified using the criteria adopted by the European Economic Community (EEC) for aquatic organism toxicity. A legend summarizing the classification scheme appears below.

Legend for Aquatic Organism Toxicity (Journal of the European Communities, Annex VII A, Section 5.2.1)

Values	Classifications
LC50 or EC50<or=1.0 mg/L	Very Toxic
LC50 or EC50>1.0 mg/L and < or = 10 mg/L	Toxic
LC50 or EC50>10 mg/L and < or=100 mg/L	Harmful
LC50 or EC50 > 100 mg/L	Practically Nontoxic

Biodegradation tests suggest that this product would meet the OECD guidelines for classification as "Inherently biodegradable".

13. DISPOSAL CONSIDERATIONS

This material when discarded is not a hazardous waste as that term is defined by the Resource, Conservation and Recovery Act (RCRA), 40 CFR 261. Dispose of by incineration or recycle in accordance with local, state and federal regulations. Consult your attorney or appropriate regulatory officials for information on such disposal.

This product should not be dumped spilled rinsed or washed into sewers or public waterways.

14. TRANSPORT INFORMATION

The data provided in this section is for information only. Please apply the appropriate regulations to properly classify your shipment for transportation.

DOT Classification: Environmentally Hazardous Substances, Liquid, N.O.S (diphenyl oxide), 9, UN 3082 III*, Marine pollutant.
DOT Label: None
DOT Reportable Quantity: Not Applicable
Special Provisions: This material meets the definition of a marine pollutant.

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IATA/ICAO: Not Applicable

IMDG Code: See U.S.DOT

* Applies ONLY for shipments in bulk or via water transportation.

15. REGULATORY INFORMATION

TSCA Inventory: Listed
SARA Hazard Notification
Hazard Categories Under Title III Rules (40 CFR 37): Immediate
Section 302 Extremely Hazardous substances: Not Applicable
Section 313 Toxic Chemical(s): Not Applicable

CERCLA Reportable Quantity: Not Applicable

Refer to Section 11 for OSHA Hazardous Chemical(s) and Section 13 for RCRA classification.

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AUTHORISED SIGNATORIES

APPENDIX D ECD COMMENT RESPONSE TABLE

မွန်ပြည်နယ်၊ ပေါင်မြို့နယ်၊ သဲဖြူကုန်းကျေးရွာအုပ်စု၊ ရဲပြားကုန်းကျေးရွာ ကွင်းအမှတ် (၉၂၈) ရဲပြားမြောက်၊ ဦးပိုင်အမှတ် (၄၁+၄၂+၁၀၈+ ၁၀၉+၇၇+၁၀၇+၁၆၆)၊ မြေဧရိယာ (၅၀.၇၃) ဧကပေါ်ရှိ ပဒုမ္မာဆပ်ပြာစက်ရုံမှ အဝတ်လျှော်ဆပ်ပြာတောင့် နှင့် အခဲများထုတ်လုပ်ခြင်းအတွက် တင်ပြလာသည့် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်(EMP) အပေါ် **ECD မှ** စိစစ်တွေ့ရှိချက်များနှင့် အကြံပြုချက်များကို ပြင်ဆင်ဖြည့်စွက်ဖြေရှင်းချက်

စဉ်	ပြန်လည်ပြင်ဆင်ဖြည့်စွက်တင်ပြရန်အချက်များ	ပြန်ကြားချက်
၁။	**အစီရင်ခံစာအကျဉ်းချုပ်**	
1	အကျဉ်းချုပ်အစီရင်ခံစာတွင် အစီရင်ခံစာတစ်ခုလုံးကို ခြုံငုံသိရှိ နိုင်သော အောက်ဖော်ပြပါ အခန်းအလိုက် အဓိက အချက်များကို ပြည့်စုံစွာ ဖော်ပြရန် • မူဝါဒ၊ ဥပဒေမူဘောင်များ • စီမံကိန်းအကြောင်းအရာဖော်ပြချက် • လက်ရှိပတ်ဝန်းကျင် အခြေအနေ • ပတ်ဝန်းကျင်အပေါ် ထိခိုက်နိုင်မှုများနှင့် လျော့နည်းစေရေးဆောင်ရွက်မည့် နည်းလမ်းများ • ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ် • စောင့်ကြပ်ကြည့်ရှုမည့် အစီအစဉ်	အခန်း ၁ စာမျက်နှာ 16 – 66 တွင်ဖော်ပြ ထား ပါ သည်။

	• အများပြည်သူနှင့်တိုင်ပင်ဆွေးနွေးခြင်းနှင့်သတင်းအချက်အလက်များ ထုတ်ဖော်ခြင်း • နိဂုံးနှင့် အကြံပြုချက်	
၂။	**နိဒါန်း**	
2	စီမံကိန်းအဆိုပြုသူထံ ဆက်သွယ်ရန် ဖုန်းနံပါတ် အီးမေးလ်တို့ကို ဖော်ပြရန်	ခေါင်းစဉ်ခွဲ ၂.၁ စာမျက်နှာ 68 တွင်ဖော်ပြ ထား ပါ သည်။
3	စီမံကိန်းအကောင်အထည် ဖော်ဆောင်ရွက်သည့် တာဝန်ခံ၏ အမည် ဆက်သွယ်ရန် လိပ်စာ ဖုန်းနံပါတ် အီးမေးလ်တို့ကို ဖော်ပြရန်	• ခေါင်းစဉ်ခွဲ ၂.၁, စာမျက်နှာ 68, တွင်ဖော်ပြ ထား ပါ သည်။ • ခေါင်းစဉ်ခွဲ ၃.၁, စာမျက်နှာ ၇၂ တွင်ဖော်ပြ ထား ပါ သည်။
၃။	**စီမံကိန်းအကြောင်းအရာဖော်ပြချက်**	
1	လုပ်ငန်း၏ လိပ်စာ ကို ပြည့်စုံစွာ ဖော်ပြရန်	ခေါင်းစဉ်ခွဲ ၃.၂, စာမျက်နှာ ၇၂, တွင်ဖော်ပြ ထား ပါ သည်။
2	စီမံကိန်း၏ တည်နေရာပြအမှတ်များကို ပြန်လည်ဆန်းစစ်ဖော်ပြရန်	• ခေါင်းစဉ်ခွဲ ၃.၂, စာမျက်နှာ ၇၂ တွင်ဖော်ပြ ထား ပါ သည်။ • ခေါင်းစဉ်ခွဲ ၃.၂ စာမျက်နှာ ၇၆, ၇၇ ရှိ **Figure 3.3 Figure 3.4** တွင် ဖော်ပြထားပါသည်။
3	စီမံကိန်း၏ အနီးဝန်းကျင်ပြမြေပုံကို ဖော်ပြရန်	ခေါင်းစဉ်ခွဲ ၃.၂ စာမျက်နှာ ၇၅ ရှိ **Figure 3.5** တွင် ဖော်ပြထားပါသည်။

4	စီမံကိန်းဧရိယာ အတွင်းရှိ အဆောက်အဦးများ၏ အရွယ်အစားတို့ အားဖော်ပြရန်	ခေါင်းစဉ်ခွဲ ၃.၂ စာမျက်နှာ ၇၂-၇၃ ရှိ Table 3.1 တွင် ဖော်ပြထားပါသည်။
5	အစီရင်ခံစာ အပိုဒ် ၃.၄ ကုန်ချောထွက်ရှိမှုပမာဏနှင့် Final products အစီရင်ခံစာ အပိုဒ် ၃.၁၀ Products and production capacity ရှိထုတ်လုပ်မှု ပမာဏ တို့ကွဲလွဲနေမှုအား ပြန်လည်ဆန်းစစ် ဖော်ပြရန်	ခေါင်းစဉ်ခွဲ ၃.၁၀ စာမျက်နှာ ၁၀၅ တွင် ဖော်ပြထားပါသည်။
6	စီမံကိန်း၌ ကုန်ကြမ်းပစ္စည်းအသုံးပြုမှု ပမာဏ သယ်ယူသည့် နည်းလမ်း သိုလှောင်ထားရှိမှု အခြေအနေ တို့ ကို ဓာတ်ပုံမှတ်တမ်း ဖြင့် ဖော်ပြရန်	ခေါင်းစဉ်ခွဲ ၃.၅ စာမျက်နှာ ၈၃-၈၄ ရှိ Table 3.4, Figure 3.9 တွင် ဖော်ပြထားပါသည်။
7	ဘေးထွက်ပစ္စည်းလိုင်းရည် တစ်ရက်ထွက်ရှိမှုပမာဏ ကို ဖော်ပြရန်	ခေါင်းစဉ်ခွဲ ၃.၁၀ စာမျက်နှာ ၁၀၅ ဖော်ပြထားပါသည်။
8	ရေသုံးစွဲမှုပမာဏကို (လုပ်ငန်းစဉ်၊ အထွေထွေ၊ အိမ်သုံး၊ ဘွိုင်လာ) စသည့် တစ်ခုချင်းစီတွင် သုံးသည့် ရေပမာဏအား ခွဲခြားဖော်ပြရန်နှင့် သိုလှောင်ထားရှိမှုအခြေအနေကို ဖော်ပြရာတွင် (မီးသတ်ရေကန်၊ အထွေထွေ) အသုံးပြုမှုအတွက် သိုလှောင်မှုအခြေအနေကို ဖော်ပြရန်၊	ခေါင်းစဉ်ခွဲ ၃.၉.၂ စာမျက်နှာ ၁၀၂ တွင် ဖော်ပြထားပါသည်။

9	စီမံကိန်းဌ အသုံးပြုသည့် ဓာတုပစ္စည်းအမျိုးအစား၊ အသုံးပြုမှုပမာဏ၊ ရယူသည့်အရင်းအမြစ်၊ ဓာတုပစ္စည်းများအတွက် MSDS (Material Safety Data Sheet) တို့ကို ဖော်ပြရန်၊	ခေါင်းစဉ်ခွဲ ၃.၅.၁ စာမျက်နှာ ၈၅ တွင် ဖော်ပြထားပါသည်။
10	Packing Machineအရေအတွက် Raw Materials Stored Tank, Raw Mixer Tank အရေအတွက် တို့ကိုဖော်ပြရန်	ခေါင်းစဉ်ခွဲ ၃.၆စာမျက်နှာ ၈၆ တွင် ဖော်ပြထားပါသည်။
11	ဘွိုင်လာဌ် အသုံးပြုသော လောင်စာသိုလှောင်ထားရှိမှုအခြေအနေအား ဓာတ်ပုံမှတ်တမ်းဖြင့် ဖော်ပြရန်နှင့် ဘွိုင်လာအသုံးပြုမှုအတွက် သက်ဆိုင်ရာဌာန၏ ခွင့်ပြုမိန့်၊ Boiler Stack Hight တို့ကို ဖော်ပြရန်၊	ခေါင်းစဉ်ခွဲ ၃.၆ စာမျက်နှာ ၉၃-၉၄ ရှိ Figure 3.31 Figure 3.32 တွင် ဖော်ပြထားပါသည်။
12	• စီမံကိန်း၏ တစ်နှစ်စက်လည်ပတ်ရက်အား ထည့်သွင်းဖော်ပြရန်၊	ခေါင်းစဉ်ခွဲ ၃.၇ စာမျက်နှာ ၉၅ တွင် ဖော်ပြထားပါသည်။
13	စီမံကိန်းလည်ပတ်သည့်ကာလ၊ ပိတ်သိမ်းသည့်ကာလ စွန့်ပစ်အစိုင်အခဲတစ်ရက်ထွက်ရှိမှုပမာဏ၊ အမျိုးအစား၊ ဘွိုင်လာမှ ပြာထွက်ရှိမှုပမာဏ၊ မစွန့်ပစ်မီယာယီသိုလှောင်ထားရှိမှုအခြေအနေနှင့် စွန့်ပစ်သည့် နည်းလမ်းတို့ကို ဖော်ပြရန်၊	• ခေါင်းစဉ်ခွဲ ၃.၁၁.၁ စာမျက်နှာ ၁၀၇လည်းကောင်း • ခေါင်းစဉ်ခွဲ ၃.၁၁.၁.၂ စာမျက်နှာ ၁၀၈ တွင် ဖော်ပြထားပါသည်။

