

# **ENVIRONMENTAL MANAGEMENT PLAN (EMP) REPORT**

**For**

**MYANMAR ASIA OPTICAL INTERNATIONAL COMPANY LIMITED**

**(FACTORY-1)**

## **Part-I**

**Plot No. (A2, A3), Mingaladon Industrial Park,  
Mingaladon Township, Yangon Region, Myanmar**



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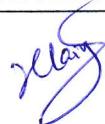

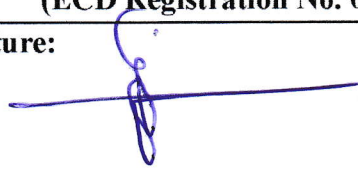
**For**

**MYANMAR ASIA OPTICAL INTERNATIONAL COMPANY LIMITED  
(FACTORY-1)**

**Part-I**

## Report Review Form

<b>Report Title: Environmental Management Plan (EMP) Report for Manufacturing of all kinds of Lens, Lens Units, Optical Apparatuses, Electronic Apparatuses, Self-focus Lens Array (SLA), Plastic Parts for Electronic Apparatuses and other Apparatuses on CMP Basis (Factory-1)</b>	
<b>Report Version: 00 Version</b>	
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<b>Date: 12/5/2022</b>	<b>Signature:</b> 
<b>Summary: EMP Report</b> This document presents the environmental management plan (EMP) report as required for Manufacturing of all kinds of Lens, Lens Units, Optical Apparatuses, Electronic Apparatuses, Self-focus Lens Array (SLA), Plastic Parts for Electronic Apparatuses and other Apparatuses on CMP Basis (Factory-1).	

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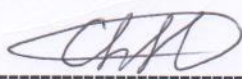
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## DOCUMENT CERTIFICATION AND DECLARATION

Green Myanmar Environmental Services Company Limited has prepared this Environmental Management Plan (EMP) report for Manufacturing of all kinds of Lens, Lens Units, Optical Apparatuses, Electronic Apparatuses, Self-focus Lens Array (SLA), Plastic Parts for Electronic Apparatuses and other Apparatuses on CMP Basis (Factory-1) project.

I, the undersigned, (Director of Myanmar Asia Optical International Company Limited) as proponent of this project, certify that the particulars in this report are correct, true to the best of my knowledge and do hereby solemnly affirm to:

- Ensure the legal and other obligations are incorporated in designs, procedures and project controls,
- Communicate legal and other requirements to personnel and contractors accountable for compliance,
- Ensure all relevant legal and other requirements and associated documentation (e.g., licenses, permits, approval applications) are readily available on site to company personnel and consultants,
- Comply with all Myanmar laws, rules and regulations, including Clauses 14 and 15 of the Environmental Conservation Law (2012),
- Conduct a compliance audit at least annually and ensure there is a process in place to monitor on-going compliance with all legal and other requirements,
- Follow according to the Environmental Management Plan (EMP) and Environmental Monitoring Plan (EMoP),
- Submit the monitoring report prescribed in the schedule of the Environmental Management Plan to the Ministry every (6) month,
- Follow company's OHS policies,
- Implement CSR,
- Commit to minimize the impact of its activities on the environment during operation phase and decommissioning phase,
- Commit that the project will always comply fully with the commitments, mitigation measures, and plans in this EMP report.

Signature :   
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Date: May 12 - 2022



## COMMITMENT AND ACKNOWLEDGEMENT

An Environmental Management Plan (EMP) describes the environmental condition of a project, including potential impact, formulation of mitigation measures, and preparation of institutional requirements and environmental monitoring. This EMP report was prepared using information from the following sources:

- Review of selected literature, reports, and advisors,
- Meetings with several interested parties,
- The experience of the Environmental Team, and
- Other information solicited from baseline data and stakeholders.

We strongly commit

- the accuracy and completeness of the EMP; and
- that the EMP has been prepared in strict compliance with the applicable laws including this Procedure.

The EMP team is grateful to the project proponent – **Myanmar Asia Optical International Company Limited** - for commissioning us to conduct this Environmental Management Plan (EMP) Report in respect of the proposed project.

We further acknowledge the support, either direct or indirect, from the various parties who assisted the EMP team towards the successful completion of this report.

Signature : \_\_\_\_\_  
Name : U Kyaw Soe Win  
Designation : Managing Director



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Date: 12/5/2022

## ABBREVIATION

AMP	Ambient Air Quality Measuring Quality
Co., Ltd.	Company Limited
CSR	Corporate Social Responsibility
CITIES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMP	Contract, Manufacturing and Processing
CNC	Computer Numerical Control
EIA	Environmental Impact Assessment
ECC	Environment Compliance Certificate
ECD	Environmental Conservation Department
EMoP	Environmental Monitoring Plan
EMP	Environmental Management Plan
EMT	Environmental Management Team
ERP	Emergency Response Plan
FQC	Final Quality Check
GAD	General Administration Department
GHS	Globally Harmonized System
GMES	Green Myanmar Environmental Services
IEE	Initial Environmental Examination
IQC	Income Quality Check
HSE	Health, Safety and Environmental
MAOI	Myanmar Asia Optical International Company Limited
MIC	Myanmar Investment Commission
MIP	Myanmar Industrial Park
MOECF	Ministry of Environmental Conservation and Forestry
MONREC	Ministry of Natural Resources and Environmental Conservation
MQC	Middle Quality Check
NEQ(E)G	National Environmental Quality (Emission) Guidelines
OHS	Occupational Health and Safety
PPE	Personal Protective Equipment
QC	Quality Control
RA	Risk Assessment
RO	Reverse Osmosis
SOC	Safety Orientation Course
SDS	Safety Data Sheet
SLA	Self-focus Lens Array



SWF	Safe Work Procedures
TDS	Total Dissolved Solids
UNFCCC	United Nations Framework Convention on Climate Change
USA	United States of America
USD	United States Dollar
WCC	Workplace Coordinating Committee
WHO	World Health Organization
WSH	Workplace Safety and Health
WWTP	Wastewater Treatment Plant

### **Units**

Al	Aluminum
As	Arsenic
dB (A)	weighted system (the decibel values of sounds at low frequencies)
CH <sub>4</sub>	Methane
CO	Carbon Monoxide
CO <sub>2</sub>	Carbon Dioxide
m <sup>3</sup> /hr	Cubic Meter per hour
dB	Decibel
°C	Degree Celsius
g	gram(s)
gal	Gallons
H <sub>2</sub> S	Hydrogen Sulfide
hr	Hour
kg	Kilogram
kVA	Kilo Volt Ampere
kWh	Kilowatt-hour
l	Liter
µg/m <sup>3</sup>	Micrograms per cubic meter
m	Meter
m <sup>3</sup>	cubic meter
mg/Nm <sup>3</sup>	milligrams per cubic meter
Mn	Manganese
MW	Megawatt
NH <sub>3</sub>	Ammonia
NO	Nitrogen Oxide
NO <sub>2</sub>	Nitrogen Dioxide
O <sub>2</sub>	Oxygen
O <sub>3</sub>	Ozone

Pcs	pieces
ppb	Part Per Billion
ppm	Part Per Million
PM	Particulate Matter
PM <sub>10</sub>	Particulate Matter 10 Micrometer or Less in Diameter
PM <sub>2.5</sub>	Particulate Matter 2.5 Micrometer or Less in Diameter
pH	Power of Hydrogen, Hydrogen Ion Concentration
Qty	Quantity
Sr. No.	Serial Number
W	Watt

## ၁။ အကျဉ်းချုပ်အစီရင်ခံစာ

### ၁-၁။ နောက်ခံအကြောင်းအရာ

Myanmar Asia Optical International Company Limited (MAOI) သည် British Virgin Island ရှိ Asia Optical International Limited မှ (၉၉) ရာခိုင်နှုန်းနှင့် ဂျပန်နိုင်ငံမှ Mr. Yuzo Asano ၏ (၁) ရာခိုင်နှုန်း တို့ဖြင့် ရာနှုန်းပြည့်နိုင်ငံခြားရင်းနှီးမှုတစ်ခုဖြစ်ပြီး ကုမ္ပဏီမှတ်ပုံတင်နံပါတ် ၁၄၇၈၄၂၂၈ (၂၆.၃.၂၀၀၃) ဖြင့် မြန်မာနိုင်ငံတွင် မှတ်ပုံတင်ထားပါသည်။ MAOI တွင် စက်ရုံနှစ်ရုံဖြင့် လည်ပတ်နေပြီး စက်ရုံ-၁ တွင် မှန်ဘီလူး အမျိုးမျိုးထုတ်လုပ်နေပြီး စက်ရုံ-၂ တွင် ကင်မရာအတွက်ပလတ်စတစ်အစိတ်အပိုင်းများနှင့် ဆုံချက်စုအလင်း တန်းမှန်ဘီလူးချောင်း (Self-focus Lens Array - SLA) တို့ကို ထုတ်လုပ်လျက်ရှိပါသည်။

ဤပတ်ဝန်းကျင်ဆိုင်ရာစီမံခန့်ခွဲမှုအစီအစဉ် (EMP) အစီရင်ခံစာသည် စက်ရုံ-၁ အတွက် ပြင်ဆင် ထားခြင်းဖြစ်ပြီး ၎င်းသည် အကွက်အမှတ် (အေ ၂၊ အေ ၃)၊ မင်္ဂလာဒုံစက်မှုဇုန်၊ မင်္ဂလာဒုံမြို့နယ်၊ ရန်ကုန် တိုင်းဒေသကြီး၊ မြန်မာနိုင်ငံတွင် တည်ရှိပါသည်။

၂၀၂၀ ခုနှစ် ဖေဖော်ဝါရီလတွင် စိမ်းလန်းမြန်မာပတ်ဝန်းကျင်ဆိုင်ရာဝန်ဆောင်မှုကုမ္ပဏီလီမိတက် (GMES - Green Myanmar Environmental Services Company Limited) သို့ Myanmar Asia Optical International Company Limited (MAOI) မှ “လက်ခစားစနစ်ဖြင့် မှန်ဘီလူးများ၊ မှန်ဘီလူးယူနစ်များ၊ အလင်းနှင့်ဆိုင်သောစက်ကိရိယာများ၊ အီလက်ထရောနစ်စက်ကိရိယာများ၊ ဆုံချက်စုအလင်းတန်းမှန်ဘီလူး ချောင်း (SLA)၊ အီလက်ထရောနစ်စက်ကိရိယာများနှင့်အခြားကိရိယာများတွင်အသုံးပြုသည့် ပလတ်စတစ်အစိတ် အပိုင်းများ ထုတ်လုပ်ခြင်းလုပ်ငန်း” အတွက် သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာန၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနပြုရန် ပတ်ဝန်းကျင်ဆိုင်ရာစီမံခန့်ခွဲမှုအစီအစဉ် (EMP) အစီရင်ခံစာ ဆောင်ရွက်ရာတွင် အကြံဉာဏ်ဝန်ဆောင်မှုပေးရန် ကမ်းလှမ်းခဲ့ပါ သည်။

### ၁-၂။ လုပ်ငန်းလုပ်ကိုင်သူ၏အချက်အလက်များ

၁။	စီမံကိန်းအမည်	လက်ခစားစနစ်ဖြင့် မှန်ဘီလူးများ၊ မှန်ဘီလူးယူနစ်များ၊ အလင်းနှင့်ဆိုင်သော စက်ကိရိယာများ၊ အီလက်ထရောနစ်စက်ကိရိယာများ၊ ဆုံချက်စုအလင်းတန်း မှန်ဘီလူးချောင်း (SLA)၊ အီလက်ထရောနစ်စက်ကိရိယာများနှင့် အခြားကိရိယာ များတွင်အသုံးပြုသည့်ပလတ်စတစ်အစိတ်အပိုင်းများထုတ်လုပ်ခြင်းလုပ်ငန်း
၂။	စီမံကိန်းလုပ်ကိုင်သူ	Myanmar Asia Optical International (MAOI) Company Limited
၃။	စီမံကိန်းလိပ်စာ	အကွက်အမှတ် (အေ ၂၊ အေ ၃)၊ မင်္ဂလာဒုံစက်မှုဇုန်၊ မင်္ဂလာဒုံမြို့နယ်၊ ရန်ကုန် တိုင်းဒေသကြီး၊ မြန်မာနိုင်ငံ
၄။	ကုမ္ပဏီမှတ်ပုံတင်နံပါတ်	၁၄၇၈၄၂၂၈
၅။	စတင်တည်ထောင်သော အချိန်	၂၆.၃.၂၀၀၃
၆။	စမ်းသပ်လည်ပတ်သည့်နေ့	၂၀၀၄ ခုနှစ် မတ်လ
၇။	စီးပွားဖြစ်လည်ပတ်သည့်နေ့	၁.၇.၂၀၀၄
၈။	ရင်းနှီးမြှုပ်နှံမှုခွင့်ပြုသည့်ကာလ	(၄၅) နှစ်
၉။	လုပ်ငန်းအမျိုးအစား	ထုတ်လုပ်ခြင်းလုပ်ငန်း

၁၀။	ရင်းနှီးမြှုပ်နှံမှုအမျိုးအစား နိုင်ငံခြားမှယူလာသည့် မတည် ငွေရင်း စုစုပေါင်းရင်းနှီးမြှုပ်နှံမှုပမာဏ အမေရိကန်ဒေါ်လာ ရှယ်ယာအမျိုးအစား	၁၀၀% နိုင်ငံခြားရင်းနှီးမြှုပ်နှံမှု အမေရိကန်ဒေါ်လာ ၁၂.၈၈၀ သန်း  အမေရိကန်ဒေါ်လာ ၂၃.၅၅၈ သန်း ၄၅,၁၂၃ ရှယ်ယာ Ordinary (ရှယ်ယာတစ်စုလျှင် အမေရိကန်ဒေါ်လာ ၆,၀၀၀)
၁၁။	ပထဝီဆိုင်ရာအချက်အလက်	မြောက်လတ္တီတွဒ် ၁၆° ၅၆' ၃၃.၆၆" အရှေ့လောင်ဂျီတွဒ် ၉၆° ၀၉' ၀၉.၄၂"
၁၂။	မြေအမျိုးအစား	စက်မှုမြေ
၁၃။	မြေရယူပုံ	ငှားရမ်းမြေ
၁၄။	မြေပိုင်ဆိုင်သူ	Mingaladon Industrial Park Co., Ltd.
၁၅။	မြေငှားရမ်းသူ	Myanmar Asia optical International Co., Ltd. (MAOI)
၁၆။	စက်ရုံဧရိယာ	၅၁,၁၃၄.၅ စတုရန်းမီတာ
၁၇။	ပတ်ဝန်းကျင်အခြေအနေ	အရှေ့ဘက် Famoso Clothing Co., Ltd., Matsuya R & D (Myanmar) Co., Ltd., Kangaroo နှင့် SMK Mingaladon Garment Co., Ltd.  အနောက်ဘက် အမှတ် (၃) လမ်းမကြီး လက်ဝဲဘက် မင်္ဂလာဒုံစက်မှုဥယျာဉ်၏ပင်မရေဆိုးသန့်စင်စက် လက်ယာဘက် မင်္ဂလာဒုံစက်မှုဥယျာဉ်ဇုန်ရုံး
၁၈။	ရေအရင်းအမြစ်	ရေတွင်း (၆ လက်မ x ၆၀၀ ပေ) ၄ တွင်း MIP ရေပိုက်ခေါင်း ၃ ခု
၁၉။	လျှပ်စစ်ဓာတ်အားရယူမှု	နိုင်ငံတော်ဓာတ်အားစနစ်
၂၀။	လျှပ်စစ်ဓာတ်အားဖြန့်ဖြူးမှု	ထရန်စဖော်မာ (၃) ခု  မီးစက် ၁၆၀ kVA ဒီဇယ်အင်ဂျင် (တစ်လုံး) ၅၅၀ kVA ဒီဇယ်အင်ဂျင် (တစ်လုံး) ၁,၀၀၀ kVA ဒီဇယ်အင်ဂျင် (တစ်လုံး) ၁,၂၅၀ kVA ဒီဇယ်အင်ဂျင် (သုံးလုံး) ၁,၄၀၀ kVA ဒီဇယ်အင်ဂျင် (ငါးလုံး)
၂၁။	ကုန်ကြမ်းပစ္စည်းများ	❖ မှန်ဘီလူးအတွက် ကုန်ကြမ်းပစ္စည်းများ ➢ Optical Glass (အဓိကကုန်ကြမ်း) ➢ Dusper K3 Cleaning Paper ➢ Dusper K4 Cleaning Paper ➢ Finger Cots ➢ Computer Paper ➢ Vacuum Bag ➢ Filter Paper/Glassing paper