14	လုပ်ငန်းမှ ဘေးအန္တရာယ် ရှိစွန့်ပစ်ပစ္စည်း တစ်ရက် ထွက်ရှိမှု ပမာဏ , မစွန့်ပစ်မီ ယာယီသိုလှောင်ထားရှိမှု အခြေအနေ , စွန့်ပစ်သည့် နည်းလမ်းတို့အား ဖော်ပြရန်	ခေါင်းစဉ်ခွဲ ၃.၁၁.၃ စာမျက်နှာ ၁၁၂,၁၁၃ရှိ **Figure 3.44** တွင် ဖော်ပြထားပါသည်။
15	စိမ်ကိန်းလည်ပတ်သည့်ကာလ၊ ပိတ်သိမ်းသည့်ကာလ စွန့်ပစ်ရေ (လုပ်ငန်းစဉ်၊ အထွေထွေ၊ ဘွိုင်လာ) တစ်ရက်ထွက်ရှိမှုပမာဏနှင့် နောက်ဆုံးစွန့်ထုတ်သည့်နေရာတို့အား ဖော်ပြရန်၊	ခေါင်းစဉ်ခွဲ ၃.၁၁.၂.၁ စာမျက်နှာ ၁၀၉, ၁၁၀ ရှိ Figure 3.43 တွင် ဖော်ပြထားပါသည်။
16	လုပ်ငန်းမှ စွန့်ထုတ်ရေ၊ အိမ်သုံးစွန့်ပစ်ရေများအား သန့်စင်သည့် နည်းစနစ်အားဖော်ပြရန်၊	ခေါင်းစဉ်ခွဲ ၃.၁၁.၂.၁ စာမျက်နှာ ၁၀၉ တွင် ဖော်ပြထားပါသည်။
၄။	မူဝါဒ ဥပဒေ နှင့် အဖွဲ့ အစည်းဆိုင်ရာမူဘောင်	

1	စီမံကိန်းအဆိုပြုသူမှ အစီရင်ခံစာတွင် ခေါင်းစဉ်များသာ ဖော်ပြထားသော ဥပဒေများအပြင် စီမံကိန်းနှင့်သက်ဆိုင်သော မြန်မာနိုင်ငံမှ ထုတ်ပြန်ထားသော လိုက်နာဆောင်ရွက်ရမည့် အောက်ဖော်ပြပါ ဥပဒေ၊ နည်းဥပဒေတို့ကို ၄င်းတို့၏ ပုဒ်မ၊ ပုဒ်မခွဲများနှင့်အတူ အစီရင်ခံစာတွင် ဖြည့်စွက်ဖော်ပြရန်- • Environmental Impact Assessment Procedure (2015) • The Private Industrial Enterprise Law, 1990 • The Prevention of Hazard from Chemical and Related Substances Law,2013 • Boiler Law (2015)	ခေါင်းစဉ်ခွဲ ၄.၃ စာမျက်နှာ ၁၁၆, ၁၁၇ တွင် ဖော်ပြထားပါသည်။
2	စက်ရုံ၏ လုပ်ငန်းဆောင်ရွက်မှုများကြောင့် ပတ်ဝန်းကျင်အပေါ် ထိခိုက်နိုင်မှုများအား တွက်ချက်ရာတွင် အသုံးပြုသည့် Guideline များ၏ Paremeter ၊ Averaging Period ၊ Unit ၊ Guideline Values ကို Environmental Equipment (လေ၊ ရေ၊ မြေ၊ ဆူညံသံ၊ တုန်ခါမှု၊ စွန့်ပစ်ရေ၊ စွန့်ထုတ်ရေ၊ လုပ်ငန်းစဉ်မှ ထွက်ရှိသည့် စွန့်ပစ်ရေ) တစ်ခုချင်းစီအလိုက် ဖော်ပြရန်၊	ခေါင်းစဉ်ခွဲ ၄.၅, ၄.၅.၁,၄.၅.၂, ၄.၅.၃ စာမျက်နှာ ၁၁၈ မှ ၁၁၇ ရှိ Table 4.1 , Table 4.2 , Table 4.3 ,Table 4.4 တွင် ဖော်ပြထားပါသည်။
3	စီမံကိန်းနှင့် သက်ဆိုင်သည့် နိုင်ငံတကာကွန်ဗင်းရှင်းများရှိပါက ဖော်ပြရန်၊	ခေါင်းစဉ်ခွဲ ၄.၆.၁ စာမျက်နှာ ၁၂၁, ၁၂၂ ရှိ **Figure 3.5** တွင် ဖော်ပြထားပါသည်။
၅။	**လက်ရှိပတ်ဝန်းကျင်အခြေအနေ**	

1	စီမံကိန်းမှ လေ့လာမည့် ရေယာ(၅၀၀)မိတာအကွာအဝေးမှာ စီမံကိန်းမှ ပတ်ဝန်းကျင်အပေါ် ဆိုးကျိုးသက်ရောက်နိုင်မှုအတွက် လုံလောက်မှုရှိ/မရှိဖော်ပြရန်၊	ခေါင်းစဉ်ခွဲ ၅.၄.၁ စာမျက်နှာ ၁၄၅ တွင် ဖော်ပြထားပါသည်။
2	စက်ရုံ၏ မြေအသုံးချမှုပြမြေပုံ၌ စက်ရုံမှ 2 km အတွင်း၌ မုတ္တမသစ်တောကြိုးဝိုင်းတည်ရှိနေကြောင်းဖော်ပြထားသည့်အတွက် သက်ဆိုင်ရာ သစ်တောဌာန၏ ခွင့်ပြုမိန့်အား ဖော်ပြရန်၊	ခေါင်းစဉ်ခွဲ ၅.၃.၃ စာမျက်နှာ ၁၄၁ Figure 5.15 တွင် ဖော်ပြထားပါသည်။
3	Air Quality Standard နှင့်ပတ်သက်၍ စီမံကိန်းမှ လိုက်နာမည့် NEQEG Guideline နှင့် US-EPA Standard Guideline Value တို့အား ရည်ညွှန်းရသည့် အကြောင်းအရာတို့ကို ဖော်ပြရန်၊	ခေါင်းစဉ်ခွဲ ၅.၄.၃ စာမျက်နှာ ၁၄၈, ၁၄၉ Table 5.12 တွင် ဖော်ပြထားပါသည်။
4	ဘွိုင်လာနှင့် ဂျင်နရေတာတို့ရှိ လေအရည်အသွေးတိုင်းတာမှုရလဒ်များတွင် PM_{10}၊ $PM_{2.5}$ တန်ဖိုးများမှာ သတ်မှတ်လမ်းညွှန်တန်ဖိုးထက်ကျော်လွန်နေမှုအပေါ် ကျော်လွန်နေရသည့် အကြောင်းအရင်းနှင့် လေအရည်အသွေးတိုင်းတာထားသောနေရာများကို ကိုဩဒိနိတ်အမှတ်များပါဝင်သည့် မြေပုံဖြင့် ဖော်ပြရန်၊	ခေါင်းစဉ်ခွဲ ၅.၄.၂ စာမျက်နှာ ၁၄၇, ၁၄၈ Table 5.11 တွင် ဖော်ပြထားပါသည်။

5	Operation Area ရှိ လေအရည်အသွေးတိုင်းတာထားသော နေရာ၊ အဆိုပါနေရာများအား ကိုယ်စားပြုနိုင်သော မြေပုံနှင့် တိုင်းတာမှုရလဒ်များ၌ PM_{10} ၊ $PM_{2.5}$ တန်ဖိုးများမှာ သတ်မှတ်လမ်းညွှန်တန်ဖိုးထက် ကျော်လွန်နေမှုအပေါ် ကျော်လွန်နေရသည့် အကြောင်းအရင်းတို့အားဖော်ပြရန်၊	ခေါင်းစဉ်ခွဲ ၅.၄.၃ စာမျက်နှာ ၁၅၃, ၁၅၄ Table 5.17 တွင် ပြန်လည်တိုင်းတာ၍ ရလဒ်များကို ဖော်ပြထားပါသည်။ တိုင်းတာမှု ရလဒ်များ မှာ guideline တန်ဖိုးအတွင်းရှိပါသည်
6	လေအရည်အသွေးတိုင်းတာခဲ့သည့် အချိန်၊ တိုင်းတာမှုရလဒ်များအား ဓာတ်ခွဲခန်းရလဒ်များဖြင့် ဖော်ပြရန်နှင့် လေအရည်အသွေးတိုင်းတာထားသော Averaging Period အား ဖော်ပြရန်၊	ခေါင်းစဉ်ခွဲ ၅.၄.၃ စာမျက်နှာ ၁၅၄ တွင် ဖော်ပြထားပါသည်
7	Noise Standard နှင့် ပတ်သက်၍ စီမံကိန်းမှ လိုက်နာမည့် NEQEG Guideline Value ကို ရည်ညွှန်းရသည့် အကြောင်းအရာအား ဖော်ပြရန်၊	ခေါင်းစဉ်ခွဲ ၅.၄.၄ စာမျက်နှာ ၁၅၅တွင် ဖော်ပြထားပါသည်။
8	ဆူညံသံတိုင်းတာရာတွင် ဘွိုင်လာ၊ ဂျင်နရေတာ၊ Mazzoni ၊ Soap Pan ၊ Virgo ၊ Stemplex Plodder Area ရှိ တိုင်းတာမှုရလဒ်များမှာ သတ်မှတ်လမ်းညွှန်တန်ဖိုးထက် ကျော်လွန်နေမှုအပေါ် ကျော်လွန်နေရသည့် အကြောင်းအရင်းကို ဖော်ပြရန်၊	ခေါင်းစဉ်ခွဲ ၅.၄.၄ စာမျက်နှာ ၁၅၅ တွင် ဖော်ပြထားပါသည်။

9	ဆူညံသံတိုင်းတာရာတွင် ဘွိုင်လာ၊ ဂျင်နရေတာ၊ Mazzoni ၊ Soap Pan ၊ Virgo ၊ Stemplex Plodder Area ရှိ တိုင်းတာမှုရလဒ်များမှာ သတ်မှတ်လမ်းညွှန်တန်ဖိုးထက် ကျော်လွန်နေမှုအပေါ် ကျော်လွန်နေရသည့် အကြောင်းအရင်းကို ဖော်ပြရန်၊	ခေါင်းစဉ်ခွဲ ၅.၄.၄ စာမျက်နှာ ၁၅၅, ၁၅၆ **Figure 5.22** တွင် ဖော်ပြထားပါသည်။
10	စီမံကိန်း၏ အနီးပတ်ဝန်းကျင်ရှိ Residential Area ၌ ကျေးရွာများ တည်ရှိကြောင်း ဖော်ပြထားမှုအပေါ် စီမံကိန်းမှ အဆိုပါကျေးရွာများ အပေါ် ဆူညံသံထိခိုက်နိုင်မှုရှိ/မရှိနှင့် ရှိပါက ဆူညံသံတိုင်းတာရာတွင် စီမံကိန်း၏ Residential Area ကို ပါ တိုင်းတာ၍ စီမံကိန်းမှ လိုက်နာမည့် Guideline Value ကို ဖော်ပြရန်၊ အဆိုပါ Guideline Value ကို ရည်ညွှန်းရသည့် အကြောင်းအရာဖော်ပြချက်နှင့် တိုင်းတာမှုရလဒ်များမှာ လမ်းညွှန်တန်ဖိုးထက်ကျော်လွန်နေပါက ကျော်လွန်ရသည့် အကြောင်းအရင်းတို့အား ဖော်ပြရန်၊	ခေါင်းစဉ်ခွဲ ၅.၄.၄ စာမျက်နှာ ၁၅၇တွင် ဖော်ပြထားပါသည်။
11	Water Quality Standard နှင့် ပတ်သက်၍ စီမံကိန်းမှ လိုက်နာမည့် WHO Standard အား ရည်ညွှန်းရသည့် အကြောင်းအရာကို ဖော်ပြရန်၊	ခေါင်းစဉ်ခွဲ ၅.၄.၅.၁ စာမျက်နှာ ၁၅၈တွင် ဖော်ပြထားပါသည်။
12	Wastewater Quality Standard တို့နှင့် ပတ်သက်၍ YCDC Target Range ကို ရည်ညွှန်းရသည့် အကြောင်းအရာကို ဖော်ပြရန်၊	ခေါင်းစဉ်ခွဲ ၅.၄.၅.၂ စာမျက်နှာ ၁၆၀တွင် ဖော်ပြထားပါသည်။

13	စွန့်ပစ်ရေအရည်အသွေးတိုင်းတာမှုနှင့်ပတ်သက်၍ နောက်ဆုံး Drainage ရေကန်မှ တိုင်းတာမှုရလဒ်များတွင် BOD တန်ဖိုးမှာ သတ်မှတ်လမ်းညွှန် တန်ဖိုးထက်ကျော်လွန်နေမှုအပေါ် ကျော်လွန်ရသည့်အကြောင်းအရင်း အား ဖော်ပြရန်၊	ခေါင်းစဉ်ခွဲ ၅.၄.၅.၂ စာမျက်နှာ ၁၆၀တွင် ဖော်ပြထားပါသည်။
14	ပေါင်မြို့နယ်၏ လူမှုစီးပွားဆိုင်ရာ အချက်အလက်များအား ဖော်ပြ ရာတွင် Primary Data (သို့) ရည်ညွှန်းကိုးကားခဲ့သည့် Reference များဖြင့် တိကျစွာ ဖော်ပြရန်၊	ခေါင်းစဉ်ခွဲ ၅.၁.၄ စာမျက်နှာ ၁၂၇, ၁၂၈တွင် ဖော်ပြထားပါသည်။
15	ပေါင်မြို့နယ်၏ လူမှုစီးပွားရေးဆိုင်ရာ အချက်များအား ရယူခဲ့သည့် အချိန်ကို ဖော်ပြရန်၊	ခေါင်းစဉ်ခွဲ ၅.၁.၄ စာမျက်နှာ ၁၂၈တွင် ဖော်ပြထားပါသည်။
၆။	**ပတ်ဝန်းကျင်အပေါ်ထိခိုက်နိုင် မှုများ နှင့် လျော့နည်းစေရေးဆောင်ရွက်မည့်လုပ်ငန်းများ**	
1	ဆပ်ပြာထုတ်လုပ်ခြင်းလုပ်ငန်းစဉ်မှ ထွက်ရှိလာသော စွန့်ပစ်ရေများ အား ထိခိုက်နိုင်သော Level သတ်မှတ်ချက်ကို ဖော်ပြရာတွင် Low ဟု ဖော်ပြထားမှုအပေါ် ပြန်လည်ဆန်းစစ်ဖော်ပြရန်၊	နောက်ဆုံးစီ'ဆင်းရေကန် ရှိ ရေအရည်အသွေးတိုင်းတာမှုရလဒ်၏ BOD တန်ဖိုးမှာ ကျော်လွန်နေသော်လည်း အဆိုပါ ရေကန်မှရေသည် အခြားနေရာများသို့ စီးထွက် ခြင်းမရှိဘဲ နွေရာသီတွင် ခန်းခြောက်ခြင်းဖြစ်သဖြင့် ရေအရည်အသွေးအပေါ် ထိခိုက်နိုင်မှု အား Low ဟုဖော်ပြထားခြင်း ဖြစ်ပါသည်။
2	ဘွိုင်လာ၌ လေထုညစ်ညမ်းမှုလျော့ချရာတွင် အသုံးပြုမည့် Filter အမျိုးအစား၊ အရေအတွက်၊ ကြီးမားသောစက်ပစ္စည်းများတွင် လေထု ညစ်ညမ်းမှုကို ထိန်းချုပ်ရာတွင် အသုံးပြုမည့်ပစ္စည်းကိရိယာ အမျိုး အစားများနှင့် အရေအတွက်တို့ကို ဖော်ပြရန်၊	ခေါင်းစဉ်ခွဲ၆. ၆.၁.၁ စာမျက်နှာ ၁၈၇တွင် ဖော်ပြထားပါသည်။

3	ရေအရည်အသွေး တိုင်းတာမှုရလဒ်များ၌ နောက်ဆုံးစီးဆင်းရေကန်မှ BOD တန်ဖိုးကျော်လွန်ရသည့် အကြောင်းအရင်းအပေါ် လျှော့ချမည့် နည်းလမ်းများကို ဖော်ပြရန်၊	ခေါင်းစဉ်ခွဲ ၆.၆.၃ စာမျက်နှာ ၁၉၁တွင် ဖော်ပြထားပါသည်
4	ဂျင်နရေတာ၊ ဘွိုင်လာ၊ Mazzoni Area ရှိ ဆူညံသံထွက်ရှိမှုများအား ဆန်းစစ်ဖော်ပြရန်နှင့် အဆိုပါနေရာများ၌ ဆူညံသံကျော်လွန်နေရသည့် အကြောင်းအရင်းအပေါ် လျှော့ချမည့်နည်းလမ်းနှင့် တပ်ဆင်အသုံးပြုမည့် ပစ္စည်းကိရိယာတို့အား ဖော်ပြရန်၊	ခေါင်းစဉ်ခွဲ ၆.၆.၂ စာမျက်နှာ ၁၈၈, ၁၈၉ Table 6.11 တွင် ဖော်ပြထားပါသည်။
၈။	**ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်**	
1	ဘွိုင်လာမှ ထုတ်လွှတ်အခိုးအငွေ့ထွက်ရှိမှုဆိုင်ရာစီမံခန့်ခွဲမည့် နည်းလမ်းများနှင့်ပတ်သက်၍ PM အမှုန်များလျှော့ချရာတွင် တပ်ဆင်အသုံးပြုမည့် PM Filter အား Maintenance ပြုလုပ်မည့်အချိန်နှင့် အကြိမ်အရေအတွက်အားတို့အား ဖော်ပြရန်၊	ခေါင်းစဉ်ခွဲ ၇.၃.၁ စာမျက်နှာ ၂၀၆ Table 7.3 တွင် ဖော်ပြထားပါသည်။
2	Lime စွန့်ပစ်ရေများကို စီမံခန့်ခွဲရာတွင် တပ်ဆင်သွားမည့် HTV Sheet အား Maintenance ပြုလုပ်မည့် အချိန်နှင့် အကြိမ်အရေအတွက်တို့အား ဖော်ပြရန်၊	ခေါင်းစဉ်ခွဲ ၇.၃.၂ စာမျက်နှာ ၂၀၇ တွင် ဖော်ပြထားပါသည်။

3	နောက်ဆုံး Treatment ပြုလုပ်သည့် ရေကန်ရှိ BOD တန်ဖိုးကျော်လွန်နေမှုအပေါ် လျှော့ချရာတွင် ဆောင်ရွက်မည့် စီမံခန့်ခွဲမှုအစီအစဉ်ကို ဖော်ပြရန်၊	ခေါင်းစဉ်ခွဲ ၇.၃.၂ စာမျက်နှာ ၂၀၇ တွင် ဖော်ပြထားပါသည်။
4	စွန့်ပစ်အစိုင်အခဲစီမံခန့်ခွဲမှုနှင့် ပတ်သက်၍ စွန့်ပစ်အစိုင်အခဲများနှင့် အိမ်သုံးအမှိုက်များအား မစွန့်ပစ်မီ ယာယီသိုလှောင်ထားမှုအစီအစဉ်၊ နောက်ဆုံးစွန့်ပစ်သည့်နေရာ၊ စွန့်ပစ်သည့်အချိန်၊ စွန့်ပစ်သည့် အကြိမ်အရေအတွက်တို့ကို ဖော်ပြရန်၊	ခေါင်းစဉ်ခွဲ ၇.၃.၃ စာမျက်နှာ ၂၀၈ Table 7.5 တွင် ဖော်ပြထားပါသည်။
5	လုပ်ငန်းလည်ပတ်စဉ်ကာလ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်များကို ဖော်ပြရာတွင် ပတ်ဝန်းကျင်ဆိုင်ရာ ထိခိုက်မှုများဖြစ်ပေါ်စေသော လုပ်ငန်းဆောင်ရွက်ချက်များကို ဖော်ပြရန်၊	ခေါင်းစဉ်ခွဲ ၇.၈ စာမျက်နှာ ၂၁၆-၂၂၀ Table 7.8 တွင် ဖော်ပြထားပါသည်။
၉။	စောင့်ကြပ်ကြည့်ရှုမည့် အစီအစဉ်	
1	စီမံကိန်းလည်ပတ်သည့်ကာလ စောင့်ကြပ်ကြည့်ရှုမည့် အစီအစဉ်နှင့် ပတ်သက်၍ ဆူညံသံ၊ စွန့်ပစ်ရေထွက်ရှိသော နေရာတို့၏ ကိုယ်ြ ဒိနိတ်အမှတ်များကို ဖော်ပြရန်၊ မီးခိုးခေါင်းတိုင်မှ ထုတ်လွှတ်အခိုး အငွေ့အား စောင့်ကြပ်ကြည့်ရှုရန်နှင့် အဆိုပါနေရာ၏ ကိုယ်ြဒိနိတ် အမှတ်၊ အကြိမ်အရေအတွက်၊ ပါရာမီတာတို့ကို ဖော်ပြရန်၊	ခေါင်းစဉ်ခွဲ ၅.၄.၃ စာမျက်နှာ ၂၂၄-၂၂၆ Table 7.11 တွင် ဖော်ပြထားပါသ

2	ပတ်ဝန်းကျင်ထိခိုက်ဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်းအပိုဒ် (၁၀၈) အရ စောင့်ကြပ်ကြည့်ရှုမည့် အစီရင်ခံစာကို ဝန်ကြီးဌာနသို့ (၆)လ တစ်ကြိမ်တင်ပြရမည်ဟု ဖော်ပြထားသဖြင့် လေအရည်အသွေး၊ ဆူညံသံ၊ ရေအရည်အသွေး၊ မီးဘေးအန္တရာယ်ကာကွယ်ရေးတို့ကို တစ်နှစ်တစ်ကြိမ်စောင့်ကြပ်ကြည့်ရှုမည်ဟု ဖော်ပြထားမှုအား ပြန်လည်ပြင်ဆင်ဖော်ပြရန်၊	ခေါင်းစဉ်ခွဲ ၇.၉.၄ စာမျက်နှာ ၂၂၅, ၂၂၆ Table 7.11 တွင် ဖော်ပြထားပါသည်။
၉။	• စိမံကိန်းကြောင့်ထိခိုက်ခံစားရသည့် ဒေသခံပြည်သူများအတွက် ဆောင်ရွက်ပေးမည့် ဒေသဖွံ့ဖြိုးရေးအစီအစဉ်	
1	စီမံကိန်းကြောင့်ထိခိုက်ခံစားရသည့် ဒေသခံပြည်သူများအတွက် ဆောင်ရွက်ပေးမည့် ဒေသဖွံ့ဖြိုးရေးအစီအစဉ်များနှင့် အဆိုပါအစီအစဉ်များအတွက် အသုံးပြုမည့် ရန်ပုံငွေလျာထားချက်အား ထည့်သွင်းဖော်ပြရန်၊	ခေါင်းစဉ်ခွဲ 7.4 စာမျက်နှာ 210, 211 တွင် ဖော်ပြထားပါသည်။

APPENDIX E CONSULTANT TEAM'S CERTIFICATES

ကုမ္ပဏီမှတ်ပုံတင်လက်မှတ်

Certificate of Incorporation

သဘာဝပါတ်ဝန်းကျင်ဆိုင်ရာ စိမ်းလန်းစိုပြေမှု အတိုင်ပင်ခံ ကုမ္ပဏီ လီမိတက်

GREEN EHSS CONSULTANCY COMPANY LIMITED

Company Registration No. 103494397

မြန်မာနိုင်ငံကုမ္ပဏီများအက်ဥပဒေ ၁၉၁၄ ခုနှစ် အရ

သဘာဝပါတ်ဝန်းကျင်ဆိုင်ရာ စိမ်းလန်းစိုပြေမှု အတိုင်ပင်ခံ ကုမ္ပဏီ လီမိတက်

အား ၂၀၁၂ ခုနှစ် မတ်လ ၁၂ ရက်နေ့တွင်

အစုရှယ်ယာအားဖြင့် တာဝန်ကန့်သတ်ထား သည့် အများနှင့်မသက်ဆိုင်သောကုမ္ပဏီ

အဖြစ် ဖွဲ့စည်းမှတ်ပုံတင်ခွင့် ပြုလိုက်သည်။

This is to certify that

GREEN EHSS CONSULTANCY COMPANY LIMITED

was incorporated under the Myanmar Companies Act 1914 on 12 March 2012 as a Private Company Limited by Shares.