		<ul style="list-style-type: none"> <li>➢ Fill</li> <li>➢ Paper Tape/Masking Tape</li> <li>➢ Tape</li> <li>➢ Plastic Film</li> <li>➢ Paper Box</li> <li>➢ Paper Pad</li> <li>➢ Silica Gel/ Desiccant</li> </ul> <p>ဓာတုပစ္စည်းများ (၆၈ မျိုး)</p>												
၂၂။	ကုန်ကြမ်းတင်သွင်းသည့်နိုင်ငံများ	တရုတ်၊ ထိုင်ဝမ်၊ ဂျပန်နှင့် ထိုင်း												
၂၃။	ထုတ်ကုန်ပစ္စည်းများ	မှန်ဘီလူးအမျိုးမျိုး												
၂၄။	ကုန်ချောတင်ပို့သည့်နိုင်ငံများ	တရုတ်၊ ထိုင်ဝမ်၊ ဂျပန်နှင့် ထိုင်း												
၂၅။	ကုန်ချောထွက်ရှိမှုပမာဏ	တစ်လလျှင် ၄,၅၀၀,၀၀၀ ခု												
၂၆။	လုပ်သားအင်အား	နိုင်ငံခြားသားဝန်ထမ်း ၆၅ ဦး ပြည်တွင်းဝန်ထမ်း ၃,၄၅၄ ဦး စုစုပေါင်း ၃,၅၁၉ ဦး												
၂၇။	အလုပ်ချိန် အလုပ်လုပ်ရက် အလုပ်လုပ်ချိန်	<p>တစ်ရက်လျှင် အလုပ်လုပ်ချိန် ၈ နာရီ (ရုံးလုပ်ငန်းစီမံခန့်ခွဲမှုနှင့် စက်ရုံ)</p> <p>သတ္တတစ်ပတ်လျှင် ၆ ရက်</p> <p><b>ရုံးလုပ်ငန်းစီမံခန့်ခွဲမှု</b></p> <p>အဆိုင်း (၁) ဆိုင်း</p> <p>၇:၃၀ a.m. ~ ၄:၃၀ p.m. (တနင်္လာမှစနေ)</p> <p>(ထမင်းစားနားချိန် - ၁၁:၃၀ a.m. ~ ၁၂:၃၀ p.m.)</p> <p><b>စက်ရုံလည်ပတ်ချိန်</b></p> <p>အဆိုင်း (၂) ဆိုင်း (နေ့ဆိုင်းနှင့် ညဆိုင်း)</p> <table border="0"> <thead> <tr> <th></th><th>နေ့ဆိုင်း</th><th>ညဆိုင်း</th></tr> </thead> <tbody> <tr> <td>တနင်္လာမှစနေ</td><td>၇:၃၀ a.m.~၄:၀၀ p.m.</td><td>၇:၃၀ p.m.~၄:၀၀ a.m.</td></tr> <tr> <td>ထမင်းစားနားချိန်</td><td>၁၁:၃၀ a.m.~၁၂:၀၀ p.m.</td><td>၁၁:၃၀ p.m.~၁၂:၀၀ a.m.</td></tr> <tr> <td>အချိန်ပို</td><td>၄:၀၀ p.m.~၇:၃၀ p.m.</td><td>၄:၀၀ a.m.~၇:၃၀ a.m.</td></tr> </tbody> </table>		နေ့ဆိုင်း	ညဆိုင်း	တနင်္လာမှစနေ	၇:၃၀ a.m.~၄:၀၀ p.m.	၇:၃၀ p.m.~၄:၀၀ a.m.	ထမင်းစားနားချိန်	၁၁:၃၀ a.m.~၁၂:၀၀ p.m.	၁၁:၃၀ p.m.~၁၂:၀၀ a.m.	အချိန်ပို	၄:၀၀ p.m.~၇:၃၀ p.m.	၄:၀၀ a.m.~၇:၃၀ a.m.
	နေ့ဆိုင်း	ညဆိုင်း												
တနင်္လာမှစနေ	၇:၃၀ a.m.~၄:၀၀ p.m.	၇:၃၀ p.m.~၄:၀၀ a.m.												
ထမင်းစားနားချိန်	၁၁:၃၀ a.m.~၁၂:၀၀ p.m.	၁၁:၃၀ p.m.~၁၂:၀၀ a.m.												
အချိန်ပို	၄:၀၀ p.m.~၇:၃၀ p.m.	၄:၀၀ a.m.~၇:၃၀ a.m.												
၂၈။	ဒါရိုက်တာစာရင်း	<p>အမည် - Mr. Yuzo Asano</p> <p>နိုင်ငံသား - ဂျပန်</p> <p>နိုင်ငံကူးလက်မှတ်အမှတ် - TZ 1187753</p> <p>ရာထူး - မန်နေဂျင်းဒါရိုက်တာ</p> <p>အမည် - Mr. Chen, Han-Jung</p> <p>နိုင်ငံသား - တရုတ်</p> <p>နိုင်ငံကူးလက်မှတ်အမှတ် - 314993106</p> <p>ရာထူး - ဒါရိုက်တာ</p>												
၂၉။	ဆက်သွယ်ရန်အသေးစိတ်	စီမံကိန်းလိပ်စာ အကွက်အမှတ် (အေ ၂၊ အေ ၃)၊ မင်္ဂလာဒုံစက်မှုဇုန်၊												



		မင်္ဂလာဒုံမြို့နယ်၊ ရန်ကုန်တိုင်းဒေသကြီး၊ မြန်မာနိုင်ငံ +၉၅၉-၅၁၇ ၃၅၄၁ တယ်လီဖုန်းနံပါတ် အီးမေးလ် <a href="mailto:mao80@asiaoptical.com.mm">mao80@asiaoptical.com.mm</a> , <a href="mailto:maoiimexp2@gmail.com">maoiimexp2@gmail.com</a>
၃၀။	EMP အစီရင်ခံစာအပြင်ဆင်ရေး အတွက် ဆက်သွယ်ရန်ပုဂ္ဂိုလ်	အမည် ရာထူး တယ်လီဖုန်းနံပါတ် အီးမေးလ် ဒေါ်မေချမ်းခိုင် အုပ်စုမှူး (Admin Department, Import/Export Section) ၀၉၄၂၀၀၉၂၂၈၁ <a href="mailto:maoiimexp4@gmail.com">maoiimexp4@gmail.com</a>

### ပတ်ဝန်းကျင်ဆိုင်ရာစီမံခန့်ခွဲမှုအစီအစဉ် (EMP) အစီရင်ခံစာ လေ့လာပြုစုသည့်အဖွဲ့အစည်း

ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန (ECD) ၏ကြားကာလကုမ္ပဏီ အကြံပေးမှတ်ပုံတင်လက်မှတ် အမှတ်စဉ် ၀၀၀၆ ရရှိထားသော စိမ်းလန်းမြန်မာပတ်ဝန်းကျင်ဆိုင်ရာဝန်ဆောင်မှုကုမ္ပဏီလီမိတက်သည် ပတ်ဝန်းကျင်ဆိုင်ရာစီမံခန့်ခွဲမှုအစီအစဉ် (EMP) အစီရင်ခံစာ လေ့လာပြုစုသည့်အဖွဲ့အစည်းဖြစ်ပြီး အသေးစိတ်အချက်အလက်များကို အောက်ပါဇယားတွင် ဖော်ပြထားပါသည်။

ဇယား ၁-၁ GMES ၏ EMP လေ့လာပြုစုရေးအဖွဲ့

စဉ်	လုပ်ငန်းတာဝန်	သတ်မှတ်တာဝန်	အမည်၊ ရာထူး၊ အဖွဲ့အစည်းနှင့် ကြားကာလအကြံပေးမှတ်ပုံတင်အမှတ်
၁။	အဖွဲ့ခေါင်းဆောင်	<ul style="list-style-type: none"> <li>EMP ရေးသားမှုအတွက် အလုံးစုံ စီမံခန့်ခွဲခြင်း</li> <li>လုပ်ငန်းအစီအစဉ်ချမှတ်ခြင်း</li> <li>နည်းပညာပိုင်း ဆွေးနွေးညှိနှိုင်းခြင်း</li> <li>အချက်အလက်စုဆောင်းခြင်းနှင့်ထုတ်လုပ်မှုလုပ်ငန်းနည်းစဉ်လေ့လာခြင်း</li> <li>အများပြည်သူနှင့်တိုင်ပင်ဆွေးနွေးရန် အစီအစဉ်ဆွဲခြင်း၊ ဦးစီးဦးဆောင်ပြုလုပ်ခြင်း</li> <li>ရရှိလာသောဒေတာအချက်အလက်များကို ခွဲခြမ်းစိတ်ဖြာခြင်း</li> <li>စိတ်ပါဝင်စားသူများနှင့်ညှိနှိုင်းဆောင်ရွက်ခြင်း</li> </ul>	<p>Engr. ဦးကျော်စိုးဝင်း အုပ်ချုပ်မှုဒါရိုက်တာ စိမ်းလန်းမြန်မာပတ်ဝန်းကျင်ဆိုင်ရာဝန်ဆောင်မှုလုပ်ငန်းကုမ္ပဏီလီမိတက် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအတွေးအကြံပြုသူ</p> <p>ကြားကာလအကြံပေးမှတ်ပုံတင်နံပါတ် - ၀၀၁၉</p>
၂။	နည်းပညာပိုင်းဆိုင်ရာအကြံပေး	<ul style="list-style-type: none"> <li>EMP ပြင်ဆင်မှုအတွက် အကြံပေးခြင်း</li> <li>နည်းပညာပိုင်းဆိုင်ရာအစည်းအဝေးများနှင့်အလုပ်ရုံဆွေးနွေးပွဲများကိုအကြံပေးခြင်း</li> <li>EMP လုပ်ငန်းစဉ်များအား စောင့်ကြပ်ကြည့်ရှုခြင်း</li> </ul>	<p>ဒေါ်ကျော်ကျော်ဝင်း ဒါရိုက်တာ (ငြိမ်း) မြန်မာ့ရေနံဓာတုဗေဒလုပ်ငန်း၊ လျှပ်စစ်နှင့်စွမ်းအင်ဝန်ကြီးဌာန</p>

စဉ်	လုပ်ငန်းတာဝန်	သတ်မှတ်တာဝန်	အမည်၊ ရာထူး၊ အဖွဲ့အစည်းနှင့် ကြားကာလအကြံပေးမှတ်ပုံတင်အမှတ်
		<ul style="list-style-type: none"> <li>လူထုတွေ့ဆုံပွဲများအတွက်အကြံပေးခြင်း</li> <li>အရည်အသွေးစစ်ဆေးမှုဆိုင်ရာနည်းပညာအကြံပေးခြင်း</li> <li>အချက်အလက်များစုစည်းမှုနှင့်စိစစ်မှုဆိုင်ရာလုပ်ငန်းများအတွက် အကြံပေးခြင်း</li> </ul>	
၃။	ပတ်ဝန်းကျင်ဆိုင်ရာ အကြံပေး	<ul style="list-style-type: none"> <li>EMP ပုံစံဒီဇိုင်းအကြံပေးခြင်း</li> <li>ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအဖွဲ့၏သတ်မှတ်တာဝန်နှင့်လုပ်ပိုင်ခွင့်ကိုဖွံ့ဖြိုးတိုးတက်စေခြင်း</li> <li>ပတ်ဝန်းကျင်ဆိုင်ရာအချက်အလက်များအပေါ် အကြံဉာဏ်ပေးခြင်း</li> <li>ကွင်းဆင်းအချက်အလက်ကောက်ယူရာတွင် အကြံပေးခြင်း</li> <li>နည်းပညာနှင့်စပ်လျဉ်း၍ခွဲခြမ်းစိတ်ဖြာမှုအတွက် တိုးတက်အဆင်ပြေစေခြင်း</li> <li>ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်အား ပိုမိုကောင်းမွန်စေခြင်း</li> </ul>	<p>Engr. ဒေါ်ခင်ဆွေအေး ကထိက (ငြိမ်း)၊ ဓာတုအင်ဂျင်နီယာဌာန၊ ရန်ကုန်နည်းပညာတက္ကသိုလ်။</p> <p>ကြားကာလအကြံပေးမှတ်ပုံတင် နံပါတ် - ၀၀၂၁</p>
၄။	လေထုအရည်အသွေး အကြံပေးစီမံခန့်ခွဲမှု	<ul style="list-style-type: none"> <li>လေထုအရည်အသွေးအတွက်ကွင်းဆင်းအချက်အလက်ကောက်ယူရာတွင်အကြံပေးခြင်း</li> <li>လေထုအရည်အသွေးထိန်းသိမ်းမှုအတွက် အကြံပေးခြင်း</li> <li>လေထုညစ်ညမ်းမှုပမာဏလျော့နည်းစေရန်ဆောင်ရွက်မှုအား အကြံဉာဏ်ပေးခြင်း</li> <li>ကိန်းဂဏန်းအချက်အလက်များကို ခွဲခြမ်းစိတ်ဖြာ၍ ပုံစံထုတ်ခြင်း</li> <li>အစီရင်ခံစာရေးသားရန်အကြံဉာဏ်ပေးခြင်း</li> </ul>	<p>Engr. ဦးစိန်သောင်းဦး ဥက္ကဋ္ဌ စိမ်းလန်းမြန်မာပတ်ဝန်းကျင်ဆိုင်ရာ ဝန်ဆောင်မှုလုပ်ငန်းကုမ္ပဏီလီမိတက် ကြားကာလအကြံပေးမှတ်ပုံတင် နံပါတ် - ၀၀၂၃</p>
၅။	စွန့်ပစ်ရည်စီမံခန့်ခွဲမှု ကျွမ်းကျင်အကြံပေး	<ul style="list-style-type: none"> <li>စီမံကိန်းနှင့်မြူနီစီပယ်ဆိုင်ရာစွန့်ပစ်ရည်အချက်အလက်များ ကွင်းဆင်းကောက်ယူရန် အကြံပေးခြင်း</li> <li>ဓာတ်ခွဲနည်းပညာအကြံပေးဦးဆောင်ခြင်း</li> <li>ကိန်းဂဏန်းအချက်အလက်များကိုစိစစ်ခြင်း၊တွက်ချက်ခြင်း၊ကောက်ချက်ချခြင်း၊ ပုံစံပြုဆန်းသစ်ခြင်းများတွင်အကြံပေးခြင်း</li> </ul>	<p>Engr. ဒေါ်တင်မေစိုး ပါမောက္ခ (ငြိမ်း)၊ ဓာတုအင်ဂျင်နီယာဌာန၊ မန္တလေးနည်းပညာတက္ကသိုလ်။ ပတ်ဝန်းကျင်အဆိပ်အတောက်နှင့် ညစ်ညမ်းမှုထိန်းသိမ်းရေးအတွေ့အကြုံ ရှိ ကျွမ်းကျင်ပညာရှင်</p>