ကုမ္ပဏီမှတ်ပုံတင်အရာရှိ

Registrar of Companies

ရင်းနှီးမြှုပ်နှံမှုနှင့်ကုမ္ပဏီများညွှန်ကြားမှုဦးစီးဌာန

Directorate of Investment and Company Administration

Former Registration No. 4289/2011-2012

REPUBLIC OF THE UNION OF MYANMAR

Ministry of Natural Resources and Environmental Conservation

CERTIFICATE FOR TRANSITIONAL CONSULTANT REGISTRATION

(ကြားကာလအကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်းအတောက်အထားလက်မှတ်)

No. 00023 Date

The Ministry of Natural Resources and Environmental Conservation, hereby, issues this certificate to the organization under Environmental Impact Assessment Procedure, Notification No. 616/2015.

(ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း အမိန့်ကြော်ငြာစာအမှတ် ၅၁၆/၂၀၁၅ အရ သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာနသည် ဤအထောက်အထားလက်မှတ်ကို အဖွဲ့အစည်းအား ထုတ်ပေးလိုက်သည်။)

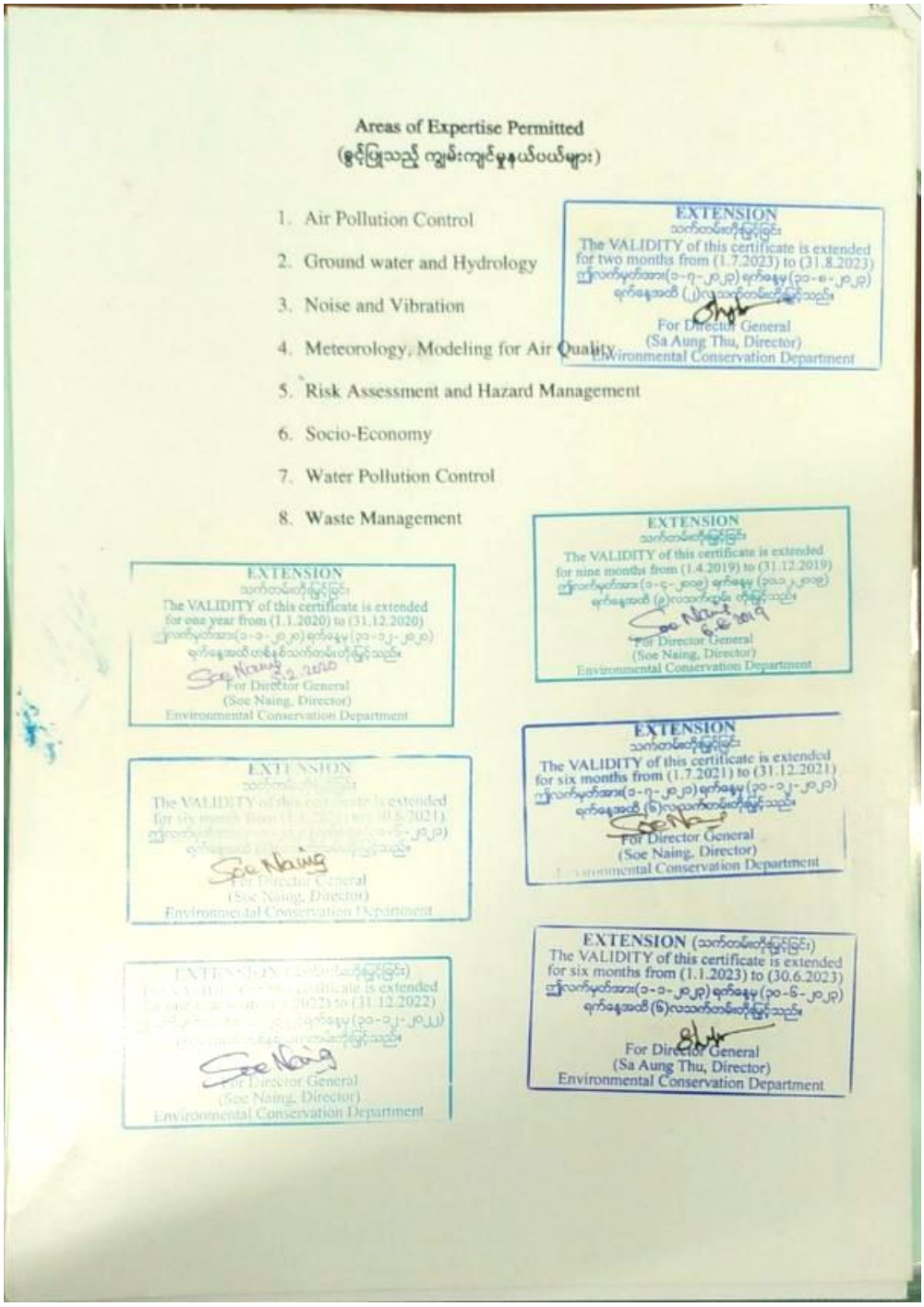
(a)	Name of Organization (အဖွဲ့အစည်းအမည်)	Green EHSS Consultancy Co., Ltd.
(b)	Name of the representative in the organization (အဖွဲ့အစည်းကိုယ်စားလှယ်၏ အမည်)	Daw Catherine Soe Soe Au
(c)	Citizenship of the representative in the organization (အဖွဲ့အစည်းကိုယ်စားလှယ်၏ နိုင်ငံသား)	Myanmar
(d)	Identity Card /Passport Numberof the representative person in the organization (အဖွဲ့အစည်းကိုယ်စားလှယ်၏ မှတ်ပုံတင်/ နိုင်ငံကူးလက်မှတ် အမှတ်)	12/ KaMaYa (N) 030356
(e)	Address of organization (ဆက်သွယ်ရန်လိပ်စာ)	140(B), Sayar San Road, Bahan Township, Yangon catherine@greenehss.com , 09425353553
(f)	Type of Consultancy (အကြံပေးလုပ်ကိုင်မှုအမျိုးအစား)	Organization
(g)	Duration of validity (သက်တမ်းကုန်ဆုံးရက်)	31 March 2018

EXTENSION

The VALIDITY of this certificate is extended for one year from (1.4.2018) to (31.3.2019)

For Director General
(Soe Naing, Director)
Environmental Conservation Department

Director General
Environmental Conservation Department
Ministry of Natural Resources and Environmental Conservation



Areas of Expertise Permitted
(ခွင့်ပြုသည့် ကျွမ်းကျင်မှုနယ်ပယ်များ)

1. Air Pollution Control
2. Ground water and Hydrology
3. Noise and Vibration
4. Meteorology, Modeling for Air Quality
5. Risk Assessment and Hazard Management
6. Socio-Economy
7. Water Pollution Control
8. Waste Management

EXTENSION
The VALIDITY of this certificate is extended for two months from (1.7.2023) to (31.8.2023)
For Director General
(Sa Aung Thu, Director)
Environmental Conservation Department

EXTENSION
The VALIDITY of this certificate is extended for nine months from (1.4.2019) to (31.12.2019)
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION
The VALIDITY of this certificate is extended for one year from (1.1.2020) to (31.12.2020)
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION
The VALIDITY of this certificate is extended for six months from (1.7.2021) to (31.12.2021)
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION
The VALIDITY of this certificate is extended for six months from (1.1.2023) to (30.6.2023)
For Director General
(Sa Aung Thu, Director)
Environmental Conservation Department

REPUBLIC OF THE UNION OF MYANMAR

Ministry of Natural Resources and Environmental Conservation

CERTIFICATE FOR TRANSITIONAL CONSULTANT REGISTRATION

(ကြားကာလအကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်းအတောက်အထားလက်မှတ်)

No. 10080 Date 07 JUL 2017

The Ministry of Natural Resources and Environmental Conservation, hereby, issues this certificate to the person under Environmental Impact Assessment Procedure, Notification No. 616/2015.

(ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း၊ အမိန့်ကြော်ငြာစာအမှတ်၊ ၅၁၆/၂၀၁၅ အရ သယ်ဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာနသည် ဤအတောက်အထားလက်မှတ်ကို လွှမ်းမိုးလ်အားထုတ်ပေးလိုက်သည်။)

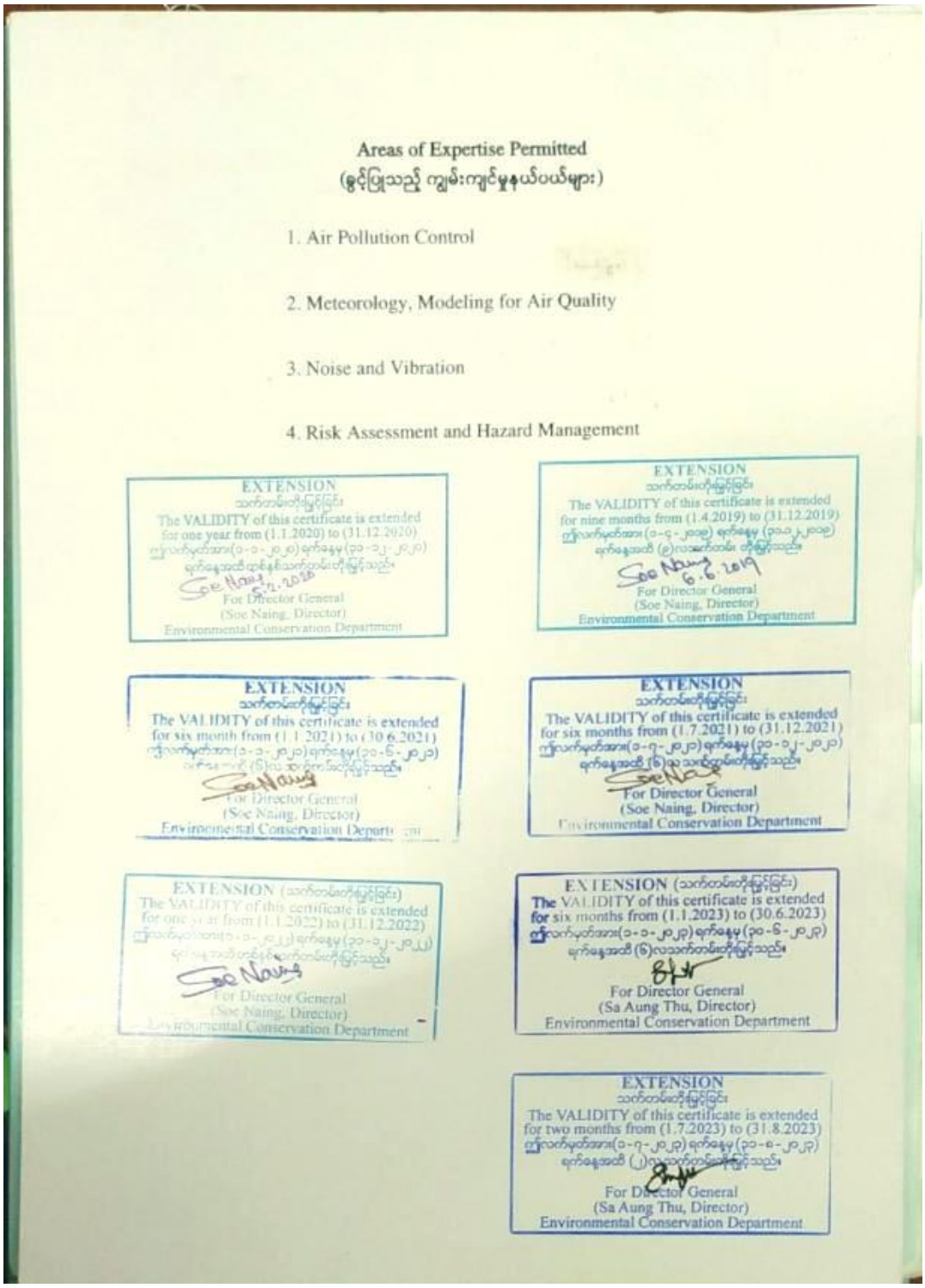
(a)	Name of Consultant (အကြံပေးပုဂ္ဂိုလ်အမည်)	Daw Catherine Soe Soe Aung
(b)	Citizenship (နိုင်ငံသား)	Myanmar
(c)	Identity Card / Passport Number (မှတ်ပုံတင်/နိုင်ငံကူးလက်မှတ် အမှတ်)	12/ Ka Ma Ya (N) 030356
(d)	Address (ဆက်သွယ်ရန်လိပ်စာ)	140 (B), Sayar San Road, Bahan Township, Yangon, Myanmar catherine@greenehss.com , 09 425353553
(e)	Organization (အဖွဲ့အစည်း)	Green EHSS Consultancy Co., Ltd.
(f)	Type of Consultancy (အကြံပေးလုပ်ကိုင်မှုအမျိုးအစား)	Person
(g)	Duration of validity (သက်တမ်းကုန်ဆုံးရက်)	31 March 2018