စဉ်	လုပ်ငန်းတာဝန်	သတ်မှတ်တာဝန်	အမည်၊ ရာထူး၊ အဖွဲ့အစည်းနှင့် ကြားကာလအကြံပေးမှတ်ပုံတင်အမှတ်
		<ul style="list-style-type: none"> <li>ဓာတ်ခွဲစမ်းသပ်မှုများကို အစီရင်ခံစာရေးသားပြုစုရာတွင် အကြံပေးခြင်း</li> </ul>	ကြားကာလအကြံပေးမှတ်ပုံတင် နံပါတ် - ၀၀၂၈
၆။	ဓာတ်ခွဲခန်းရလဒ်ဆိုင်ရာ အကြံပေး	<ul style="list-style-type: none"> <li>ရေနှင့်စွန့်ပစ်ရည်နမူနာများကောက်ယူခြင်း၊ ကိုင်တွယ်ခြင်းနှင့် စမ်းသပ်ခြင်းများတွင် အကြံပေးခြင်း</li> <li>ဓာတ်ခွဲစမ်းသပ်မှုများအတွက်ညွှန်ကြားခြင်း</li> <li>ပတ်ဝန်းကျင်ရေးရာဓာတ်ခွဲရလဒ်များကို စစ်ဆေးခြင်း</li> <li>ဓာတ်ခွဲရလဒ်များကိုနှိုင်းယှဉ်အတည်ပြုခြင်း</li> </ul>	<p>ဦးမျိုးမြင့် စက်ရုံမှူး (ငြိမ်း)၊ အမှတ် (၁) စက်မှုဝန်ကြီးဌာန။</p> <p>ကြားကာလအကြံပေးမှတ်ပုံတင် နံပါတ် - ၀၀၂၆</p>
၇။	ပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး စီမံခန့်ခွဲမှုအကြံပေး	<ul style="list-style-type: none"> <li>ပတ်ဝန်းကျင်ဆိုင်ရာလေထုနှင့်ရေထု အရည်အသွေးအတွက် နမူနာကောက်ယူရာတွင် လမ်းညွှန်မှုပြုခြင်း၊ ပြင်ဆင်ပေးခြင်း</li> <li>နမူနာကောက်ယူခြင်းများကိုစောင့်ကြပ်ကြည့်ရှုခြင်း</li> <li>နမူနာကောက်ယူမှုကိုစာရင်းသွင်းခြင်း၊စစ်ဆေးခြင်း</li> <li>ပတ်ဝန်းကျင်အခြေခံအချက်အလက်များအတွက်အစီရင်ခံစာပြင်ဆင်ခြင်းကို ဦးဆောင်အကြံပေးခြင်း</li> </ul>	<p>ဒေါ်ခင်ရွှေဌေး ကထိက (ငြိမ်း)၊ ဓာတုအင်ဂျင်နီယာဌာန၊ ရန်ကုန်နည်းပညာတက္ကသိုလ်။ ပတ်ဝန်းကျင်ဆိုင်ရာအင်ဂျင်နီယာ</p> <p>ကြားကာလအကြံပေးမှတ်ပုံတင် နံပါတ် - ၀၀၂၂</p>
၈။	လူမှုပတ်ဝန်းကျင်ထိခိုက်မှုကွင်းဆင်းလေ့လာရေး ခေါင်းဆောင်	<ul style="list-style-type: none"> <li>နည်းပညာဆိုင်ရာအစည်းအဝေးများညှိနှိုင်းဆွေးနွေးခြင်းနှင့် မှတ်တမ်းတင်ထားခြင်း</li> <li>အချက်အလက်များရှာဖွေခြင်းနှင့် ဒေသဆိုင်ရာအချက်အလက်များကိုစုဆောင်းခြင်း</li> <li>သက်ဆိုင်ရာအာဏာပိုင်၊ဒေသခံများနှင့် ဆွေးနွေးတိုင်ပင်မှုများ ပြုလုပ်ခြင်း</li> </ul>	<p>ဦးခင်အောင် လူမှုပတ်ဝန်းကျင် ကျွမ်းကျင်ပညာရှင် စိမ်းလန်းမြန်မာပတ်ဝန်းကျင်ဆိုင်ရာ ဝန်ဆောင်မှုလုပ်ငန်းကုမ္ပဏီလီမိတက်</p> <p>ကြားကာလအကြံပေးမှတ်ပုံတင် နံပါတ် - ၀၀၂၅</p>
၉။	ကွင်းဆင်းလေ့လာဆောင်ရွက်သည့်အဖွဲ့ကြီးကြပ်ရေးခေါင်းဆောင်	<ul style="list-style-type: none"> <li>ပတ်ဝန်းကျင်ဆိုင်ရာလေ့လာမှုများအတွက် Checklist ပြင်ဆင်ခြင်း</li> <li>အကြံပေးကွင်းဆင်းလေ့လာစစ်ဆေးခြင်း</li> <li>ကွင်းဆင်းလေ့လာမှုကို ကြီးကြပ်ခြင်း</li> <li>အစီရင်ခံစာစစ်ဆေးခြင်းနှင့်ပြင်ဆင်ခြင်း</li> </ul>	<p>ဦးကြည်ဟန်ဘို B.E (Aerospace Fuel and Propellant Engineer)</p>
၁၀။	ပတ်ဝန်းကျင်ဆိုင်ရာ	<ul style="list-style-type: none"> <li>အချက်အလက်များစုဆောင်းခြင်း</li> </ul>	ဒေါ်အေးသူဇာဟိန်း

စဉ်	လုပ်ငန်းတာဝန်	သတ်မှတ်တာဝန်	အမည်၊ ရာထူး၊ အဖွဲ့အစည်းနှင့် ကြားကာလအကြံပေးမှတ်ပုံတင်အမှတ်
	ကျွမ်းကျင်ပညာရှင်များ	<ul style="list-style-type: none"> <li>စာရွက်စာတမ်းအထောက်အထားများ စစ်ဆေးပြုစုခြင်း</li> <li>စီမံကိန်းလုပ်ငန်းများအားလေ့လာခြင်း</li> <li>သက်ရောက်မှုများကိုရှာဖွေဖော်ထုတ်ခြင်းနှင့် စီမံခန့်ခွဲမှုစနစ် ပြင်ဆင်ရေးဆွဲခြင်း</li> </ul>	<p>B.E (Chemical)</p> <p>ဒေါ်နင်းထက်ထက်လှိုင်</p> <p>B.E (Port and Harbor)</p> <p>ဒေါ်ဝေဝေမွန်</p> <p>B.E (Port and Harbor)</p> <p>ဒေါ်နီနီနင်းနုနွေး</p> <p>B.E (Port and Harbor)</p>
၁၁။	ပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေးစောင့်ကြည့်တိုင်းတာရေးအဖွဲ့	<ul style="list-style-type: none"> <li>ပတ်ဝန်းကျင်ဆိုင်ရာအခြေခံအချက်အလက်များ ကောက်ယူခြင်း</li> <li>အချက်အလက်များအားဆန်းစစ်တွက်ချက်ခြင်း</li> <li>အခြေခံအချက်အလက်ကောက်ယူသော မြေပုံများထုတ်ခြင်း</li> <li>အခြေခံအချက်အလက်ဆိုင်ရာအစီရင်ခံစာ ပြင်ဆင်ပြုစုခြင်း</li> </ul>	<p>ဦးပြည့်ဖြိုးကျော်</p> <p>B.Sc (Forestry)</p> <p>(အဖွဲ့ခေါင်းဆောင်)</p> <p>ဦးမျိုးသက်နောင်</p> <p>B.E (Aerospace Fuel and Propellant Engineer)</p> <p>(လက်ထောက်အဖွဲ့ခေါင်းဆောင်)</p> <p>ဦးအောင်ကိုမင်း</p> <p>B.E (Chemical)</p> <p>(တိုင်းတာရေးကျွမ်းကျင်ပညာရှင်)</p> <p>ဦးသီဟဇော်</p> <p>(လက်ထောက်တိုင်းတာရေး ကျွမ်းကျင်ပညာရှင်)</p>
၁၂။	လူထုဆက်ဆံရေး	<ul style="list-style-type: none"> <li>ဌာနဆိုင်ရာတာဝန်ရှိသူများနှင့်ဆွေးနွေးမှုများတွင် ပါဝင်ကူညီခြင်း</li> <li>စာရွက်စာတမ်းများပြင်ဆင်ခြင်းနှင့် လိုက်လံဖိတ်ကြားခြင်း</li> <li>လူထုတွေ့ဆုံမှုများအတွက်လိုအပ်သော စာရွက်စာတမ်းများ ပြင်ဆင်ခြင်း</li> <li>လူထုတွေ့ဆုံမှုများတွင် အကြံပြုချက်များ ရယူခြင်း</li> </ul>	<p>ဦးအောင်ကျော်သန်း</p> <p>B.E (Chemical)</p>
၁၃။	ဓာတ်ခွဲစမ်းသပ်မှုကျွမ်းကျင်ပညာရှင်များ	<ul style="list-style-type: none"> <li>ရေနှင့်စွန့်ပစ်ရည်နမူနာများကောက်ယူပြင်ဆင်ခြင်းရန် ကြိုတင်</li> <li>ဓာတ်ခွဲစမ်းသပ်နိုင်ရေးအတွက်ကြိုတင်</li> </ul>	<p>ဒေါ်ချယ်ရီသွင်</p> <p>B.E (Chemical)</p> <p>ဓာတ်ခွဲခန်းမန်နေဂျာ</p>

စဉ်	လုပ်ငန်းတာဝန်	သတ်မှတ်တာဝန်	အမည်၊ ရာထူး၊ အဖွဲ့အစည်းနှင့် ကြားကာလအကြံပေးမှတ်ပုံတင်အမှတ်
		ပြင်ဆင်ခြင်း <ul style="list-style-type: none"> <li>ဓာတ်ခွဲစမ်းသပ်ခြင်း</li> <li>ဓာတ်ခွဲစမ်းသပ်ခြင်းမှရရှိလာသောရလဒ်များကို စုစည်းတင်ပြခြင်း</li> </ul>	ဦးသက်မင်းပိုင် B.E (Chemical) ဓာတ်ခွဲခန်းပညာရှင်

### ၁-၃။ မူဝါဒ၊ ဥပဒေနှင့်အဖွဲ့အစည်းဆိုင်ရာ မူဘောင်

ပတ်ဝန်းကျင်ဆိုင်ရာစီမံခန့်ခွဲမှုအစီအစဉ်အစီရင်ခံစာ၏အခန်း(၃)သည် မူဝါဒ၊ဥပဒေနှင့်အဖွဲ့အစည်းဆိုင်ရာမူဘောင်ဖြစ်ပြီး ယင်းတွင်ပါဝင်မှုများမှာ

- နောက်ခံ
- မူဝါဒရေးရာ
- ပတ်ဝန်းကျင်ဆန်းစစ်ခြင်းအတွက် မြန်မာနိုင်ငံမူဘောင်များ  
အသေးစိတ်မှာ
  - အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာမြန်မာမူဝါဒ (၂၀၁၉)
  - မြန်မာနိုင်ငံအစီအစဉ် ၂၁ (၁၉၉၇)
  - အမျိုးသားစဉ်ဆက်မပြတ်ဖွံ့ဖြိုးတိုးတက်ရေးဗျူဟာ (၂၀၀၉)
  - ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဥပဒေ (၂၀၁၂)
  - ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးနည်းဥပဒေ (၂၀၁၄)
  - ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းလုပ်ထုံးလုပ်နည်း (၂၀၁၅)
  - အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာအရည်အသွေး(ထုတ်လွှတ်မှု)လမ်းညွှန်ချက် (၂၀၁၅)
- မြန်မာနိုင်ငံ၏ပတ်ဝန်းကျင်နှင့်သက်ဆိုင်သော ဥပဒေနှင့်နည်းဥပဒေများ
 

အုပ်ချုပ်ရေးကဏ္ဍနှင့်သက်ဆိုင်ခြင်း	၃ ခု
စီးပွားရေး/အဆောက်အအုံ/အုပ်ချုပ်ရေးနှင့်သက်ဆိုင်ခြင်း	၃ ခု
သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းနှင့်သက်ဆိုင်ခြင်း	၅ ခု
ယဉ်ကျေးမှုအမွေအနှစ်နှင့်သက်ဆိုင်ခြင်း	၁ ခု
သစ်တော/ဇီဝမျိုးစုံ/စိုက်ပျိုးရေးနှင့်သက်ဆိုင်ခြင်း	၄ ခု
မြေယာစီမံခန့်ခွဲမှုနှင့်သက်ဆိုင်ခြင်း	၄ ခု
အရေးပေါ်/ဘေးအန္တရာယ်နှင့်သက်ဆိုင်ခြင်း	၂ ခု
ဘဏ္ဍာရေးနှင့်အခွန်ကဏ္ဍနှင့်သက်ဆိုင်ခြင်း	၃ ခု
အမျိုးသားစီမံကိန်းနှင့်စီးပွားရေးဖွံ့ဖြိုးတိုးတက်မှု နှင့်သက်ဆိုင်ခြင်း	၁ ခု
စက်မှုလုပ်ငန်းနှင့်သက်ဆိုင်ခြင်း	၆ ခု
ပြည်သူ့ကျန်းမာရေးနှင့်သက်ဆိုင်ခြင်း	၄ ခု
သယံဇာတပို့ဆောင်ရေးနှင့်သက်ဆိုင်ခြင်း	၁ ခု

လုပ်သားကဏ္ဍနှင့်သက်ဆိုင်ခြင်း

၉ ခုတို့ကို

ဖော်ပြထားပါသည်။

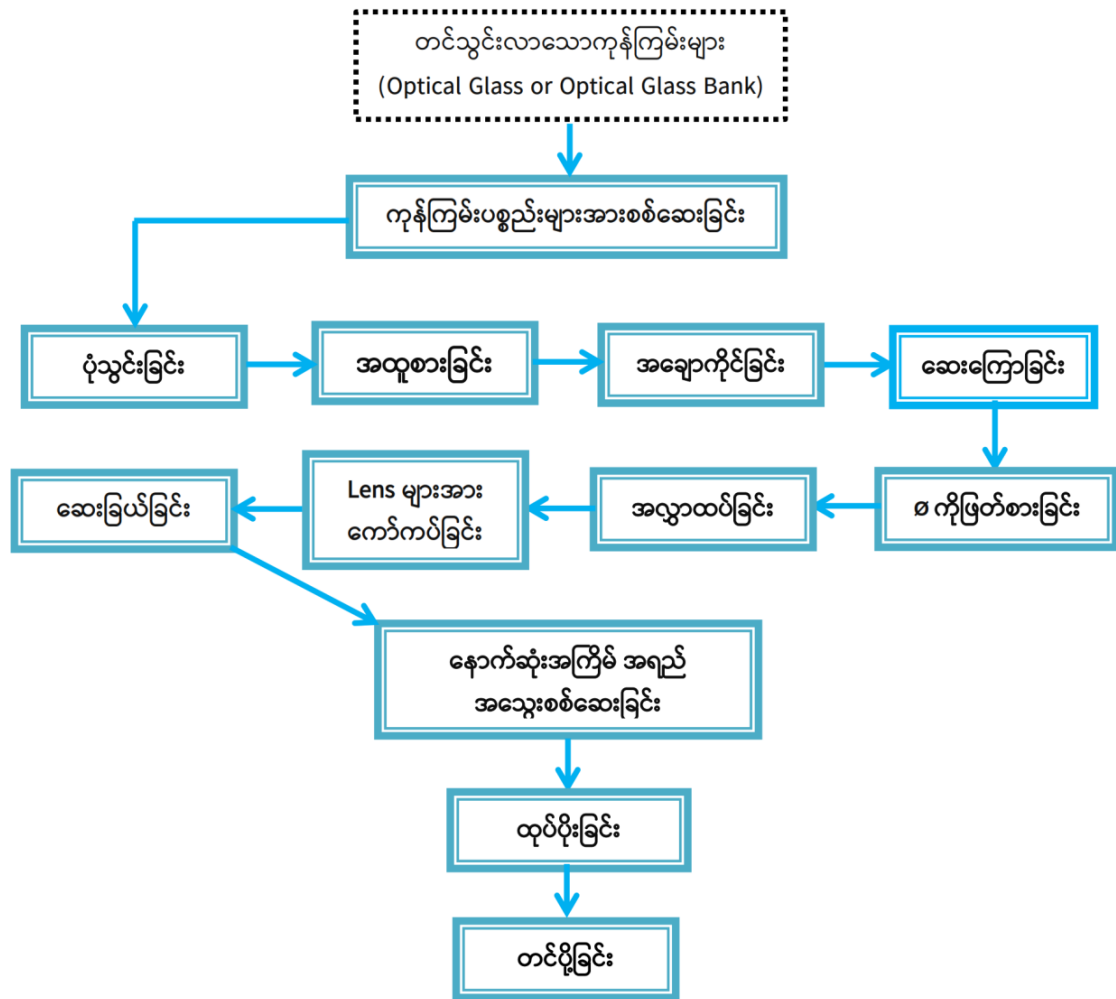
- အပြည်ပြည်ဆိုင်ရာကွန်ဗင်းရှင်းများ၊ စာချုပ်များနှင့် သဘောတူညီချက်များ  
ကွန်ဗင်းရှင်းများ၊ စာချုပ်များနှင့် သဘောတူညီချက်များ စုစုပေါင်း (၁၂) ခုကို တင်ပြထား  
ပါသည်။
- စီမံကိန်း၏ပတ်ဝန်းကျင်နှင့်သက်ဆိုင်သောစံနှုန်းများနှင့်လမ်းညွှန်ချက်များ
  - လေထုအရည်အသွေး
  - ရေထုအရည်အသွေး
  - ဆူညံသံ
  - အလင်းရောင်

#### ၁-၄။ စီမံကိန်းအကြောင်းအရာဖော်ပြချက်

MAOI တွင်ထုတ်လုပ်သည့်ကုန်ပစ္စည်း (၃) မျိုးရှိပြီး မှန်ဘီလူးအမျိုးမျိုး၊ ကင်မရာအတွက် ပလတ်စတစ်အစိတ်အပိုင်းများနှင့် ဆုံချက်စုအလင်းတန်းမှန်ဘီလူးချောင်း (SLA) တို့ဖြစ်ပါသည်။ ယင်းတို့အနက် မှန်ဘီလူးအမျိုးမျိုးကို စက်ရုံ-၁ တွင်ထုတ်လုပ်ပါသည်။

MAOI တွင် ကင်မရာများ၊ ပရိဂျက်တာများ၊ လက်ကိုင်ဖုန်းများ၊ ကားကင်မရာများ၊ အဏုကြည့်မှန်ဘီလူးများ၊ တယ်လီစကုပ်မှန်ဘီလူးများနှင့် လေဆာအကွာအဝေးရှာဖွေသည့်ကိရိယာများ အစရှိသည်တို့တွင် သုံးသည့် မှန်ဘီလူးအမျိုးမျိုးကိုထုတ်လုပ်ပါသည်။

MAOI ရှိအလင်းကြည့်မှန်ဘီလူးထုတ်လုပ်ခြင်းလုပ်ငန်းစဉ်အဆင့်များကို ယေဘုယျအားဖြင့် အောက်ပါအတိုင်းဖော်ပြထားပါသည်။



ပုံ ၁-၁ မှန်ဘီလူးထုတ်လုပ်မှုလုပ်ငန်းစဉ်အဆင့်ဆင့်

၁-၅။ လက်ရှိသဘာဝပတ်ဝန်းကျင်နှင့်လူမှုရေးဆိုင်ရာအခြေအနေဖော်ပြချက်များ

ပတ်ဝန်းကျင်ဆိုင်ရာစီမံခန့်ခွဲမှုအစီအစဉ်အစီရင်ခံစာရေးသားပြုစုခြင်းအတွက် စီမံကိန်းနှင့်သက်ဆိုင်သော လက်ရှိသဘာဝပတ်ဝန်းကျင်နှင့် လူမှုရေးဆိုင်ရာအခြေအနေများကိုဖော်ပြရန် အချက်အလက်များစုဆောင်းရာတွင် ချဉ်းကပ်မှုနည်းလမ်း (၂) သွယ်ဖြင့် စုဆောင်းခဲ့ပါသည်။

(၁) မူလအခြေခံအချက်အလက်များ (Primary Data) စုဆောင်းခြင်းနှင့် လေ့လာဆန်းစစ်ခြင်း

(၂) ပြုစုပြီးအချက်အလက်များ (Secondary Data) စုဆောင်းခြင်းနှင့် လေ့လာဆန်းစစ်ခြင်း

**မူလအခြေခံအချက်အလက်(Primary Data)များ စုဆောင်းခြင်းနှင့်လေ့လာဆန်းစစ်ခြင်း** - ပတ်ဝန်းကျင်ဆိုင်ရာစီမံခန့်ခွဲမှုအစီအစဉ်တွင် အခြေခံအချက်အလက်များ (baseline data) စုဆောင်းရခြင်း၏ရည်ရွယ်ချက်မှာ လက်ရှိပတ်ဝန်းကျင်၏အခြေအနေအရပ်ရပ်ကို မူလအခြေခံအချက်အလက်များအဖြစ် စုဆောင်းထားရန်ဖြစ်သည်။ ချဉ်းကပ်မှုနည်းလမ်းကို “Myanmar Asia Optical International (MAOI) Company Limited” စီမံကိန်းအတွက် ပတ်ဝန်းကျင်ဆိုင်ရာအရည်အသွေးညွှန်းကိန်းများ၏အခြေခံအချက်အလက်များကို ဆန်းစစ်ရန် ရည်ရွယ်ထားပါသည်။ ပတ်ဝန်းကျင်ဆိုင်ရာအခြေခံအချက်အလက်ပါရာမီတာများကိုအဆိုပြုစီမံကိန်းအတွက် သတ်မှတ်ထားသော လမ်းညွှန်ချက်များအတိုင်း သတ်မှတ်ပါသည်။



လေအရည်အသွေး၊ အလင်းရောင်၊ ဆူညံသံအဆင့်နှင့် တုန်ခါမှုစသည့် ပတ်ဝန်းကျင်ဆိုင်ရာအခြေခံ အချက်အလက်များ (primary data)ကို ပစ္စည်းကိရိယာများဖြင့်တိုင်းတာပြီး ရေအရည်အသွေးနှင့် မြေအရည် အသွေးတို့အတွက် နမူနာများကိုကောက်ယူ၍ GMES ဓာတ်ခွဲခန်းနှင့် စိမ်းလန်းအမိမြေဖွံ့ဖြိုးတိုးတက်ရေး အသင်း၏ ပတ်ဝန်းကျင်ရေးရာဓာတ်ခွဲခန်း (ALARM ecological laboratory) တို့တွင် စမ်းသပ်စစ်ဆေးခဲ့ပါ သည်။ ဓာတ်ခွဲရလဒ်များကို အခန်း (၅) တွင် ဖော်ပြထားပြီး နောက်ဆက်တွဲတွင်လည်း ဖော်ပြထားပါသည်။

ပတ်ဝန်းကျင်ဆိုင်ရာလေအရည်အသွေး၊ လုပ်ငန်းခွင်လေအရည်အသွေး၊ အလင်းရောင်၊ ဆူညံသံ အဆင့်၊ ရေအရည်အသွေးနှင့်မြေအရည်အသွေးများနမူနာကောက်ယူခြင်းနှင့်လေ့လာဆန်းစစ်ခြင်း၊ နေရာရွေး ချယ်ခြင်းအတွက် လိုအပ်သောအကြောင်းအရာများကို GMES မှ ပြုလုပ်ပါသည်။

ပြုစုပြီးအချက်အလက်များ(Secondary Data)စုဆောင်းခြင်းနှင့် လေ့လာဆန်းစစ်ခြင်း - လူမှုစီးပွားဆိုင်ရာ အခြေအနေများ၊ ရုပ်ပိုင်းဆိုင်ရာ၊ ဇီဝဆိုင်ရာပတ်ဝန်းကျင်နှင့် ရာသီဥတုအချက်အလက်စသည်တို့ကို သက်ဆိုင် ရာဝက်ဘ်ဆိုဒ်များမှ စုဆောင်းပြီး EMP လေ့လာရေးအဖွဲ့မှ လေ့လာသုံးသပ်ပါသည်။ မင်္ဂလာဒုံမြို့နယ်၏ ဒေသဆိုင်ရာအချက်အလက်များကို ၂၀၂၀ ခုနှစ်တွင်ထုတ်ဝေထားသော အထွေထွေအုပ်ချုပ်ရေးဦးစီးဌာန၏ ဒေသဆိုင်ရာအချက်အလက်များလက်စွဲစာအုပ်မှ ရယူပါသည်။

၁-၅-၁။ ပတ်ဝန်းကျင်ဆိုင်ရာအခြေခံအချက်အလက်များ (မူလအခြေခံအချက်အလက်များ)

(က) လေထုအရည်အသွေး

လေထုအရည်အသွေးကို စီမံကိန်းဧရိယာတွင် အဓိကအဆုံးအဖြတ်ပေးနိုင်သောနေရာ/ ထိ လွယ်လွယ်သောနေရာများတွင် တိုင်းတာခဲ့ပါသည်။

- ၁) ပတ်ဝန်းကျင်လေထုကို နေရာတစ်နေရာတွင်လည်းကောင်း၊
- ၂) လုပ်ငန်းခွင်လေထုကို (၁၇) နေရာတွင်လည်းကောင်း၊
- ၃) ဒီဇယ်မီးစက်များ၏ခေါင်းတိုင်တွင်လည်းကောင်း တိုင်းတာခဲ့ပါသည်။

၁) ပတ်ဝန်းကျင်လေထုအရည်အသွေး

ပတ်ဝန်းကျင်လေထုအရည်အသွေးကို အပိုင်းသုံးပိုင်းဖြင့် တင်ပြထားပါသည်။

❖ လေထုအရည်အသွေးအတွက် တိုင်းတာသည့်ပါရာမီတာများ

စဉ်	ပါရာမီတာများ	ခွဲခြမ်းစိတ်ဖြာခြင်းနည်းလမ်းများ
၁	ဆာလဖာဒိုင်အောက်ဆိုဒ် ( $SO_2$ )	အီလက်ထရိုကင်မီကယ်ဆင်ဆာ
၂	နိုက်ထရိုဂျင်ဒိုင်အောက်ဆိုဒ် ( $NO_2$ )	အီလက်ထရိုကင်မီကယ်ဆင်ဆာ
၃	ကာဗွန်ဒိုင်အောက်ဆိုဒ် ( $CO_2$ )	NDIR (optional sensor)
၄	ကာဗွန်မိုနောက်ဆိုဒ် ( $CO$ )	အီလက်ထရိုကင်မီကယ်ဆင်ဆာ
၅	ဟိုက်ဒရိုဂျင်ဆာလဖိုင် ( $H_2S$ )	အီလက်ထရိုကင်မီကယ်ဆင်ဆာ
၆	သေးငယ်သောအမှုန်အမွှား ( $PM_{2.5}$ )	Infrared light scattering
၇	သေးငယ်သောအမှုန်အမွှား ( $PM_{10}$ )	Infrared light scattering

စီမံကိန်းဧရိယာရှိပတ်ဝန်းကျင်လေထုအရည်အသွေးကို အမှတ်နေရာတစ်ခုတည်းတွင် ၂၄ နာရီဆက်တိုက် တိုင်းတာခဲ့ပါသည်။

❖ လေထုအရည်အသွေးတိုင်းတာခဲ့သည့်နေရာဖော်ပြချက်

စဉ်	တိုင်းတာသည့်နေရာ	ပထဝီဆိုင်ရာနေရာဖော်ပြချက်	တည်နေရာ
၁	AMP	မြောက်လတ္တီတွဒ် ၁၆°၅၆'၂၈.၆၇" အရှေ့လောင်ဂျီတွဒ် ၉၆°၀၉' ၁၂.၄၈"	စက်ရုံ-၁၏ရုံးခန်း ဝင်ပေါက်အနီး

AMP = Ambient Air Quality Measuring Point



ပုံ ၁-၂ ပတ်ဝန်းကျင်ဆိုင်ရာလေထုအရည်အသွေးတိုင်းတာသည့်နေရာပြပုံ



ပုံ ၁-၃ ပတ်ဝန်းကျင်လေထုအရည်အသွေးတိုင်းတာနေပုံ

❖ ပတ်ဝန်းကျင်လေထုအရည်အသွေးတိုင်းတာမှုရလဒ်များ (AMP)

စဉ်	ပါရာမီတာများ	ယူနစ်	Analysis Values		အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လုပ်မှု) လမ်းညွှန်ချက်		မှတ်ချက်
			ရလဒ် တန်ဖိုး	ပျမ်းမျှ ကြာချိန်	Guideline တန်ဖိုး	ပျမ်းမျှ ကြာချိန်	
၁	နိုက်ထြိုဂျင်ဒိုင်အောက်ဆိုဒ်	μg/m <sup>3</sup>	၄၂.၃၅	၂၄ နာရီ	၂၀၀	၁ နာရီ	၁၀/၂/၂၀၂၀ ၂၂:၃၂-၂၃:၃၁ (Peak Hour)
၂	ဆာလဖာဒိုင်အောက်ဆိုဒ်	μg/m <sup>3</sup>	၀	၂၄ နာရီ	၂၀	၂၄ နာရီ	-
၃	သေးငယ်သောအမှုန်အမွှား (PM <sub>10</sub> )	μg/m <sup>3</sup>	၁၃၉	၂၄ နာရီ	၅၀	၂၄ နာရီ	-
၄	သေးငယ်သောအမှုန်အမွှား (PM <sub>2.5</sub> )	μg/m <sup>3</sup>	၈၆	၂၄ နာရီ	၂၅	၂၄ နာရီ	-
၅	အမိုးနီးယား	ppm	၀.၈၆	၂၄ နာရီ	NG	-	-
၆	ကာဗွန်ဒိုင်အောက်ဆိုဒ်	ppm	၂၇၈.၇၆	၂၄ နာရီ	NG	-	-
၇	ကာဗွန်မိုနောက်ဆိုဒ်	ppm	၀.၇၈	၂၄ နာရီ	NG	-	-
၈	ဟိုက်ဒရိုဂျင်ဆာလဖိုင်	ppb	၃.၉၃	၂၄ နာရီ	NG	-	-
၉	မီသိန်း	ppm	၀	၂၄ နာရီ	NG	-	-
၁၀	Relative Humidity	%	၅၉.၅၈	၂၄ နာရီ	NG	-	-
၁၁	အပူချိန်	°C	၂၈.၂၀	၂၄ နာရီ	NG	-	-

အထက်ပါဇယားများအရ တိုင်းတာရရှိသည့်ရလဒ်များတွင် အမှုန်အမွှားများ (PM<sub>10</sub> နှင့် PM<sub>2.5</sub>) သည် အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာအရည်အသွေး (ထုတ်လုပ်မှု) လမ်းညွှန်ချက်စံနှုန်းများထက်မြင့်မားနေပြီး ဤသို့ဖြစ်ရခြင်းမှာ လေတိုင်းတာသည့်နေရာအနီးတစ်ဝိုက်တွင် ယာဉ်များနှင့်လူများ လှုပ်ရှားသွားလာနေခြင်းကြောင့်ဖြစ်သည်။ ကျန်ပါရာမီတာများသည် အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာအရည်အသွေး (ထုတ်လုပ်မှု) လမ်းညွှန်ချက်စံနှုန်းများအတွင်းတွင်ရှိကြောင်း တွေ့ရပါသည်။

၂) လုပ်ငန်းခွင်လေထုအရည်အသွေး

လုပ်ငန်းခွင်လေထုအရည်အသွေးကို အပိုင်းနှစ်ပိုင်းဖြင့် တင်ပြထားပါသည်။

❖ လုပ်ငန်းခွင်လေထုအရည်အသွေးများတိုင်းတာခဲ့သည့်နေရာဖော်ပြချက်

စဉ်	တိုင်းတာသည့်နေရာများ	တည်နေရာဖော်ပြချက်
၁	ID-01	Centering ဌာန၏အရှေ့
၂	ID-02	Centering ဌာနရှိအမှတ်-၁
၃	ID-03	Centering ဌာနရှိအမှတ်-၂