EXTENSION

VALIDITY of this certificate is extended for one year from (1.4.2018) to (31.3.2019)

For Director General
(Soe Naing, Director)
Environmental Conservation Department

Director General
Environmental Conservation Department
Ministry of Natural Resources and Environmental Conservation



Areas of Expertise Permitted
(ခွင့်ပြုသည့် ကျွမ်းကျင်မှုနယ်ပယ်များ)

1. Air Pollution Control

2. Meteorology, Modeling for Air Quality

3. Noise and Vibration

4. Risk Assessment and Hazard Management

EXTENSION
The VALIDITY of this certificate is extended for one year from (1.1.2020) to (31.12.2020)
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION
The VALIDITY of this certificate is extended for nine months from (1.4.2019) to (31.12.2019)
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION
The VALIDITY of this certificate is extended for six month from (1.1.2021) to (30.6.2021)
For Director General
(Soe Naing, Director)
Environmental Conservation Depart

EXTENSION
The VALIDITY of this certificate is extended for six months from (1.7.2021) to (31.12.2021)
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION
The VALIDITY of this certificate is extended for one year from (1.1.2022) to (31.12.2022)
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION
The VALIDITY of this certificate is extended for six months from (1.1.2023) to (30.6.2023)
For Director General
(Sa Aung Thu, Director)
Environmental Conservation Department

EXTENSION
The VALIDITY of this certificate is extended for two months from (1.7.2023) to (31.8.2023)
For Director General
(Sa Aung Thu, Director)
Environmental Conservation Department

REPUBLIC OF THE UNION OF MYANMAR

Ministry of Natural Resources and Environmental Conservation

CERTIFICATE FOR TRANSITIONAL CONSULTANT REGISTRATION

(ကြားကာလအကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်းအထောက်အထားလက်မှတ်)

No. 00081 Date 11 ... 2017

The Ministry of Natural Resources and Environmental Conservation, hereby, issues this certificate to the person under Environmental Impact Assessment Procedure, Notification No. 616/2015.

(ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း၊ အမိန့်ကြော်ငြာစာအမှတ်၊ ၆၁၆/၂၀၁၅ အရ သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာနသည် ဤအထောက်အထားလက်မှတ်ကို လူပုဂ္ဂိုလ်အားထုတ်ပေးလိုက်သည်။)

(a)	Name of Consultant (အကြံပေးပုဂ္ဂိုလ်အမည်)	Daw Swe Swe Aung
(b)	Citizenship (နိုင်ငံသား)	Myanmar
(c)	Identity Card / Passport Number (မှတ်ပုံတင်/နိုင်ငံကူးလက်မှတ် အမှတ်)	12/ Ka Ma Ya (N) 031573
(d)	Address (ဆက်သွယ်ရန်လိပ်စာ)	No. 140, Second Floor, Saya San Road, Bahan Township, Yangon, Myanmar. masweaung@gmail.com info@greenehss.com , 09 973276261
(e)	Organization (အဖွဲ့အစည်း)	Associate EIA Consultant
(f)	Type of Consultancy (အကြံပေးလုပ်ကိုင်မှုအမျိုးအစား)	Person
(g)	Duration of validity (သက်တမ်းကုန်ဆုံးရက်)	31 March 2018

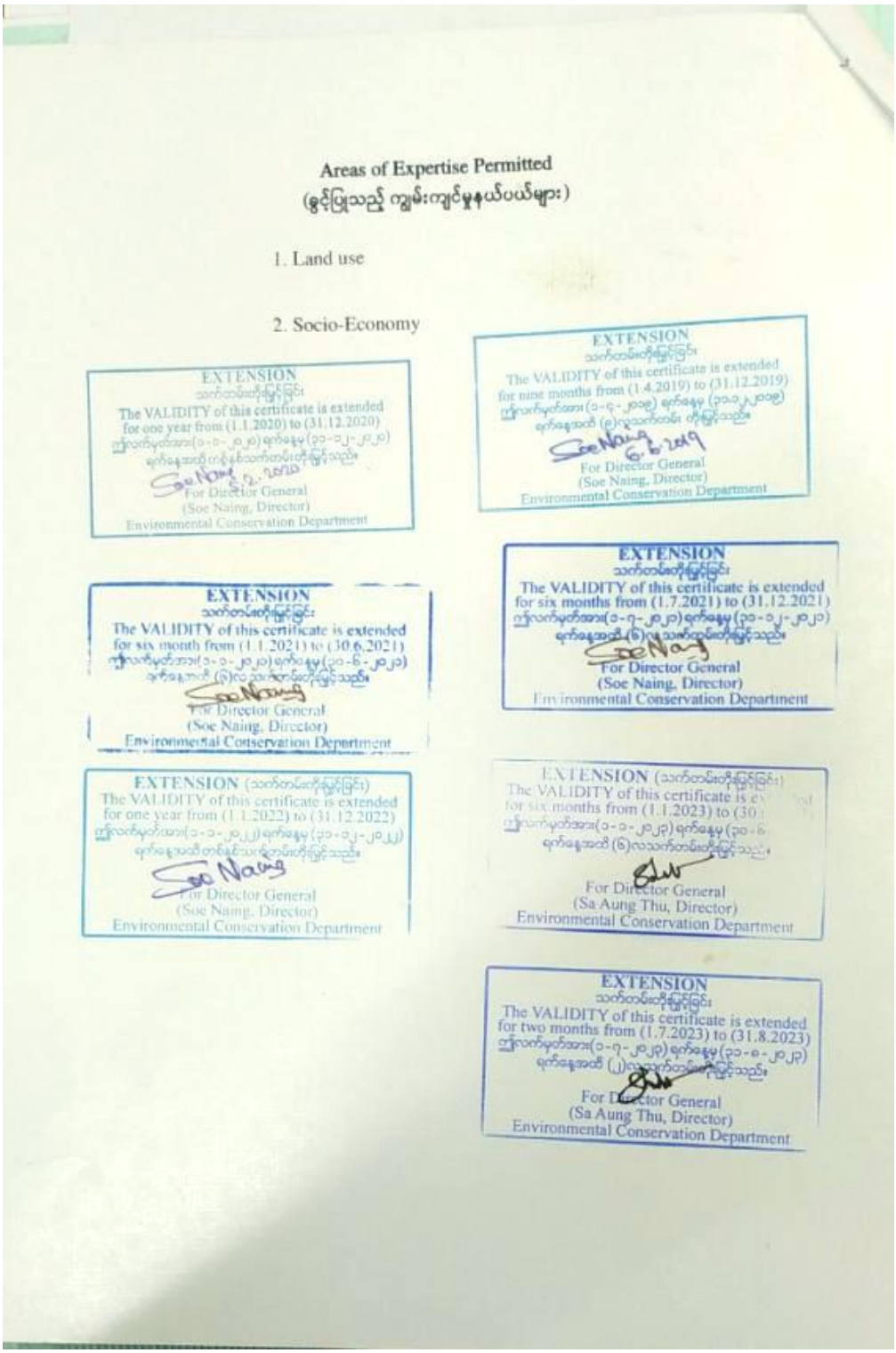
EXTENSION

The VALIDITY of this certificate is extended for one year from (1.4.2018) to (31.3.2019)

12.10.2018

For Director General
(Soe Naing, Director)
Environmental Conservation Department

Director General
Environmental Conservation Department
Ministry of Natural Resources and Environmental Conservation



Areas of Expertise Permitted
(ခွင့်ပြုသည့် ကျွမ်းကျင်မှုနယ်ပယ်များ)

1. Land use

2. Socio-Economy

EXTENSION
The VALIDITY of this certificate is extended for one year from (1.1.2020) to (31.12.2020)
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION
The VALIDITY of this certificate is extended for nine months from (1.4.2019) to (31.12.2019)
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION
The VALIDITY of this certificate is extended for six month from (1.1.2021) to (30.6.2021)
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION
The VALIDITY of this certificate is extended for six months from (1.7.2021) to (31.12.2021)
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION
The VALIDITY of this certificate is extended for one year from (1.1.2022) to (31.12.2022)
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION
The VALIDITY of this certificate is extended for six months from (1.1.2023) to (30.
For Director General
(Sa Aung Thu, Director)
Environmental Conservation Department

EXTENSION
The VALIDITY of this certificate is extended for two months from (1.7.2023) to (31.8.2023)
For Director General
(Sa Aung Thu, Director)
Environmental Conservation Department

REPUBLIC OF THE UNION OF MYANMAR
Ministry of Natural Resources and Environmental Conservation
CERTIFICATE FOR TRANSITIONAL CONSULTANT REGISTRATION
(ကြားကာလအကြေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်းအထောက်အထားလက်မှတ်)