စဉ်	တိုင်းတာသည့်နေရာများ	တည်နေရာဖော်ပြချက်
၄	ID-04	Centering ဌာနရှိအမှတ်-၃
၅	ID-05	Polishing ဌာနရှိအမှတ်-၁
၆	ID-06	Polishing ဌာနရှိအမှတ်-၂
၇	ID-07	Polishing ဌာနရှိအမှတ်-၃
၈	ID-08	Grinding ဌာနရှိအမှတ်-၁
၉	ID-09	Grinding ဌာနရှိအမှတ်-၂
၁၀	ID-10	Curved Generation ဌာနရှိအမှတ်-၁
၁၁	ID-11	Curved Generation ဌာနရှိအမှတ်-၂
၁၂	ID-12	Coating အခန်း
၁၃	ID-13	Painting အခန်း
၁၄	ID-14	ထုပ်ပိုးခန်း
၁၅	ID-15	ဓာတုပစ္စည်းသိုလှောင်ခန်း
၁၆	ID-16	မီးစက်ခန်းအမှတ်-၁
၁၇	ID-17	မီးစက်ခန်းအမှတ်-၂

## ❖ လုပ်ငန်းခွင်လေထုအရည်အသွေးတိုင်းတာမှုရလဒ်များ

စဉ်	တိုင်းတာသည့်နေရာများ	ပါရာမီတာ		
		VOC (ppm)	PM <sub>10</sub> (μg/m <sup>3</sup> )	PM <sub>2.5</sub> (μg/m <sup>3</sup> )
၁	ID-01	၃.၂	၅၀	၃၅
၂	ID-02	၂၆.၂	၆၁	၄၂
၃	ID-03	၂၈.၀	၆၃	၄၃
၄	ID-04	၂၂.၉	၆၈	၄၆
၅	ID-05	၄၈.၃	၈၅	၄၃
၆	ID-06	၄၆.၈	၆၉	၄၃
၇	ID-07	၅၇	၉၁	၄၇
၈	ID-08	၂.၂	၆၈	၄၉
၉	ID-09	၁၃.၈	၆၂	၄၁
၁၀	ID-10	၇.၅	၆၄	၄၁
၁၁	ID-11	၇.၈	၅၄	၂၁
၁၂	ID-12	၁၈.၂	၁၇	၁၄
၁၃	ID-13	၁၈.၂	၁၄	၁၁
၁၄	ID-14	၀.၅	၁၅	၁၁
၁၅	ID-15	၁.၃	၆၈	၅၇
၁၆	ID-16	၂	၇၀	၅၆
၁၇	ID-17	၂.၄	၇၃	၅၃



လုပ်ငန်းခွင်လေထုအရည်အသွေးတွင်သတ်မှတ်ထားသောလမ်းညွှန်ချက်များမရှိပါ။

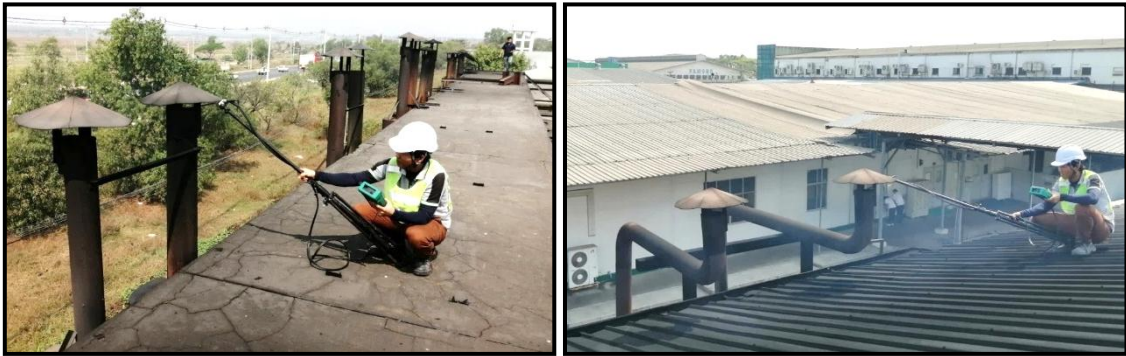
၃) လျှပ်စစ်ထုတ်စက်ခေါင်းတိုင်ထုတ်လွှတ်မှုတိုင်းတာခြင်း

လျှပ်စစ်ထုတ်စက်ခေါင်းတိုင်ထုတ်လွှတ်မှုကို အပိုင်းသုံးပိုင်းခွဲ၍ အောက်ပါအတိုင်း တင်ပြအပ်ပါသည်။

❖ မီးစက်၏အချက်အလက်များ

အမျိုးအစား                      ဒီဇယ်အင်ဂျင်သုံးလျှပ်စစ်ထုတ်စက်  
 စွမ်းအား                              ၁၆၀ kVA (၁) လုံး၊ ၅၅၀ kVA (၁) လုံး၊ ၁,၀၀၀ kVA (၁)  
    လုံး၊ ၁,၂၅၀ kVA (၃) လုံးနှင့် ၁,၄၀၀ kVA (၅) လုံး  
 လောင်စာဆီ                          ဒီဇယ်ဆီ

❖ လျှပ်စစ်ထုတ်စက်ခေါင်းတိုင်မှထုတ်လွှတ်မှုအနီးအငွေ့တိုင်းတာသည့်နေရာဖော်ပြချက်



ပုံ ၁-၄ လျှပ်စစ်ထုတ်စက်ခေါင်းတိုင်မှထုတ်လွှတ်မှုအနီးအငွေ့တိုင်းတာနေပုံ

❖ ခေါင်းတိုင်ထုတ်လွှတ်မှုတိုင်းတာရရှိမှုရလဒ်များ

စဉ်	ပါရာမီတာ	ယူနစ်	တိုင်းတာရရှိမှုရလဒ်များ										Small Combustion Facilities Emission Guidelines
			Generator-1	Generator-2	Generator-3	Generator-4	Generator-5	Generator-6	Generator-7	Generator-8	Generator-9	Generator-10	
၁	O <sub>2</sub>	%	၁၈.၇	၁၈.၇	၁၈.၇	၁၈.၇	၁၈.၇	၁၈.၇	၁၈.၆	၁၈.၆	၁၈.၇	၁၈.၆	-
၂	CO	mg/Nm <sup>3</sup>	၄၄၈	၄၈၅	၃၃၅	၁၀၅၀	၅၈၀	၇၈၃	၇၈၂	၇၅၇	၁၀၃၁	၉၆၃	-
၃	CO <sub>2</sub>	%	၁.၆၄	၁.၆၇	၁.၆၇	၁.၆၅	၁.၆၈	၁.၆၇	၁.၆၈	၁.၇၅	၁.၇၆	၁.၇၈	-
၄	NO <sub>2</sub>	mg/Nm <sup>3</sup>	၁၂၂	၁၂၀	၁၂၄	၁၂၆	၁၂၅	၁၂၇	၁၂၆	၁၈၀	၁၈၄	၁၈၅	၄၆၀
၅	SO <sub>2</sub>	mg/Nm <sup>3</sup>	၁၀.၁	၉.၈	၉.၅	၁၀.၅	၁၀.၂	၉.၈	၁၀.၂	၁၀.၉	၁၁.၄	၁၁.၅	၂,၀၀၀

တိုင်းတာမှုရလဒ်များအရ မီးစက်ခေါင်းတိုင်မှဓာတ်ငွေ့ထွက်ရှိမှုများသည် သတ်မှတ်စံနှုန်း အတွင်းရှိကြောင်း တွေ့ရပါသည်။

(ခ) ဆူညံသံနှင့်တုန်ခါမှုများ

၁) ပတ်ဝန်းကျင်ဆူညံသံ

ပတ်ဝန်းကျင်ဆူညံသံနှင့်စပ်လျဉ်း၍ အပိုင်းနှစ်ပိုင်းကို အောက်ပါအတိုင်း တင်ပြထားပါသည်။

❖ ပတ်ဝန်းကျင်ဆူညံသံတိုင်းတာခွဲသည့်နေရာဖော်ပြချက်

စဉ်	တိုင်းတာသည့် နေရာများ	ပထဝီဆိုင်ရာနေရာဖော်ပြချက်	တည်နေရာ
၁	NMP	မြောက်လတ္တီတွဒ် ၁၆°၅၆'၂၈.၆၇" အရှေ့လောင်ဂျီတွဒ် ၉၆°၀၉'၁၂.၄၈"	စက်ရုံ-၁၏ရုံးခန်း ဝင်ပေါက်အနီး



ပုံ ၁-၅ ပတ်ဝန်းကျင်ဆူညံသံတိုင်းတာခွဲသည့်နေရာဖော်ပြပုံ

❖ ပတ်ဝန်းကျင်ဆူညံသံတိုင်းတာမှုရလဒ်များ

စဉ်	တိုင်းတာသည့် နေရာများ	တိုင်းတာသည့် ရလဒ်များ (dBA)	NEQG (dBA)	မှတ်ချက်
၁	NMP	၅၇.၉၅	၇၀	နေ့အချိန် (၀၇:၀၀ a.m. ~ ၁၀:၀၀ p.m.)
		၅၈.၄၇	၇၀	ညအချိန် (၁၀:၀၀ p.m. ~ ၀၇:၀၀ a.m.)

စက်ရုံစီမံကိန်းနေရာသည် စက်မှုဇုန်အတွင်းတွင်တည်ရှိပြီး နေ့အချိန်နှင့် ညအချိန် ဆူညံသံတိုင်းတာမှုတန်ဖိုးများသည် စံနှုန်းအတွင်းကျရောက်ကြောင်း တွေ့ရပါသည်။ သို့ပါ၍ အလုပ်သမား များနှင့် ပတ်ဝန်းကျင်အပေါ် ဆူညံသံကြောင့် သက်ရောက်မှုမရှိနိုင်ပါ။



၂) လုပ်ငန်းခွင်ဆူညံသံများ

လုပ်ငန်းခွင်ဆူညံသံများနှင့်စပ်လျဉ်း၍ အောက်ပါအတိုင်း အပိုင်းနှစ်ပိုင်းတင်ပြထားပါသည်။

❖ လုပ်ငန်းခွင်ဆူညံသံတိုင်းတာခွဲသည့်နေရာများဖော်ပြချက်

စဉ်	တိုင်းတာသည့်နေရာများ	တည်နေရာဖော်ပြချက်
၁	ID-01	Centering ဌာန၏အရှေ့
၂	ID-02	Centering ဌာနရှိအမှတ်-၁
၃	ID-03	Centering ဌာနရှိအမှတ်-၂
၄	ID-04	Centering ဌာနရှိအမှတ်-၃
၅	ID-05	Polishing ဌာနရှိအမှတ်-၁
၆	ID-06	Polishing ဌာနရှိအမှတ်-၂
၇	ID-07	Polishing ဌာနရှိအမှတ်-၃
၈	ID-08	Grinding ဌာနရှိအမှတ်-၁
၉	ID-09	Grinding ဌာနရှိအမှတ်-၂
၁၀	ID-10	Curved Generation ဌာနရှိအမှတ်-၁
၁၁	ID-11	Curved Generation ဌာနရှိအမှတ်-၂
၁၂	ID-12	Coating အခန်း
၁၃	ID-13	Painting အခန်း
၁၄	ID-14	ထုပ်ပိုးခန်း
၁၅	ID-15	စာတုပ်စွည်းသိုလှောင်ခန်း
၁၆	ID-16	မီးစက်ခန်းအမှတ်-၁
၁၇	ID-17	မီးစက်ခန်းအမှတ်-၂

❖ လုပ်ငန်းခွင်ဆူညံသံတိုင်းတာမှုရလဒ်များ

စဉ်	တိုင်းတာသည့်နေရာများ	ဆူညံသံတိုင်းတာမှုရလဒ်များ (Duration = 1hr) (dB[A])	OHS Guidelines (8 hr) (dB[A])
၁	ID-01	၇၅.၈	၉၀
၂	ID-02	၇၈.၆	၉၀
၃	ID-03	၈၀.၆	၉၀
၄	ID-04	၈၃.၂	၉၀
၅	ID-05	၈၁.၅	၉၀
၆	ID-06	၈၃.၄	၉၀
၇	ID-07	၈၆.၃	၉၀
၈	ID-08	၈၅.၆	၉၀
၉	ID-09	၈၅.၇	၉၀

စဉ်	တိုင်းတာသည့် နေရာများ	ဆူညံသံတိုင်း တာမှီရလဒ်များ (Duration = 1hr) (dB[A])	OHS Guidelines (8 hr) (dB[A])
၁၀	ID-10	၈၅.၀	၉၀
၁၁	ID-11	၈၇.၆	၉၀
၁၂	ID-12	၈၀.၁	၉၀
၁၃	ID-13	၆၆.၈	၉၀
၁၄	ID-14	၅၈.၇	၉၀
၁၅	ID-15	၇၇.၆	၉၀
၁၆	ID-16	၉၄.၈	၉၀
၁၇	ID-17	၁၀၀.၁	၉၀

လုပ်ငန်းခွင်ဆူညံသံတိုင်းတာမှုရရှိမှုရလဒ်တန်ဖိုးများအရ မီးစက်ခန်းမှလွဲ၍ ကျန် တန်ဖိုးများသည် စံနှုန်းအတွင်းကျရောက်ကြောင်း တွေ့ရပါသည်။ မီးစက်ခန်းသည် လျှပ်စစ် ဓာတ်အား ပြတ်တောက်သည့်အချိန်တွင်သာမောင်းနှင်ပြီး ယင်းအချိန်တွင်သာ ထိခိုက်မှု ဖြစ်နိုင်ပါသည်။

(ဂ) အလင်းရောင်ပမာဏ

အလင်းရောင်ပမာဏနှင့်စပ်လျဉ်း၍ အပိုင်းနှစ်ပိုင်းခွဲခြား၍ အောက်ပါအတိုင်း တင်ပြထားပါ သည်။

❖ အလင်းရောင်ပမာဏတိုင်းတာသည့်နေရာဖော်ပြချက်

စဉ်	တိုင်းတာသည့် နေရာများ	တည်နေရာဖော်ပြချက်
၁	ID-01	Polishing ဌာနရှိအမှတ်-၁
၂	ID-02	Grinding ဌာနရှိအမှတ်-၁
၃	ID-03	Grinding ဌာနရှိအမှတ်-၂
၄	ID-04	Curve Generation
၅	ID-05	Coating အခန်း
၆	ID-06	Painting အခန်း

❖ အလင်းရောင်ပမာဏတိုင်းတာရရှိမှုတန်ဖိုးများ

စဉ်	တိုင်းတာသည့် နေရာများ	Measured Values (Lux)	Guideline Values (Lux)
၁	ID-01	၃၅၅	၃၀၀-၇၅၀
၂	ID-02	၃၂၀	၃၀၀-၇၅၀
၃	ID-03	၅၂၀	၃၀၀-၇၅၀
၄	ID-04	၁,၈၁၃	၁,၅၀၀-၃,၀၀၀

စဉ်	တိုင်းတာသည့် နေရာများ	Measured Values (Lux)	Guideline Values (Lux)
၅	ID-05	၁၆၅	၃၀၀-၇၅၀
၆	ID-06	၅၆၅	၃၀၀-၇၅၀

အထက်ဖော်ပြပါဇယားအရ coating အခန်းရမှလွဲ၍ ကျန်နေရာများရှိအလင်းရောင် ပမာဏသည် သတ်မှတ်ချက်အတွင်းရှိကြောင်းတွေ့ရပါသည်။ ထို့ကြောင့် စီမံကိန်းအဆိုပြု သူသည် သင့်တော်သောအလင်းစနစ်ကို စီစဉ်သင့်ပြီးစောင့်ကြည့်စစ်ဆေးသင့်ပါသည်။