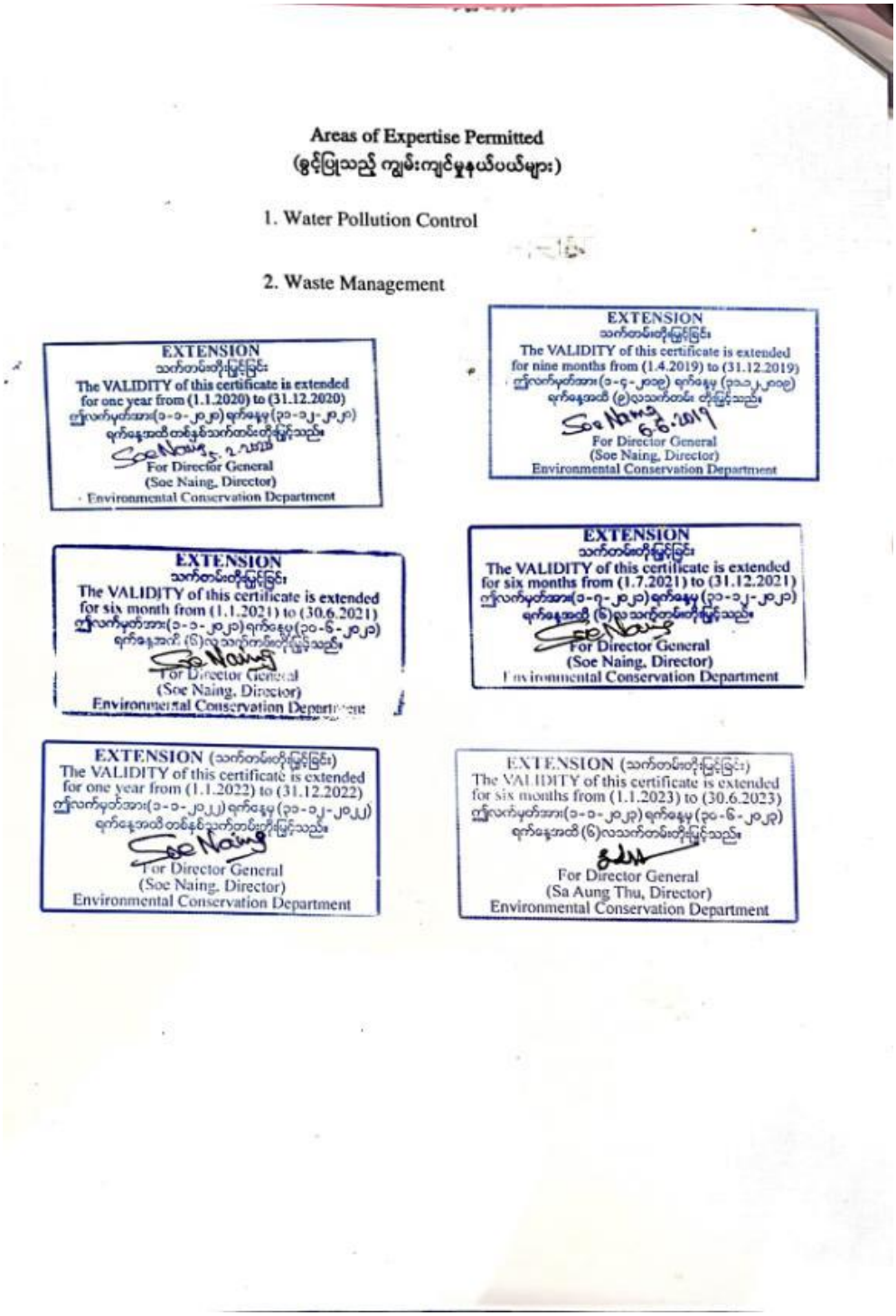
No. 10082 Date 9 1 JAN 2017

The Ministry of Natural Resources and Environmental Conservation, hereby, issues this certificate to the person under Environmental Impact Assessment Procedure, Notification No. 616/2015.
(ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း၊ အမိန့်ကြော်ငြာစာအမှတ်၊ ၅၁၆/၂၀၁၅ အရ သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာနသည် ဤအထောက်အထားလက်မှတ်ကို လူပုဂ္ဂိုလ်အားထုတ်ပေးလိုက်သည်။)

(a)	Name of Consultant (အကြေးပုဂ္ဂိုလ်အမည်)	Dr. Theingi Ye Myint
(b)	Citizenship (နိုင်ငံသား)	Myanmar
(c)	Identity Card / Passport Number (မှတ်ပုံတင်/နိုင်ငံကူးလက်မှတ် အမှတ်)	7/ Tha Ka Na (N) 000559
(d)	Address (ဆက်သွယ်ရန်လိပ်စာ)	No. C-3, Kabaraye Villa Residence, Mayangone Township, Yangon tgym559@gmail.com 095095555
(e)	Organization (အဖွဲ့အစည်း)	Yangon Technological University
(f)	Type of Consultancy (အကြေးလုပ်ကိုင်မှုအမျိုးအစား)	Person
(g)	Duration of validity (သက်တမ်းကုန်ဆုံးရက်)	31 March 2018

EXTENSION
သက်တမ်းတိုးချဲ့ခြင်း
The VALIDITY of this certificate is extended for one year from (1.4.2018) to (31.3.2019)
ဤလက်မှတ်အား (၁-၄-၂၀၁၈) ရက်နေ့မှ (၃၁-၃-၂၀၁၉) ရက်နေ့အထိ တစ်နှစ်သက်တမ်း တိုးချဲ့ပေးသည်။
For Director General
(Soe Naing, Director)
Environmental Conservation Department

Director General
Environmental Conservation Department
Ministry of Natural Resources and Environmental Conservation



Areas of Expertise Permitted
(ခွင့်ပြုသည့် ကျွမ်းကျင်မှုနယ်ပယ်များ)

1. Water Pollution Control

2. Waste Management

EXTENSION
သက်တမ်းတိုးချဲ့ခြင်း
The VALIDITY of this certificate is extended for one year from (1.1.2020) to (31.12.2020)
ဤလက်မှတ်အား(၁-၁-၂၀၂၀)ရက်နေ့မှ(၃၁-၁၂-၂၀၂၀)
ရက်နေ့အထိတစ်နှစ်သက်တမ်းတိုးချဲ့ပြုသည်။
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION
သက်တမ်းတိုးချဲ့ခြင်း
The VALIDITY of this certificate is extended for nine months from (1.4.2019) to (31.12.2019)
ဤလက်မှတ်အား(၁-၄-၂၀၁၉) ရက်နေ့မှ (၃၁-၁၂-၂၀၁၉)
ရက်နေ့အထိ (၉)လသက်တမ်း တိုးချဲ့သည်။
For Director General
(Soe Naing, Director)
Environmental Conservation Department

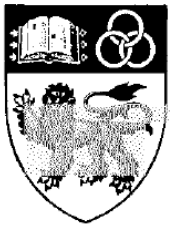
EXTENSION
သက်တမ်းတိုးချဲ့ခြင်း
The VALIDITY of this certificate is extended for six month from (1.1.2021) to (30.6.2021)
ဤလက်မှတ်အား(၁-၁-၂၀၂၁)ရက်နေ့မှ(၃၀-၆-၂၀၂၁)
ရက်နေ့အထိ (၆)လသက်တမ်းတိုးချဲ့သည်။
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION
သက်တမ်းတိုးချဲ့ခြင်း
The VALIDITY of this certificate is extended for six months from (1.7.2021) to (31.12.2021)
ဤလက်မှတ်အား(၁-၇-၂၀၂၁)ရက်နေ့မှ(၃၁-၁၂-၂၀၂၁)
ရက်နေ့အထိ (၆)လသက်တမ်းတိုးချဲ့သည်။
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION (သက်တမ်းတိုးချဲ့ခြင်း)
The VALIDITY of this certificate is extended for one year from (1.1.2022) to (31.12.2022)
ဤလက်မှတ်အား(၁-၁-၂၀၂၂)ရက်နေ့မှ(၃၁-၁၂-၂၀၂၂)
ရက်နေ့အထိတစ်နှစ်သက်တမ်းတိုးချဲ့သည်။
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION (သက်တမ်းတိုးချဲ့ခြင်း)
The VALIDITY of this certificate is extended for six months from (1.1.2023) to (30.6.2023)
ဤလက်မှတ်အား(၁-၁-၂၀၂၃)ရက်နေ့မှ(၃၀-၆-၂၀၂၃)
ရက်နေ့အထိ (၆)လသက်တမ်းတိုးချဲ့သည်။
For Director General
(Sa Aung Thu, Director)
Environmental Conservation Department

NATIONAL UNIVERSITY OF SINGAPORE



This is to certify that

Soe Soe Aung

having fulfilled the requirements prescribed by the University was conferred the degree of

MASTER OF SCIENCE (ENVIRONMENTAL ENGINEERING)

on

31 December 2003

Chairman of Council

President

ရန်ကုန်တက္ကသိုလ်

UNIVERSITY OF YANGON

မဟာသိပ္ပံဘွဲ့

Master of Science

...ဦးသိန်းအောင်...၏ ~~သား~~/သမီး

...မစိုးစိုးအောင်... အား

ဤတက္ကသိုလ်၏ ...... မဟာသိပ္ပံဘွဲ့ကို အပ်နှင်းချီးမြှင့်လိုက်သည်။

ဘွဲ့ရ မှတ်ပုံတင်အမှတ် ......

This is to certify that SEP.1992

Soe Soe Aung ~~son~~ / daughter of

U Thein Aung has been admitted

to the Degree of Master of Science in..............

in this University.

Registered Graduate No. SA - 41839.

ပါမောက္ခချုပ်

ရန်ကုန်တက္ကသိုလ်

Rector

University of Yangon

ရန်ကုန်မြို့

Yangon 24th DEC 1994

Translated Version of Degree Certificate

UNIVERSITY OF YANGON.

This is to certify that

MA SOE SOE AUNG , ~~son~~/daughter of

U THEIN AUNG , has been admitted to the

Degree of Bachelor of Science in this University.

She is eligible to proceed to M Sc (Qualifying)Course.
Passed the Examination by Correspondence Course.

Specialized Subject Zoology

Registered Graduate No. SA-41839

DISTINCTIONS GAINED

1. Vertebrates (Ornithology)
2.
3.
4.
5.
6.
7.

November 1984

Sd/- Min Oo
Registrar,
University of Yangon,
Yangon.

Sd/- Tun Maung
Rector,
University of Yangon,
Yangon.

Yangon, dated the 20th March, 1993.

Registrar,
University of Yangon,
Yangon.
(24360)

The University of Tennessee

KNOXVILLE, TENNESSEE

University Outreach and Continuing Education

ACKNOWLEDGES THAT

Soe Soe Aung

Has Participated in a Program Entitled

Introduction to Environmental Assessment Methods

conducted by The University of Tennessee, University Outreach and Continuing Education,
Department of Professional and Personal Development

October 7, 2005
Date

Program Director
Professional and Personal Development

ENVIRONMENTAL CAREERS ORGANIZATION OF CANADA

hereby certifies that

Catherine Soe Soe Aung

has been awarded the title of

Environmental Professional (EP)

in the following specialization(s)

Sustainability
Health and Safety
Waste Management
Water Quality
Air Quality

Ratified by the Canadian Environmental Certification Approvals Board (CECAB), and in accordance with the EP Code of Conduct and the current Occupational Standards, for a certification term of five (5) years, from:

November 12, 2014 to November 11, 2019

Chair, CECAB

Registrar

19898

UNBC UNIVERSITY OF NORTHERN BRITISH COLUMBIA

CONTINUING STUDIES

This document certifies that

Catherine Soe Soe Aung

has successfully completed the course

Introduction to Environmental Management

through Continuing Studies at the University of Northern British Columbia

on October 13, 2015

Lisa Haslett
Continuing Studies Manager

*** This is NOT an official Certificate ***

CCOHS
Canadian Centre for Occupational Health and Safety

Canada's National Resource for the Advancement of Workplace Health and Safety

certifies that

Green Canada/Asia Consulting Services

is a registered **Bronze** level member

Steve Horvath, President and Chief Executive Officer

Membership No. MB985-1609

Valid until April 2016

Certificate of Completion

Catherine Soe Soe Aung

has successfully completed

Surface Mining Hazards
MSHA Training
Tested On: Feb 1, 2019

HRS/CEU/CME: 2.0/0.2/2.0

certificate number
B244062D-2612-11E9-95C6-0050568D5CA3

Trained & Tested at:
www.ComplianceTrainingOnline.com

compliance training ONLINE
a division of KRIST INCORPORATED

CTO

bsi.

Exam Certificate

This document certifies that:

Catherine Soe Soe Aung

Has successfully passed:

TL - Leading Management Systems Audit Teams v2.0

And is deemed competent for:

Leading Management Systems Audit Teams

BSI is an Exemplar Global certified training provider for the modules listed above.

For and on behalf of BSI:

Reg Blake, Vice President, Regulatory Affairs, BSI Group America Inc.

Course Date: Passed Date: 9/20/2016 Certificate Number: 8501870/84635-159809

Exemplar Global

...making excellence a habit.

Green EHSS Consultancy

Certificate of Attainment

Awarded to

Catherine Soe Soe Aung

who has been assessed as having successfully completed the following course

UNDERSTANDING AN OH&S MANAGEMENT SYSTEM (ISO 45001:2018)

This course fulfils the TPECS requirements of the following Exemplar Global qualification/s

Exemplar Global OH 45001 - Occupational Health & Safety Management Systems
ISO 45001:2018

Date of Attainment: July 20, 2018
Duration/CPD: Approx. 16 hours (equivalent to 16 CPD hours or 2 days full-time study)
Certificate no: EGCA/33251086/18

Jackie Stapleton
DIRECTOR – TRAINING

Student ID: 2307
Certificate Issued: July 20, 2018

bsi.

Certificate

This document is to certify that:

Catherine Soe Soe Aung

Has attended:

ISO 9001:2015 Lead Auditor (TPECS)

For and on behalf of BSI:

Reg Blake, Vice President, Regulatory Affairs, BSI Group America Inc.