(ဃ) ရေနံစွန့်ပစ်ရည်အရည်အသွေး

ရေနံစွန့်ပစ်ရည်အရည်အသွေးနှင့်စပ်လျဉ်း၍ အောက်ပါအတိုင်း အပိုင်းနှစ်ပိုင်းဖြင့် တင်ပြ အပ်ပါသည်။

❖ ရေနံစွန့်ပစ်ရည်နမူနာကောက်ယူသည့်နေရာဖော်ပြချက်

စဉ်	တိုင်းတာသည့် နေရာများ	ဖော်ပြချက်	ပထဝီဆိုင်ရာနေရာဖော်ပြချက်	မှတ်ချက်
၁	WSP-1	ရေသန့်စင်စက်မှ အထွက်	မြောက်လတ္တီတွဒ် ၁၆° ၅၆' ၃၂.၈၀" အရှေ့လောင်ဂျီတွဒ် ၉၆° ၀၉' ၀၇.၅၆၄"	ရေ
၂	WSP-2	ရေသန့်စင်စက်သို့ အဝင်	မြောက်လတ္တီတွဒ် ၁၆° ၅၆' ၃၃.၇၄၆" အရှေ့လောင်ဂျီတွဒ် ၉၆° ၀၉' ၀၇.၄၇၇"	ရေ
၃	WSP-3	မသန့်စင်မီရေ	မြောက်လတ္တီတွဒ် ၁၆° ၅၆' ၃၈.၈၁၀" အရှေ့လောင်ဂျီတွဒ် ၉၆° ၀၉' ၀၆.၆၇၀"	ရေ
၄	WSP-4	စွန့်ပစ်ရည် သန့် စင်စက်မှအထွက်	မြောက်လတ္တီတွဒ် ၁၆° ၅၆' ၃၅.၇၀" အရှေ့လောင်ဂျီတွဒ် ၉၆° ၀၉' ၁၀.၈၆"	စွန့်ပစ်ရည်
၅	WSP-5	စွန့်ပစ်ရည်သန့် စင်စက်သို့အဝင်	မြောက်လတ္တီတွဒ် ၁၆° ၅၆' ၃၄.၃၇၉" အရှေ့လောင်ဂျီတွဒ် ၉၆° ၀၉' ၁၁.၆၉၄"	စွန့်ပစ်ရည်
၆	WSP-6	စက်ရုံရှေ့ရှိ မြောင်း-၅	မြောက်လတ္တီတွဒ် ၁၆° ၅၆' ၃၄.၅၉၂" အရှေ့လောင်ဂျီတွဒ် ၉၆° ၀၉' ၁၁.၅၇၁"	စွန့်ပစ်ရည်
၇	WSP-7	စက်ရုံရှေ့ရှိ မြောင်း-၃	မြောက်လတ္တီတွဒ် ၁၆° ၅၆' ၃၀.၈၈၀" အရှေ့လောင်ဂျီတွဒ် ၉၆° ၀၉' ၁၂.၂၉၃"	စွန့်ပစ်ရည်
၈	WSP-8	တွင်းရေ	မြောက်လတ္တီတွဒ် ၁၆° ၅၆' ၃၉.၀၇" အရှေ့လောင်ဂျီတွဒ် ၉၆° ၀၉' ၀၇.၃၈"	ရေ
၉	WSP-9	စက်ရုံရှေ့ရှိ မြောင်း-၁	မြောက်လတ္တီတွဒ် ၁၆° ၅၆' ၂၈.၅၉" အရှေ့လောင်ဂျီတွဒ် ၉၆° ၀၉' ၁၃.၀၀"	စွန့်ပစ်ရည်



ပုံ ၁-၆ ရေနမူနာကောက်ယူသည့်နေရာများဖော်ပြပုံ



ပုံ ၁-၇ ရေနမူနာကောက်ယူနေပုံ





ပုံ ၁-၈ စွန့်ပစ်ရည်နမူနာကောက်ယူသည့်နေရာများဖော်ပြပုံ





ပုံ ၁-၉ စွန့်ပစ်ရည်နမူနာများကောက်ယူနေပုံ

## ❖ ရေနဲ့စွန့်ပစ်ရည်တို့၏ဓာတ်ခွဲရလဒ်များ

ဇယား ၁-၂ ရေနမူနာဓာတ်ခွဲရလဒ်များ (GMES Laboratory)

စဉ်	ပါရာမီတာ	ယူနစ်	ဓာတ်ခွဲရလဒ်များ				Drinking Water Standard
			WSP-1	WSP-2	WSP-3	WSP-8	WHO (2011)
၁	Aluminum	mg/l	၀.၀၂	၀.၀၂	၀.၀၁	၀.၀၁	၀.၂
၂	Arsenic	μg/l	၀	၀	၀	၀	၁၀
၃	Chloride	mg/l	၂၂	၁၄	၃၀၅	၃၂၀	၂၅၀
၄	Copper	mg/l	ND	ND	၀.၀၆	၀.၀၇	၂
၅	Cyanide	mg/l	ND	ND	ND	ND	၀.၀၇
၆	Manganese	mg/l	ND	ND	၁.၀၅	၀.၉၅	၀.၄
၇	pH	-	၆.၃၃	၆.၈၃	၆.၁၈	၅.၃၄	၆.၅-၈.၅
၈	Sulfate	mg/l	ND	၂.၉	၁၁.၂	၁၃.၄	၂၅၀
၉	Total Alkalinity	mg/l	၂၈	၅၅	၆၅	၈၈	-
၁၀	Total Dissolved Solids	mg/l	၅၀	၆၀	၉၄၀	၉၉၀	၆၀၀
၁၁	Total Hardness	mg/l	၁၄	၃၉	၂၈၉	၃၀၂	၅၀၀
၁၂	Total Iron	mg/l	<၀.၁	၀.၁	၄	၃၀	၀.၃
၁၃	Turbidity	NTU	၉.၂၇	၁၀.၈	၁၆.၄	၅၈.၁	၅

ဓာတ်ခွဲစမ်းသပ်ထားသောရလဒ်များအရ ရေနမူနာ-၃ (မသန့်စင်မီရေ) နှင့် ရေနမူနာ-၈ (တွင်းရေ) တို့မှ ကလိုရိုဒ်၊ မန်းဂနီ၊ TDS၊ total iron နှင့် turbidity တို့၏တန်ဖိုးများသည် WHO ရေသန့်စံချိန်စံနှုန်းများထက် မြင့်မားနေကြောင်း တွေ့ရှိရသော်လည်း သန့်စင်ပြီးနောက်တွင် turbidity မှလွဲ၍ ကျန်တန်ဖိုးများသည် သတ်မှတ်ချက်အတွင်းရှိကြောင်း တွေ့ရှိရသည်။



ဇယား ၁-၃ စွန့်ပစ်ရည်နမူနာခတ်ခွဲရလဒ်များ (GMES Laboratory)

စဉ်	ပါရာမီတာ	ယူနစ်	ခတ်ခွဲရလဒ်များ					National Environmental Quality (Emission) Guidelines (2015) General Application
			WSP-4	WSP-5	WSP-6	WSP-7	WSP-9	
၁	Arsenic	mg/l	၀.၀၃၇၅	၀.၀၃၇၅	၀	၀	၀	၀.၁
၂	Chemical Oxygen Demand (COD)	mg/l	၁၂၅၅	၂၀၁၀	၁၆၀	၉၃၀	၂၅၃၀	၂၅၀
၃	Oil and Grease	mg/l	၁၄	၅၀	ND	ND	ND	၁၀
၄	pH	-	၆.၃၁	၆.၈၆	၄.၆၃	၆.၇၃	၅.၇၈	၆-၉
၅	Total Suspended Solids (TSS)	mg/l	၅၄	၈၂၀	၂၆	၃၈	၂၀	၅၀

ND - Not Detected

ခတ်ခွဲစမ်းသပ်ထားသောစွန့်ပစ်ရည်အရည်အသွေးရလဒ်များအရ ရေနမူနာ-၆ (စက်ရုံရှေ့ရှိမြောင်း-၅) နှင့် ရေနမူနာ-၉ (စက်ရုံရှေ့ရှိ မြောင်း-၁) တို့မှ pH တန်ဖိုးများသည် သတ်မှတ်စံချိန်စံနှုန်းထက် အနည်းငယ်နည်းပါးနေပြီး ရေနမူနာငါးခုလုံး၏ COD၊ ရေနမူနာ-၄ (စွန့်ပစ်ရည်သန့်စင်စက်မှအထွက်) နှင့် ရေနမူနာ-၅ (စွန့်ပစ်ရည်သန့်စင်စက်သို့အဝင်) တို့၏ oil and grease တန်ဖိုးနှင့် ရေနမူနာ-၄၊ ၅၊ ၆ (စက်ရုံရှေ့ရှိမြောင်း-၃)တို့၏ TSS တန်ဖိုးများသည် သတ်မှတ်စံချိန်စံနှုန်းထက်မြင့်မားနေသည်ကိုတွေ့ရှိရပြီး ကျန်ပါရာမီတာများသည် သတ်မှတ်ချက်အတွင်းတွင်ရှိကြောင်း တွေ့ရှိရသည်။

(င) မြေအရည်အသွေး

မြေအရည်အသွေးနှင့်စပ်လျဉ်း၍ အောက်ပါအတိုင်း အပိုင်းနှစ်ပိုင်း တင်ပြအပ်ပါသည်။

❖ မြေနမူနာကောက်ယူသည့်နေရာဖော်ပြချက်

စဉ်	နမူနာကောက်ယူသည့်နေရာ	ပထဝီဆိုင်ရာနေရာ ဖော်ပြချက်	တည်နေရာ
၁	SSP	မြောက်လတ္တီတွဒ် ၁၆° ၅၆'၃၆.၄၀" အရှေ့လောင်ဂျီတွဒ် ၉၆° ၀၉' ၁၀.၇၇"	စက်ရုံ-၁ ဝင်းအတွင်း

SSP = Soil Sampling Point



ပုံ ၁-၁၀ မြေနေမှုနာကောက်ယူသည့်နေရာဖော်ပြပုံ



ပုံ ၁-၁၁ မြေနေမှုနာကောက်ယူနေပုံ

❖ မြေနေမှုနာဓာတ်ခွဲရလဒ်များ

စဉ်	ပါရာမီတာ	ယူနစ်	Analysis Value
၁	Aluminum	mg/kg soil	၀.၀၅
၂	Arsenic	mg/kg soil	၀
၃	Chloride	g/kg soil	၀.၀၃၄
၄	Copper	mg/kg soil	၀.၃၅
၅	Cyanide	mg/kg soil	၀.၁
၆	Extractable Acidity	cmol/kg soil	၄.၈၈

စဉ်	ပါရာမီတာ	ယူနစ်	Analysis Value
၇	Manganese	mg/kg soil	၃.၁
၈	P-Alkalinity	mmol/l extract	၀
၉	pH	-	၆.၃၅
၁၀	Total Alkalinity	mmol/l extract	၃.၃၂
၁၁	Total Iron	g/kg soil	၀.၅

အထက်ဖော်ပြပါဓာတ်ခွဲရလဒ်များကို အခြေခံရလဒ်များအဖြစ်သတ်မှတ်ပြီး နောင်တိုင်းတာမှုတန်ဖိုးများဖြင့် နှိုင်းယှဉ်ရန်ဖြစ်ပါသည်။ ယင်းသို့နှိုင်းယှဉ်မှုအရ ပိုမိုတိုးတက်လာသည်/ဆုတ်ယုတ်လာသည်ကို သိနိုင်မည်ဖြစ်ပါသည်။

၁-၅-၂။ သဘာဝပတ်ဝန်းကျင်/ရုပ်ပတ်ဝန်းကျင် (ဆင့်ပွားအချက်အလက်များ)

(က) သဘာဝ/ရုပ်ပိုင်းဆိုင်ရာပတ်ဝန်းကျင်

စီမံကိန်းဧရိယာရှိ ရာသီဥတု၊မြေမျက်နှာသွင်ပြင်၊ဘူမိအခြေအနေ၊မြေထုနှင့်ရေဆင်းစသည့် အခြေခံအချက်အလက်များကို ရုပ်ပတ်ဝန်းကျင်အဖြစ်တင်ပြထားပါသည်။ ယင်းအချက်အလက်များကို မြို့နယ်အထွေထွေအုပ်ချုပ်ရေးဦးစီးဌာန၏ ၂၀၂၀ ခုနှစ် ရန်ကုန်တိုင်းဒေသကြီး၊ မင်္ဂလာဒုံမြို့နယ် ဒေသဆိုင်ရာအချက်အလက်များမှ ရယူထားပါသည်။ ယင်းတို့ကို အောက်ပါအတိုင်း အပိုင်း (၅) ပိုင်းဖြင့် တင်ပြထားပါသည်။

- ❖ ရာသီဥတု
- ❖ မြေမျက်နှာသွင်ပြင်
- ❖ ဘူမိအခြေအနေ
- ❖ မြေထု
- ❖ ရေဆင်း

(ခ) ဇီဝဆိုင်ရာအချက်အလက်များ

ဤခေါင်းစဉ်အောက်တွင် သဘာဝပေါက်ရောက်ပင်များနှင့် တောရိုင်းတိရစ္ဆာန်များ၏အခြေအနေကို ကောက်နုတ်တင်ပြထားပါသည်။

(ဂ) လူမှုစီးပွားအခြေအနေ

မင်္ဂလာဒုံမြို့နယ်၏လူမှုစီးပွားအခြေအနေများကို အောက်ပါခေါင်းစဉ်များဖြင့် တင်ပြအပ်ပါသည်။

- ❖ လူဦးရေနှင့်အဖွဲ့အစည်း
- ❖ ကိုးကွယ်မှု
- ❖ ပညာရေးကဏ္ဍ
- ❖ လမ်းပန်းဆက်သွယ်ရေး
- ❖ ကျန်းမာရေးကဏ္ဍ
- ❖ စီးပွားရေး

- ❖ မြေအသုံးချမှု
- ❖ လုပ်သားအင်အား

### ၁-၆။ သက်ရောက်မှုများနှင့်လျော့ပါးစေရေးနည်းလမ်းများအကျဉ်းချုပ်

MAOI စက်ရုံ-၁ သည် အဆောက်အအုံများကို ဆောက်လုပ်ထားပြီးသားဖြစ်သောကြောင့် တည်ဆောက်ရေးကာလသက်ရောက်မှုများကို ထည့်သွင်းစဉ်းစားရန်မလိုအပ်ပါ။

MAOI ထုတ်ကုန်များမှ ပြန်လည်သန့်စင်နိုင်သောပစ္စည်းများ(ဖန်ကဲ့သို့သော)ထွက်ရှိပါသည်။ သို့သော်လည်း အဆိုပါထုတ်ကုန်များသည် အခြားသောထုတ်ကုန်ပစ္စည်းများကဲ့သို့ပင် ထုတ်လုပ်မှုလုပ်ငန်းစဉ်၏ အဆင့်ဆင့်ကဲ့သို့ပင် အမျိုးမျိုးသောပတ်ဝန်းကျင်ဆိုင်ရာသက်ရောက်မှုများကို ဖြစ်ပေါ်စေနိုင်ပြီး ဤစီမံကိန်းကိုအကောင်အထည်ဖော်ခြင်းကြောင့် စီမံကိန်းဧရိယာအနီးတစ်ဝိုက်တွင် ကောင်းကျိုးနှင့်ဆိုးကျိုးတစ်ချို့ သက်ရောက်မှုရှိနိုင်ပါသည်။ ပတ်ဝန်းကျင်ဆိုင်ရာသက်ရောက်မှုများ၏အဓိကအရင်းအမြစ်မှာ ကုန်ကြမ်းမှ နောက်ဆုံးထုတ်ကုန်အထိ လုပ်ဆောင်ရသောလုပ်ငန်းစဉ်အတွင်း လိုအပ်သောစွမ်းအင်သုံးစွဲမှုနှင့် ရေသုံးစွဲမှုကြောင့် ဖြစ်သည်။

လျော့ပါးစေရေးနည်းလမ်းများသည် သိသာထင်ရှားသောသက်ရောက်မှုများကို ရှောင်ကြဉ်ရန်၊ လျော့ချရန်ဖြစ်သည်။ လုပ်ငန်းလည်ပတ်ခြင်းကာလနှင့်လုပ်ငန်းဖျက်သိမ်းခြင်းကာလများတွင် ရုပ်ဂုဏ်သတ္တိ၊ ဇီဝဖြစ်စဉ်နှင့် လူမှုပတ်ဝန်းကျင်တို့အပေါ် သိသာထင်ရှားသောသက်ရောက်မှုနှင့် လျော့ပါးစေရေးနည်းလမ်းများကို အခန်း (၆) နှင့် (၇) တို့တွင်ဖော်ပြထားသည်။

### ၁-၇။ စောင့်ကြပ်ကြည့်ရှုရေးအစီအစဉ်

#### ပတ်ဝန်းကျင်ဆိုင်ရာစောင့်ကြပ်ကြည့်ရှုရေး

စောင့်ကြပ်ကြည့်ရှုခြင်းသည် အဆိုပြုထားသော ပတ်ဝန်းကျင်ဆိုင်ရာလျော့ပါးစေရေးနည်းလမ်းများအကောင်အထည်ဖော်ဆောင်ရွက်ရေးအတွက် မရှိမဖြစ်လိုအပ်သော အစိတ်အပိုင်းတစ်ခုဖြစ်သည်။ ပတ်ဝန်းကျင်ဆိုင်ရာစောင့်ကြပ်ကြည့်ရှုရေးတွင် အသုံးဝင်သောအချက်အလက်များပါဝင်ပြီး လျော့ပါးစေရေး နည်းလမ်းများအကောင်အထည်ဖော်ရာမှ ပတ်ဝန်းကျင်ဆိုင်ရာအရည်အသွေးတိုးတက်စေမည့် ထိရောက်သောလုပ်ဆောင်ချက်များကိုချမှတ်ရန် ရည်ရွယ်ပါသည်။

စောင့်ကြပ်ကြည့်ရှုခြင်းတွင် ဆိုးကျိုးသက်ရောက်မှုများကိုလျော့ချနိုင်ရန်၊ သတ်မှတ်ချက်စံချိန်စံနှုန်းများနှင့်ကိုက်ညီသော အကြံပြုချက်များပေးနိုင်ရန် စီမံကိန်းဧရိယာအတွင်း လုပ်ငန်းဆောင်ရွက်ချက်များကို လေ့လာခြင်း၊ သုံးသပ်အကဲဖြတ်ခြင်း၊ ဆန်းစစ်ခြင်းတို့ပါဝင်ပါသည်။ ယင်းအစီအစဉ်သည် သက်ဆိုင်ရာဌာနများမှညွှန်ကြားထားသော ကြိမ်နှုန်းများအတိုင်း ဖြစ်ပေါ်နိုင်သောသက်ရောက်မှုများအပေါ် အခြေခံ၍ အစီရင်ခံစာနှင့်တကွ ရှင်းလင်းပြည့်စုံစွာ တင်ပြရမည်။

ပတ်ဝန်းကျင်ဆိုင်ရာထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာလုပ်ထုံးလုပ်နည်း အပိုဒ် (၁၀၈) အရ စီမံကိန်းအဆိုပြုသူသည် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်၏ဇယားပါအတိုင်း စောင့်ကြပ်ကြည့်ရှုမှုအစီရင်ခံစာကို ဝန်ကြီးဌာနသို့ (၆) လတစ်ကြိမ် (သို့မဟုတ်) ဝန်ကြီးဌာနကသတ်မှတ်သည့်အတိုင်း တင်ပြရမည်။

ဇယား ၁-၄ လုပ်ငန်းလည်ပတ်ခြင်းနှင့်လုပ်ငန်းဖျက်သိမ်းခြင်းကာလပတ်ဝန်းကျင်ဆိုင်ရာစောင့်ကြပ်ကြည့်ရှုခြင်းအစီအစဉ်

စဉ်	အမျိုးအစား	စောင့်ကြပ်ကြည့်ရှုရမည့် အရာများ	စောင့်ကြပ်ကြည့်ရှုမှု ပြုလုပ်ရန်အကြိမ်	စောင့်ကြပ်ကြည့်ရှု ရေးနည်းလမ်း	နေရာ	တာဝန်ရှိသူ
လုပ်ငန်းလည်ပတ်ခြင်းကာလ						
၁	လေထုအရည် အသွေး	ပတ်ဝန်းကျင်ဆိုင်ရာ လေအရည်အသွေး	တစ်နှစ်လျှင် ၁ ကြိမ်	စက်ကိရိယာများ ဖြင့် တိုင်းတာခြင်း	စက်ရုံဝင်းအတွင်း	ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုအဖွဲ့
		လုပ်ငန်းခွင်လေအရည်အသွေး	တစ်နှစ်လျှင် ၂ ကြိမ်	စက်ကိရိယာများ ဖြင့် တိုင်းတာခြင်း	လုပ်ငန်းခွင် (centering ဌာနအရှေ့နှင့် ဌာနအတွင်း ၃ နေရာ၊ polishing ဌာနအတွင်း ၃ နေရာ၊ grinding ဌာနအတွင်း ၂ နေရာ၊ curve generation ဌာနအတွင်း ၂ နေရာ၊ coating အခန်း၊ painting အခန်း၊ packaging အခန်း၊ ဓာတုပစ္စည်းသိုလှောင်ခန်းနှင့် မီးစက်ခန်းရှိ ၂ နေရာ)	ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုအဖွဲ့
		မီးစက်များ၏မီးခိုးခေါင်းတိုင်မှထုတ်လွှတ်မှုများ	တစ်နှစ်လျှင် ၂ ကြိမ်	စက်ကိရိယာများ ဖြင့် တိုင်းတာခြင်း	မီးစက်များ၏ခေါင်းတိုင်များ အားလုံး	ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုအဖွဲ့
		<ul style="list-style-type: none"> <li>ယာဉ်များနှင့်စက်ပစ္စည်းကိရိယာများကို စစ်ဆေးခြင်း</li> <li>လေဝင်လေထွက်စနစ်ကိုစစ်ဆေးခြင်း</li> <li>အိမ်သာများနှင့်မိလ္လာစနစ်ကိုစစ်ဆေးခြင်း</li> <li>အမှိုက်ပုံးများနှင့်အမှိုက်စုစည်းရာနေရာများ</li> </ul>	လစဉ်	စစ်ဆေးခြင်း	လုပ်ငန်းခွင်	ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုအဖွဲ့နှင့် ကြီးကြပ်ရေးမှူးများ

စဉ်	အမျိုးအစား	စောင့်ကြပ်ကြည့်ရှုရမည့် အရာများ	စောင့်ကြပ်ကြည့်ရှုမှု ပြုလုပ်ရန်အကြိမ်	စောင့်ကြပ်ကြည့်ရှု ရေးနည်းလမ်း	နေရာ	တာဝန်ရှိသူ
		ကို စစ်ဆေးခြင်း ▪ စစ်ဆေးမှုမှတ်တမ်း/အစီရင်ခံစာပြင်ဆင်ခြင်း				
၂	ဆူညံသံ	ပတ်ဝန်းကျင်ဆိုင်ရာဆူညံသံအဆင့်	တစ်နှစ်လျှင် ၁ ကြိမ်	စက်ကိရိယာများ ဖြင့် တိုင်းတာခြင်း	စက်ရုံဝင်းအတွင်း	ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုအဖွဲ့
		လုပ်ငန်းခွင်ဆိုင်ရာဆူညံသံအဆင့်	တစ်နှစ်လျှင် ၂ ကြိမ်	စက်ကိရိယာများ ဖြင့် တိုင်းတာခြင်း	လုပ်ငန်းခွင် (centering ဌာနအရှေ့နှင့် ဌာနအတွင်း ၃ နေရာ၊ polishing ဌာနအတွင်း ၃ နေရာ၊ grinding ဌာနအတွင်း ၂ နေရာ၊ curve generation ဌာနအတွင်း ၂ နေရာ၊ coating အခန်း၊ painting အခန်း၊ packaging အခန်း၊ ဓာတုပစ္စည်းသိုလှောင်ခန်းနှင့် မီးစက်ခန်းရှိ ၂ နေရာ)	ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုအဖွဲ့
		▪ ဆူညံသံနှင့်တုန်ခါမှုဖြစ်စေသည့်လုပ်ငန်းများ ကို မှတ်တမ်းတင်ခြင်း ▪ အသံအကာအကွယ်ပစ္စည်းများတပ်ဆင်ထားမှု ကို စစ်ဆေးခြင်း ▪ တစ်ကိုယ်ရည်သုံးကာကွယ်ရေးပစ္စည်းများကို လုံလောက်စွာ ထောက်ပံ့ပေးခြင်း	တစ်နှစ်လျှင် ၂ ကြိမ် (သိုမဟုတ်) ညွှန်ကြားချက် အတိုင်း	စစ်ဆေးခြင်း	လုပ်ငန်းခွင်	ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုအဖွဲ့နှင့် ကြီးကြပ်ရေးမှူးများ
၃	အလင်းပမာဏ	အလင်းပမာဏ	တစ်နှစ်လျှင် ၂ ကြိမ်	စက်ကိရိယာများ	လုပ်ငန်းခွင်	ပတ်ဝန်းကျင်ဆိုင်ရာ



စဉ်	အမျိုးအစား	စောင့်ကြပ်ကြည့်ရှုရမည့် အရာများ	စောင့်ကြပ်ကြည့်ရှုမှု ပြုလုပ်ရန်အကြိမ်	စောင့်ကြပ်ကြည့်ရှု ရေးနည်းလမ်း	နေရာ	တာဝန်ရှိသူ
				ဖြင့် တိုင်းတာခြင်း	(Polishing ဌာန၊ grinding ဌာနအတွင်း ၊ curve generation ဌာန၊ coating အခန်းနှင့် painting အခန်း)	စီမံခန့်ခွဲမှုအဖွဲ့
၄	ရေနှင့်စွန့်ပစ်ရည် အရည်အသွေး	ရေအရည်အသွေး	တစ်နှစ်လျှင် ၁ ကြိမ်	ဓာတ်ခွဲစမ်းသပ် ခြင်း	ရေသန့်စင်စက်မှအထွက်၊ ရေ သန့်စင်စက်သို့အဝင်၊ မသန့်စင် မီရေနှင့် တွင်းရေ	ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုအဖွဲ့
		စွန့်ပစ်ရည်အရည်အသွေး	တစ်နှစ်လျှင် ၁ ကြိမ်	ဓာတ်ခွဲစမ်းသပ် ခြင်း	ရေဆိုးသန့်စင်စက်မှအထွက်၊ ရေဆိုးသန့်စင်စက်သို့အဝင်၊ စက်ရုံအတွင်းရှိ မြောင်း-၅၊ မြောင်း-၃ နှင့် မြောင်း-၁	ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုအဖွဲ့
		<ul style="list-style-type: none"> <li>မိုးရေစီးဆင်းမှုများကိုစစ်ဆေးခြင်း</li> <li>အစိုင်အခဲစွန့်ပစ်ပစ္စည်းများစုစည်းမှုကို စစ် ဆေးခြင်းနှင့်ထိန်း သိမ်းခြင်း</li> <li>ကွန်ကရစ်ကြမ်းခင်းများအခြေအနေကို စစ် ဆေးခြင်း</li> <li>ဆီ၊ ချောဆီနှင့် လောင်စာများ ဖိတ်စင်မှု၊ ယို စိမ့်မှုများကို စစ်ဆေးခြင်း</li> <li>စစ်ဆေးမှုမှတ်တမ်း/အစီရင်ခံစာပြင်ဆင်ခြင်း</li> </ul>	လစဉ်	စစ်ဆေးခြင်း	လုပ်ငန်းခွင်နှင့် စက်ရုံဝင်း အတွင်း	ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုအဖွဲ့နှင့် ကြီးကြပ်ရေးမှူးများ
၅	မြေထုအရည် အသွေး	မြေ	တစ်နှစ်လျှင် ၁ ကြိမ်	ဓာတ်ခွဲစမ်းသပ် ခြင်း	စက်ရုံဝင်းအတွင်း	ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုအဖွဲ့
6.	စွန့်ပစ်ပစ္စည်း	<ul style="list-style-type: none"> <li>မတူညီသောစွန့်ပစ်ပစ္စည်းများအလိုက် အမှိုက်</li> </ul>	လစဉ်	စစ်ဆေးခြင်း	စက်ရုံဝင်းအတွင်းနှင့်	ပတ်ဝန်းကျင်ဆိုင်ရာ

စဉ်	အမျိုးအစား	စောင့်ကြပ်ကြည့်ရှုရမည့် အရာများ	စောင့်ကြပ်ကြည့်ရှုမှု ပြုလုပ်ရန်အကြိမ်	စောင့်ကြပ်ကြည့်ရှု ရေးနည်းလမ်း	နေရာ	တာဝန်ရှိသူ
	စွန့်ပစ်မှု	<ul style="list-style-type: none"> <li>ပုံးများ ခွဲခြားထားခြင်း</li> <li>စွန့်ပစ်ပစ္စည်းပမာဏကိုမှတ်တမ်းတင်ထားခြင်း</li> <li>အမှိုက်စွန့်ပစ်မှုစနစ်ကိုစစ်ဆေးခြင်း</li> <li>အမှိုက်သိုလှောင်မှုစနစ်ကိုစစ်ဆေးခြင်း</li> </ul>			အနီးအနားပတ်ဝန်းကျင်	စီမံခန့်ခွဲမှုအဖွဲ့
၇	အန္တရာယ်ရှိစွန့်ပစ်ပစ္စည်းစွန့်ပစ်မှု	<ul style="list-style-type: none"> <li>အန္တရာယ်ရှိစွန့်ပစ်ပစ္စည်းပမာဏကိုမှတ်တမ်းတင်ခြင်း</li> <li>စွန့်ပစ်မှုစနစ်ကိုစစ်ဆေးခြင်း</li> <li>အန္တရာယ်ရှိစွန့်ပစ်ပစ္စည်းသိုလှောင်ဧရိယာကိုစစ်ဆေးခြင်း</li> </ul>	လစဉ်	စစ်ဆေးခြင်း	အန္တရာယ်ရှိစွန့်ပစ်ပစ္စည်းသိုလှောင်ဧရိယာ	ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုအဖွဲ့
၈	ရေအသုံးပြုမှု	<ul style="list-style-type: none"> <li>ရေအသုံးပြုမှုပမာဏကို မှတ်တမ်းတင်ထားခြင်း</li> </ul>	နေ့စဉ်/လစဉ်	ရေမီတာဖြင့်မှတ်တမ်း တင်ခြင်း	သောက်ရေ၊ လုပ်ငန်းသုံးရေနှင့် ဝန်ထမ်းသုံးရေ	ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုအဖွဲ့
၉	လျှပ်စစ်အသုံးပြုမှု	<ul style="list-style-type: none"> <li>လျှပ်စစ်အသုံးပြုမှုပမာဏကိုမှတ်တမ်းတင်ထားခြင်း</li> </ul>	နေ့စဉ်/လစဉ်	မှတ်တမ်းတင်ခြင်း	လျှပ်စစ်မီတာ	ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုအဖွဲ့
၁၀	လောင်စာအသုံးပြုမှု	<ul style="list-style-type: none"> <li>ဒီဇယ်အသုံးပြုမှုပမာဏကိုမှတ်တမ်းတင်ထားခြင်း</li> </ul>	နေ့စဉ်/လစဉ်	မှတ်တမ်းတင်ခြင်း	မီးစက်များ	ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုအဖွဲ့
၁၁	လုပ်ငန်းခွင်ကျန်းမာရေးနှင့်ဘေးအန္တရာယ်ကင်းရှင်းရေး	<ul style="list-style-type: none"> <li>လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေးကို မှတ်တမ်းတင်ခြင်း</li> <li>အလုပ်သမားများ၏အဆင်မပြေမှုများနှင့် တောင်းဆိုမှုများကို မှတ်တမ်းတင်ခြင်း</li> <li>တစ်ကိုယ်ရည်သုံးကာကွယ်ရေးပစ္စည်းများ အားစစ်ဆေးခြင်းနှင့် မှတ်တမ်းတင်ခြင်း</li> </ul>	လစဉ်	စစ်ဆေးခြင်း	စက်ရုံဝင်းအတွင်း	HSE အရာရှိနှင့် ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုအဖွဲ့