Course Date: 2016-09-12 - 2016-09-15

Certificate Number: 8501870-159809

Issue Date: 2016-09-20

CEUs Awarded: 3.2

...making excellence a habit.

19

ရန်ကုန်တက္ကသိုလ် University of Yangon

မဟာဝိဇ္ဇာဘွဲ့
Master of Arts

.....ဦးသိန်းအောင် _..... ၏ သား/သမီး

.....မဆွေဆွေအောင် _..... အား

ဤတက္ကသိုလ်၏ .....ပထဝီဝင်..... မဟာဝိဇ္ဇာဘွဲ့ကို အောင်မြင်စိုးမြွှန်လိုက်သည်။

စာမေးပွဲကို အထူးအောင်မြင်သည်၊

ဘွဲ့ရဖွတ်ပုံတင်အမှတ် .....၁၄၈၈၃၃.....

This is to certify that

.....Swe Swe Aung..... ~~သား~~ / daughter of

.....U Thein Aung..... has been admitted

to the Degree of Master of Arts in .....Geography.....

in this University. ~~He~~/She passed the examination with Credit.

Registered Graduate No. 148833

ရန်ကုန်မြို့၊
19th December 1997
Yangon, ...19.....

ပါမောက္ခချုပ်
ရန်ကုန်တက္ကသိုလ်
Rector
University of Yangon

ရန်ကုန်တက္ကသိုလ် UNIVERSITY OF YANGON

ဝိဇ္ဇာ(ဂုဏ်ထူး)ဘွဲ့

Bachelor of Arts (Honours)

...............ဦးသိန်းအောင်-...........................၏ ~~သား~~/သမီး

.................................မစွေဆွေအောင်-.................. သည်၊

....ပထဝီဝင်.... ဂုဏ်ထူးတန်းစာမေးပွဲကို ..ဒုတိယ... တန်း....ပထမ.....အဆင့်

အရည်အချင်းအလိုက် အမှတ်စဉ် ....ပထမ................ ဖြင့်အောင်မြင်၍

ဤတက္ကသိုလ်၏ ဝိဇ္ဇာ(ဂုဏ်ထူး)ဘွဲ့ကို အပ်နှင်းချီးမြှင့်လိုက်သည်။

ဘွဲ့ရ မှတ်ပုံတင်အမှတ်..........၁၄၈၈၃၃......

This is to certify that

.........Swe Swe Aung-..... ~~son~~ / daughter of

..........U Thein Aung-..... has been admitted

to the Degree of Bachelor of Arts (Honours) in

...Geography. in this University and was placed

...................First.......in order of merit

in the..Second..Class, Division..I..........

NOV 1992

Registered Graduate No..148833.......

ရန်ကုန်မြို့
၁၉၉၅-ခု၊ ဖေဖော်ဝါရီလ(၁၈)ရက်
Yangon, 18th Feb., 1995.

ပါမောက္ခချုပ်
ရန်ကုန်တက္ကသိုလ်
Rector
University of Yangon

Centre for Human Resource Development

University of Yangon

C H R D

UNIVERSITY OF YANGON

Diploma in Geographic Information Systems

This is to certify that .....Swe Swe Aung.... ~~son~~ / daughter of ...U Thein Aung.....has successfully completed Course No. ( ) of the nine-month Diploma in **Geographic Information Systems** Course and is hereby awarded this certificate.

Chairman
Centre for Human Resource Development
University of Yangon

Dated 18 OCT 2003
Yangon

1

JRO

Centre for Human Resource Development

University of Yangon

C.H.R.D

Diploma in English

This is to certify that Ma Swe Swe Aung ~~son~~ / daughter of U Thein Aung has successfully completed Course No. (2/2004) of the **Diploma in English** and is hereby awarded this certificate.

Chairman
Centre for Human Resource Development
University of Yangon

Dated 4 OCT 2005
Yangon

233

MINISTRY OF FOREIGN AFFAIRS
YANGON, MYANMAR

This is to certify that

Daw Swe Swe Aung

completed the

CERTIFICATE COURSE IN BASIC DIPLOMATIC SKILLS
(BDS 15 / 2006)

held from (24-4-2006) *to* (13-7-2006) *and is awarded this*

CERTIFICATE OF COMPLETION

MINISTRY OF FOREIGN AFFAIRS

Dated: 14 **July 2006**

Nyan Win
Minister for Foreign Affairs

SINGAPORE POLYTECHNIC

CERTIFICATE OF ATTENDANCE

This is to certify that

DAW SWE SWE AUNG

has attended a 24-hour Initiative for ASEAN Integration training course on

COMMUNICATION SKILLS

From 18 to 20 September 2006
as part of IAI Work Plan Project:
Capacity Building Programme for the Public Sector in CLMV – Non MFA

Conducted by Singapore Polytechnic
Organised by IAI Unit, the ASEAN Secretariat
Funded by Japan-ASEAN General Exchange Fund

DIRECTOR
DEPARTMENT OF INDUSTRY SERVICES

DIRECTOR
DEPARTMENT OF LANGUAGE AND COMMUNICATION

ရန်ကုန်နည်းပညာတက္ကသိုလ် YANGON TECHNOLOGICAL UNIVERSITY

အသုံးချသိပ္ပံမဟာဘွဲ့ (အင်ဂျင်နီယာ ဓါတုဗေဒ)

Master of Science (Engineering Chemistry)

ဦးရဲမြင့် ၏ ~~သား~~/သမီး မသိင်္ဂီရဲမြင့် အား

အသုံးချသိပ္ပံမဟာဘွဲ့ (အင်ဂျင်နီယာ ဓါတုဗေဒ)

ကို အပ်နှင်းချီးမြှင့်လိုက်သည်။

JAN 2002

The degree of Master of Science (Engineering Chemistry)

is awarded to

Ma Theingi Ye Myint ~~son~~/**daughter of** U Ye Myint

အမျိုးသားမှတ်ပုံတင်အမှတ် (National Registration Number) 7/Tha Ka Na (Naing) 000559

ဘွဲ့ရမှတ်ပုံတင်အမှတ် (Graduate Registration Number) 19410

မော်ကွန်းထိန်း
ရန်ကုန်နည်းပညာတက္ကသိုလ်
Registrar
Yangon Technological University

ပါမောက္ခချုပ်
ရန်ကုန်နည်းပညာတက္ကသိုလ်
Rector
Yangon Technological University

ရန်ကုန်မြို့ ၂၀၀၂ ခု ဇွန် လ ၃၀ ရက်

Yangon, 30 MAY 2002

ရန်ကုန်တက္ကသိုလ်

University of Yangon

သိပ္ပံ(ဂုဏ်ထူး)ဘွဲ့
Bachelor of Science (Honours)

.....ဦးရဲမြင့်.....၏ သား/သမီး

.....သိင်္ဂီရဲမြင့်.....သည်၊

ကုန်ထုတ်ဓာတုဗေဒ ဂုဏ်ထူးတန်းစာမေးပွဲကို ပထမ တန်း - အဆင့်

အရည်အချင်းအလိုက် အမှတ်စဉ် ပထမ ဖြင့်အောင်မြင်၍

ဤတက္ကသိုလ်၏ သိပ္ပံ(ဂုဏ်ထူး) ဘွဲ့ကို အပ်နှင်းချီးမြှင့်လိုက်သည်။

ဘွဲ့ရမှတ်ပုံတင်အမှတ် ၂၁၆၀၇၁

This is to certify that

.....Theingi Ye Myint.....~~son~~ / daughter of

.....U Ye Myint.....has been admitted

to the Degree of Bachelor of Science (Honours) in

Industrial Chemistry...in this University and was placed

.....in order of merit

in the .....First.....Class, Division .....

Registered Graduate No. 216071.....

ရန်ကုန်မြို့၊

၂၀၀၁-ခု ဖေဖော်ဝါရီလ ၁၀ ရက်နေ့

Yangon, 10th February 2001 19.....

ပါမောက္ခချုပ်
ရန်ကုန်တက္ကသိုလ်

Rector
University of Yangon

NATIONAL UNIVERSITY OF SINGAPORE

This is to certify that

Theingi Ye Myint

having fulfilled the requirements prescribed by the University was conferred the degree of

MASTER OF SCIENCE (ENVIRONMENTAL ENGINEERING)

on

30 June 2003

President

Provost

၂

ရန်ကုန်နည်းပညာတက္ကသိုလ် YANGON TECHNOLOGICAL UNIVERSITY

အင်ဂျင်နီယာ ပါရဂူဘွဲ့ (ပတ်ဝန်းကျင် ဝိဇ္ဇာသိပ္ပံမှုဆိုင်ရာ အင်ဂျင်နီယာ)

Doctor of Philosophy (Environmental Engineering)

ဦးရဲမြင့် ၏ သား/သမီး မသိင်္ဂီရဲမြင့် အား

အင်ဂျင်နီယာ ပါရဂူဘွဲ့ (ပတ်ဝန်းကျင် ဝိဇ္ဇာသိပ္ပံမှုဆိုင်ရာ အင်ဂျင်နီယာ)

ကို အပ်နှင်းချီးမြှင့်လိုက်သည်။

NOV 2009

The degree of Doctor of Philosophy (Environmental Engineering)

is awarded to

Ma Theingi Ye Myint son/ **daughter of** U Ye Myint

အမျိုးသားမှတ်ပုံတင်အမှတ် (National Registration Number) 7/Tha Ka Na (Naing) ၀၀၀၆၆၁

ဘွဲ့ရမှတ်ပုံတင်အမှတ် (Graduate Registration Number) 27046

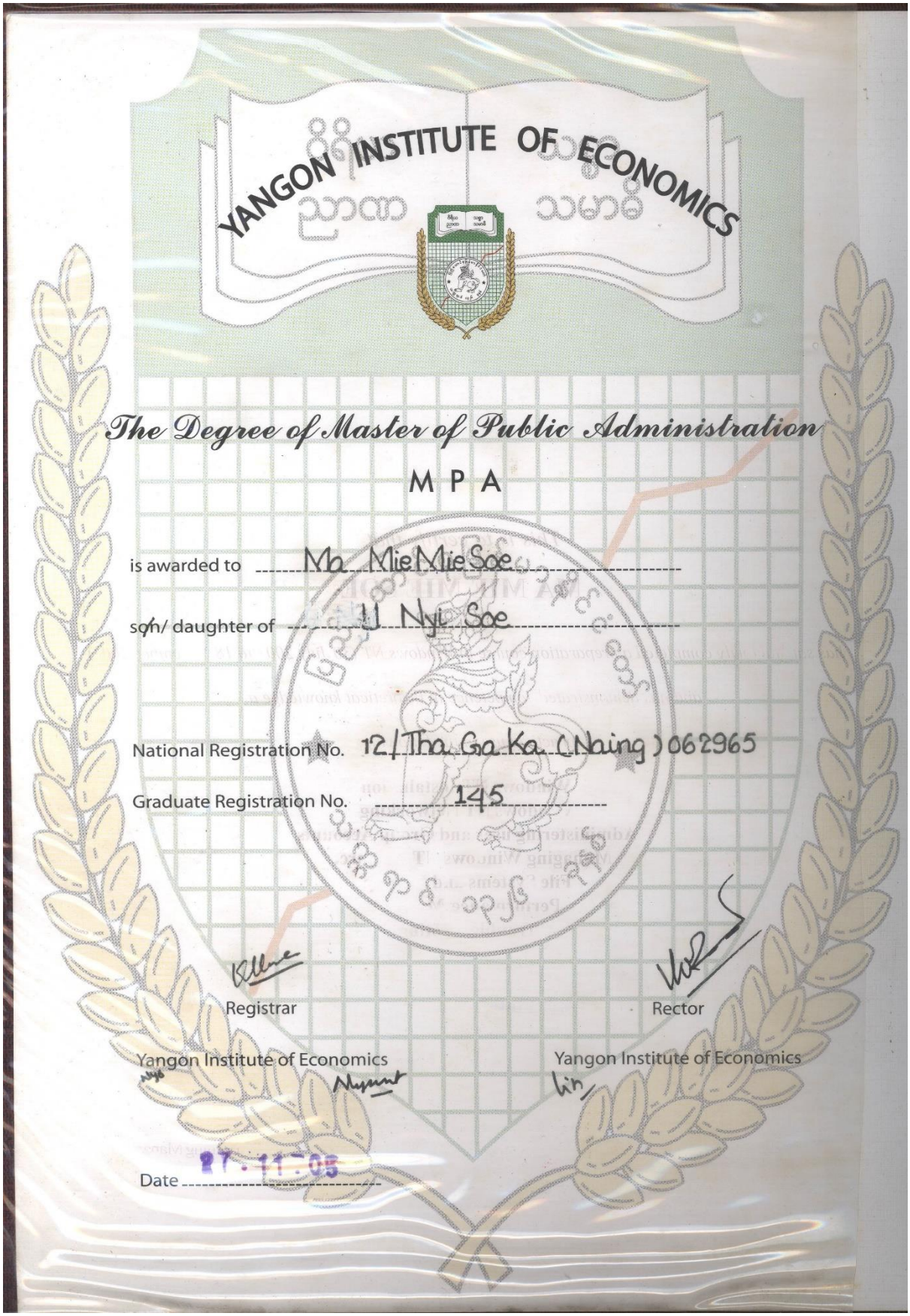
မော်ကွန်းထိန်း
ရန်ကုန်နည်းပညာတက္ကသိုလ်
Registrar
Yangon Technological University

ပါမောက္ခချုပ်
ရန်ကုန်နည်းပညာတက္ကသိုလ်
Rector
Yangon Technological University

ရန်ကုန်မြို့, ၂၀၁၀ ခု မတ် လ ၂၀ ရက်

20 MAR 2010

Yangon, ,



YANGON INSTITUTE OF ECONOMICS

The Degree of Master of Public Administration

M P A

is awarded to Ma Mie Mie Soe

son/ daughter of U Nyi Soe

National Registration No. 12/Tha Ga Ka (Naing) 062965

Graduate Registration No. 145

Registrar

Yangon Institute of Economics

Rector

Yangon Institute of Economics

Date 27.11.03

Green EHSS Consultancy

ရန်ကုန်စီးပွားရေးတက္ကသိုလ်

ပြည်သူ့ရေးရာစီမံခန့်ခွဲမှုပညာမဟာဘွဲ့

ဦးညီဝိုး ၏ သား / သမီး

မောင် / မ ခိုင်ခိုင်ဝိုး အား

ပြည်သူ့ရေးရာစီမံခန့်ခွဲမှုပညာမဟာဘွဲ့ ကို အပ်နှင်းချီးမြှင့်လိုက်သည်။

နိုင်ငံသားစိစစ်ရေးကတ်ပြားအမှတ် ၁၂/ဥကတ(နိုင်)၀၆၂၉၆၅

ဘွဲ့ရသူမှတ်ပုံတင်အမှတ် ၁၄၅

မော်ကွန်းထိန်း
ရန်ကုန်စီးပွားရေးတက္ကသိုလ်

ပါမောက္ခချုပ်
ရန်ကုန်စီးပွားရေးတက္ကသိုလ်

ရက်စွဲ ၂၀၀၅ ခု နိုဝင်ဘာ လ ရက်။

၁၁၇

ရန်ကုန်တက္ကသိုလ် University of Yangon

ဘွဲ့လွန်ဒိပလိုမာ
Post-Graduate Diploma

.....ဦးညီစိုး.....၏ သား/သမီး

.....မမိမိစိုး.....သည်၊

....အသုံးချစီတင်ပညာ.....ဒီပလိုမာသင်တန်းစာမေးပွဲကိုအရည်အချင်းအလိုက် အမှတ်စဉ်

.....ဖြင့်အောင်မြင်၍ ဤတက္ကသိုလ်၏ အသုံးချစီတင်ပညာ

ဘွဲ့လွန်ဒီပလိုမာဘွဲ့ကို အပ်နှင်းချီးမြှင့်လိုက်သည်။

ဘွဲ့ရမှတ်ပုံတင်အမှတ် .....၁၄၉၆၅၆.....

This is to certify that MAR 2005

.....son / daughter of

.....has been conferred

the Post-Graduate Diploma in .....

by this University.

He / She was placed .....in order of merit.

Registered Graduate No. .....

ရန်ကုန်မြို့၊ ၂၀၀၅-ခု၊ အောက်တိုဘာလ (၂၉) ရက်နေ့

Yangon, 29th October 2005. 20.....

ပါမောက္ခချုပ်
ရန်ကုန်တက္ကသိုလ်
Rector
University of Yangon

ရန်ကုန်တက္ကသိုလ် UNIVERSITY OF YANGON

သိပ္ပံဘွဲ့

Bachelor of Science

..................ဦးညိရိုး –..................................၏ ~~သား~~/သမီး

..............................မခိခိရိုး –.............................. အား

ဤတက္ကသိုလ်၏ သိပ္ပံဘွဲ့ကို အပ်နှင်းချီးမြှင့်လိုက်သည်။

အထူးပြု ဘာသာ.........ဓာတုဗေဒ..........

ဘွဲ့ရ မှတ်ပုံတင်အမှတ်..................၁၄၉၆၅၆...

This is to certify that

.... son / daughter of

.... has been admitted

to the Degree of Bachelor of Science in this University. NOV 1992

Subject of Specialization.............................

Registered Graduate No...................................

ပါမောက္ခချုပ်
ရန်ကုန်တက္ကသိုလ်
Rector
University of Yangon

ရန်ကုန်မြို့
၁၉၉၃–ခု၊ ဖေဖေါ်ဝါရီလ (၁၈) ရက်
၁၉.....ခု.............လ၊.....ရက်
Yangon,..........19....

No. DP-Nov '94 - 283

CERTIFICATE OF TRAINING

This is to certify that

Miss Mie Mie Soe

has successfully completed
the computer course
in the undermentioned subject(s)
from 7-Nov'94 *to* 12-Jan'95

1. DOS 6.2
2. WordPerfect ver 5.1
3. Lotus 1-2-3 rel 2.4
4. dBASE IV ver 1.5
5. BASIC

KMD Computer Centre

THAUNG TIN
B.E. Elec., M.Sc. Comp. Sc.
Principal

Date. 12-Jan-1995

Green EHSS Consultancy

၁၀၀

ရန်ကုန်တက္ကသိုလ်

မဟာသိပ္ပံဘွဲ့

ဦး စီခူးမား ဇော်သမီး၊ မအောက်စီသာခူးမား ~ အား
မဟာသိပ္ပံဘွဲ့ကို အပ်နှင်းချီးမြှင့်လိုက်သည်။

အဓိကဘာသာ သတ္တဗေဒ

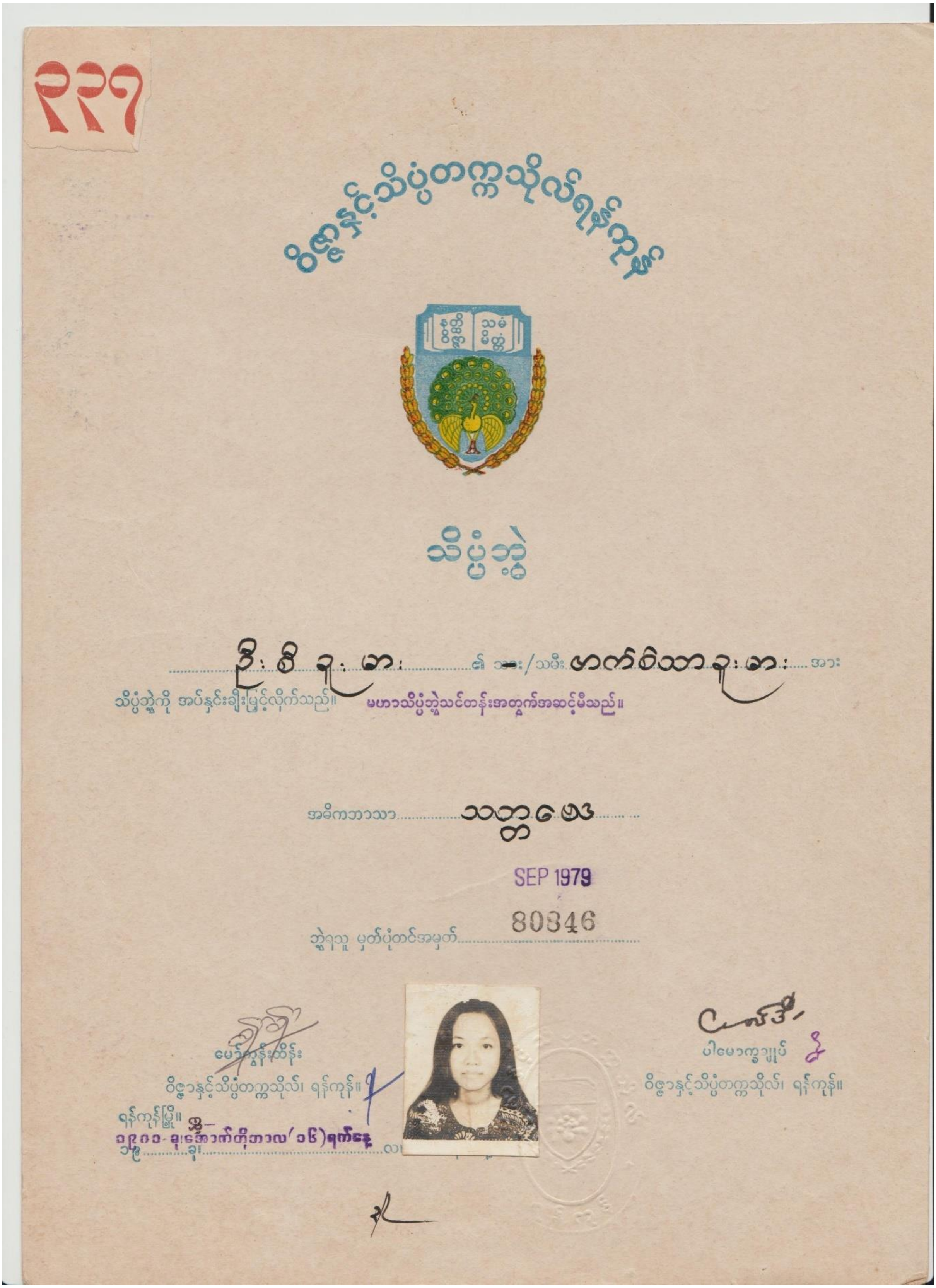
DEC 1983

ဘွဲ့ရသူမှတ်ပုံတင်အမှတ် ၈၀၈၄၆

မော်ကွန်းထိန်း
ရန်ကုန်တက္ကသိုလ်

ပါမောက္ခချုပ်
ရန်ကုန်တက္ကသိုလ်

ရန်ကုန်မြို့။
၁၉၈၄-ခုနှစ်၊ ဧပြီလ (၄)ရက်နေ့



ဝိဇ္ဇာနှင့်သိပ္ပံတက္ကသိုလ်ရန်ကုန်

သိပ္ပံဘွဲ့

၏ သား/သမီး အား

သိပ္ပံဘွဲ့ကို အပ်နှင်းချီးမြှင့်လိုက်သည်။ မဟာသိပ္ပံဘွဲ့သင်တန်းအတွက်အဆင့်မီသည်။

အဓိကဘာသာ

SEP 1979

ဘွဲ့ရသူ မှတ်ပုံတင်အမှတ် 80346

မော်ကွန်းထိန်း
ဝိဇ္ဇာနှင့်သိပ္ပံတက္ကသိုလ်၊ ရန်ကုန်။

ပါမောက္ခချုပ်
ဝိဇ္ဇာနှင့်သိပ္ပံတက္ကသိုလ်၊ ရန်ကုန်။

ရန်ကုန်မြို့။

ENVIRONMENTAL/ SOCIAL IMPACT ASSESSMENT CONSULTANT

GREEN ENVIRONMENTAL, HEALTH, SAFETY & SOCIAL CONSULTANCY CO., LTD.
Unit-1112 , Building C2A, Times Square Condo Complex, Merchant Road, Botahtaung Township,Yangon, Myanmar, Email: catherine@greenehss.com www.greenehss.com Ph: +951 -546782, + 959-425353553

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