စဉ်	အမျိုးအစား	စောင့်ကြပ်ကြည့်ရှုရမည့် အရာများ	စောင့်ကြပ်ကြည့်ရှုမှု ပြုလုပ်ရန်အကြိမ်	စောင့်ကြပ်ကြည့်ရှု ရေးနည်းလမ်း	နေရာ	တာဝန်ရှိသူ
		<ul style="list-style-type: none"> <li>ရေဦးသူနာပြုဆေးသေတ္တာများထားရှိပေးခြင်း</li> <li>အလုပ်သမားများနားနေဆောင်များနှင့် သောက်ရေရရှိမှုအခြေအနေများအား စစ်ဆေးပေးခြင်း</li> <li>အိမ်သာနှင့်မိလ္လာစနစ်အားစစ်ဆေးခြင်း</li> </ul>				
		<ul style="list-style-type: none"> <li>အရေးကြီးသောနေရာတွင် ဝန်ထမ်းများအတွက် ပုံမှန်စစ်ဆေးခြင်း</li> <li>ဝန်ထမ်းတစ်ဦးစီ၏ ဆေးစစ်ချက်မှတ်တမ်း</li> <li>OHS နှင့် ရေဦးသူနာပြုခြင်းအတွက် လေ့ကျင့်ပေးခြင်း</li> </ul>	တစ်နှစ်လျှင် ၁ ကြိမ်	စစ်ဆေးခြင်း	စက်ရုံဝင်းအတွင်း	HSE အရာရှိနှင့် ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုအဖွဲ့
၁၂	အခြားသောလူမှုဆိုင်ရာကိစ္စရပ်များ	<ul style="list-style-type: none"> <li>လူမှုတာဝန်သိအစီအစဉ်လုပ်ငန်းများ</li> <li>အလုပ်သမားဖူလုံထောက်ပံ့ရေးဆောင်ရွက်မှုများ</li> </ul>	နှစ်စဉ်	မှတ်တမ်းတင်ခြင်း	အနီးဆုံးဒေသနှင့်စက်ရုံဧရိယာ	HR မန်နေဂျာနှင့် ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုအဖွဲ့
၁၃	အရေးပေါ်သဘာဝဘေးအန္တရာယ်များ	<ul style="list-style-type: none"> <li>မီးသတ်ပစ္စည်းများအားစစ်ဆေးခြင်း</li> <li>သင်တန်းအခြေအနေနှင့်တက်ရောက်သူများစာရင်းအား မှတ်တမ်းတင်ခြင်း</li> <li>ဘေးအန္တရာယ်ရှိသောပစ္စည်းများကိုတွယ်ခြင်းနှင့်စီမံခန့်ခွဲမှုများအား မှတ်တမ်းတင်ခြင်း</li> <li>အရေးပေါ်တုံ့ပြန်မှုလုပ်ငန်းများအား စစ်ဆေးခြင်းနှင့် မှတ်တမ်းတင်ခြင်း</li> </ul>	တစ်နှစ်လျှင် ၂ ကြိမ် သို့မဟုတ် လိုအပ်သလို	စစ်ဆေးခြင်း	စက်ရုံဝင်းအတွင်း	အရေးပေါ်တုံ့ပြန်ရေးအဖွဲ့နှင့် ပတ်ဝန်းကျင်ဆိုင်ရာစီမံခန့်ခွဲမှုအဖွဲ့

စဉ်	အမျိုးအစား	စောင့်ကြပ်ကြည့်ရှုရမည့် အရာများ	စောင့်ကြပ်ကြည့်ရှုမှု ပြုလုပ်ရန်အကြိမ်	စောင့်ကြပ်ကြည့်ရှု ရေးနည်းလမ်း	နေရာ	တာဝန်ရှိသူ
		<ul style="list-style-type: none"> <li>စီမံကိန်းဧရိယာတစ်ဝိုက်ရှိမြောင်းများအား စစ်ဆေးခြင်းနှင့် မှတ်တမ်းတင်ခြင်း</li> <li>အရေးပေါ်တုံ့ပြန်မှုအစီအစဉ်အား မှတ်တမ်းတင်ခြင်း</li> <li>စစ်ဆေးမှုအချက်အလက်များအား မှတ်တမ်းတင်ခြင်း</li> </ul>				
လုပ်ငန်းဖျက်သိမ်းခြင်းကာလ						
၁	လေထုအရည်အသွေး	ပတ်ဝန်းကျင်ဆိုင်ရာ လေထုအရည်အသွေး	တစ်ကြိမ်	စက်ကိရိယာများဖြင့် တိုင်းတာခြင်း	စက်ရုံဝင်းအတွင်း	ဖျက်သိမ်းရေးကန်ထရိုက်တာ
		ဖုန်မှုန့်ထုတ်လုပ်ခြင်း	တစ်ကြိမ်	အမြင်ဖြင့်စစ်ဆေးခြင်း	စက်ရုံဝင်းအတွင်း	ဖျက်သိမ်းရေးကန်ထရိုက်တာ
		အိတ်ဇောဓာတ်ငွေ့များ	အပတ်စဉ်	အမြင်ဖြင့်စစ်ဆေးခြင်း	စက်ရုံဝင်းအတွင်း	ဖျက်သိမ်းရေးကန်ထရိုက်တာ
		မော်တော်ယာဉ်များ၊ စက်ယန္တရားများ ပြုပြင်ထိန်းသိမ်းခြင်း	လိုအပ်လျှင်လိုအပ်သလို	ပြုပြင်ထိန်းသိမ်းမှုမှတ်တမ်း	စက်ရုံဝင်းအတွင်း	ဖျက်သိမ်းရေးကန်ထရိုက်တာ
၂	ဆူညံသံအဆင့်	ပတ်ဝန်းကျင်ဆိုင်ရာဆူညံသံအဆင့်	တစ်ကြိမ်	စက်ကိရိယာများဖြင့် တိုင်းတာခြင်း	စက်ရုံဝင်းအတွင်း	ဖျက်သိမ်းရေးကန်ထရိုက်တာ
		မော်တော်ယာဉ်များ၊ စက်ယန္တရားများနှင့် စက်ကိရိယာများကို ပြုပြင်ထိန်းသိမ်းခြင်း	လိုအပ်လျှင်လိုအပ်သလို	ပြုပြင်ထိန်းသိမ်းမှုမှတ်တမ်း	စက်ရုံဝင်းအတွင်း	ဖျက်သိမ်းရေးကန်ထရိုက်တာ
၃	ရေနှင့်စွန့်ပစ်ရည်အရည်အသွေး	သောက်ရေနှင့်သုံးရေတို့၏ရေအရည်အသွေး	တစ်ကြိမ်	ဓာတ်ခွဲစမ်းသပ်ခြင်း	စက်ရုံဝင်းအတွင်း	ဖျက်သိမ်းရေးကန်ထရိုက်တာ
		စွန့်ပစ်ရည်အရည်အသွေး	တစ်ကြိမ်	ဓာတ်ခွဲစမ်းသပ်	ပြင်ပမြောင်းသို့မစွန့်ပစ်မီ	ဖျက်သိမ်းရေး

စဉ်	အမျိုးအစား	စောင့်ကြပ်ကြည့်ရှုရမည့် အရာများ	စောင့်ကြပ်ကြည့်ရှုမှု ပြုလုပ်ရန်အကြိမ်	စောင့်ကြပ်ကြည့်ရှု ရေးနည်းလမ်း	နေရာ	တာဝန်ရှိသူ
				ခြင်း	နောက်ဆုံးရေထွက်ပေါက်	ကန်ထရိုက်တာ
		ယာယီရေကန်များအသုံးပြုခြင်း	အပတ်စဉ်	အမြင်ဖြင့်စစ်ဆေးခြင်း	စက်ရုံဝင်းအတွင်း	ဖျက်သိမ်းရေး ကန်ထရိုက်တာ
		စွန့်ပစ်ရည်များစုဆောင်းခြင်း	လစဉ်	ရေဆိုးစုဆောင်းရေး ပြေစာမှတ်တမ်း	ယာယီမိလ္လာကန်များ	ဖျက်သိမ်းရေး ကန်ထရိုက်တာ
၄	မြေထုအရည်အသွေး	မြေ	တစ်ကြိမ်	ဓာတ်ခွဲစမ်းသပ်ခြင်း	စက်ရုံဝင်းအတွင်း	ဖျက်သိမ်းရေး ကန်ထရိုက်တာ

အဆိုပြုစီမံကိန်း၏လုပ်ငန်းလည်ပတ်စဉ်နှင့်ဖျက်သိမ်းခြင်းကာလများတွင် ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုရေးရန်ပုံငွေတို့ကို ၂၂,၈၃၀,၀၀၀ ကျပ်နှင့် ၃,၄၅၀,၀၀၀ ကျပ် အသီးသီးလျာထားပါကြောင်းနှင့် အသေးစိတ်အချက်အလက်များကို အပိုဒ် ၈-၂ တွင် တင်ပြထားပါသည်။

၁-၈။ အများပြည်သူနှင့် တွေ့ဆုံဆွေးနွေးခြင်းနှင့် ထုတ်ဖော်ကြေညာခြင်း

အဖွဲ့လိုက်တွေ့ဆုံဆွေးနွေးမှုများတွင် စက်ရုံဝန်ထမ်းများနှင့်တွေ့ဆုံခြင်းနှင့် သက်ဆိုင်ရာအစိုးရအဖွဲ့ အစည်းများနှင့် စီမံကိန်းအနီးနေထိုင်သူ ဒေသခံပြည်သူများနှင့် တွေ့ဆုံဆွေးနွေး၍ အကြံပြုချက်များရယူခြင်း ဟူ၍ နည်းနှစ်နည်းရှိပါသည်။

၁-၈-၁။ စက်ရုံဝန်ထမ်းများနှင့်တွေ့ဆုံခြင်း

၂၀၂၁ ခုနှစ် မတ်လ ၁၂ ရက်နေ့တွင် Myanmar Asia Optical International (MAOI) ကုမ္ပဏီလီမိတက်၏စက်ရုံထဲသို့ စက်ရုံလုပ်သားဝန်ထမ်းများနှင့် တွေ့ဆုံဆွေးနွေးမှုကို ဆောင်ရွက်ခဲ့ပါသည်။ တက်ရောက်သူဦးရေ ၂၄၂ ဦးစာရင်းရရှိခဲ့ပြီး အကြံပြုလွှာများ ရရှိ ခဲ့ပါသည်။



ပုံ ၁-၁၂ စက်ရုံဝန်ထမ်းများနှင့်တွေ့ဆုံဆွေးနွေးပွဲမှ ဓာတ်ပုံများ

စက်ရုံဝန်ထမ်းများနှင့်တွေ့ဆုံဆွေးနွေးခြင်းဆိုင်ရာ အသေးစိတ်အချက်အလက်များမှာ အောက်ပါ အတိုင်းဖြစ်သည်။

ဇယား ၁-၅ စက်ရုံဝန်ထမ်းများနှင့်တွေ့ဆုံဆွေးနွေးခြင်းဆိုင်ရာ အချက်အလက်များ

စဉ်	ကိစ္စရပ်များ	အကြံပြုချက်များ/မှတ်ချက်များ	စက်ရုံဘက်မှတုံ့ပြန်ချက်များ
(၁) လုပ်ငန်းခွင်ကျန်းမာရေးနှင့်ဘေးအန္တရာယ်ကင်းရှင်းရေးအတွက် အကြံပြုချက်			
၁.၁	လုပ်ငန်းခွင်သုံးအကာ	တက်ရောက်လာသူအားလုံးကလုံ	✓ ဝန်ထမ်းများအားလုံးများအားလုံးကို



စဉ်	ကိစ္စရပ်များ	အကြံပြုချက်များ/မှတ်ချက်များ	စက်ရုံဘက်မှတုံ့ပြန်ချက်များ
	အကွယ်ပစ္စည်းများ	လောက်စွာထောက်ပံ့ပေးထားကြောင်း ဖော်ပြခဲ့သည်။	PPE များထောက်ပံ့ပေးထားပါသည်။
၁.၂	သောက်ရေ	တက်ရောက်လာသူအားလုံးကသောက် ရေများလုံလောက်စွာရရှိကြောင်း ဖော် ပြထားပါသည်။	✓ ကုမ္ပဏီသည်ကျန်းမာရေးနှင့်ညီညွတ် သောသောက်ရေကို ထောက်ပံ့ထား ပေးပြီး ရေအရည်အသွေးကို နှစ်စဉ် စစ်ဆေးပါသည်။
၁.၃	မိလ္လာစနစ်	လူအားလုံးသည်ကောင်းမွန်ပြီးလုံ လောက်သည်ဟု ဖော်ပြထားပါသည်။	✓ စက်ရုံရှိအိမ်သာ၊ စားသောက်ဆောင် နှင့် အများသူငှာနေရာများတွင် ဆပ် ပြာနှင့်လက်သန့်ဆေးရည်များ ထား ပေးထားပါသည်။
၁.၄	ဆေးကြောသန့်စင်ခြင်း စနစ်	အစည်းအဝေးသို့တက်ရောက်လာသူ များမှ ဆပ်ပြာနှင့်လက်သန့်ဆေးရည် များထောက်ပံ့ပေးထားကြောင်း ဖော်ပြ ထားပါသည်။	
(၂) လုပ်ငန်းခွင်တွင် အလုပ်လုပ်ကိုင်မှုအခြေအနေနှင့်စပ်လျဉ်း၍ အကြံပြုချက်			
၂.၁	လုပ်ငန်းခွင်ဆူညံသံ	တက်ရောက်လာသူဝန်ထမ်းများအနက် ၄၀ဦးမှဆူညံမှုမရှိကြောင်းဖော်ပြထား သော်လည်း ၇ဦးမှာမူ အနည်းငယ်ရှိ ကြောင်းဖော်ပြထားပါသည်။	✓ ဆူညံသံကိုလစဉ်စောင့်ကြည့်ပါ သည်။ ✓ ဆူညံသံသတ်မှတ်ချက်ထက်ကျော် လွန်သောလုပ်ငန်းခွင်တွင် လုပ်ကိုင် ရသောဝန်ထမ်းများအတွက်နားကြပ် နှင့်နားအစွပ်များပေးထားပါသည်။
၂.၂	အနံ့ဆိုး	တက်ရောက်လာသူဝန်ထမ်းများအနက် ၄၅ဦးမှအနံ့မရှိကြောင်းဖော်ပြထား သော်လည်း ၂ဦးမှာမူ အနံ့အနည်းငယ်ရှိ ကြောင်းဖော်ပြထားပါသည်။	✓ လေဝင်/လေထွက်စနစ်ကို ပုံမှန် လစဉ် သန့်ရှင်းပေးပါမည်။
၂.၃	လုပ်ငန်းခွင်ရှိအလင်း ရောင်	အားလုံးမှအဆင်ပြေကြောင်းဆွေးနွေး ထားပါသည်။	✓ ကုမ္ပဏီလုပ်ငန်းခွင်နေရာတိုင်းတွင် စံချိန်မီမီးချောင်း/မီးအိမ်များ လုံ လောက်စွာတပ်ဆင်ထားပါသည်။
၂.၄	လုပ်ငန်းခွင်ရှိအမှုန် အမွှား/ဖုန်မှုန့်များ	တက်ရောက်လာသူ(၉)ဦးမှအမှုန်အမွှား မရှိဟုဖော်ပြထားပြီး (၈)ဦးမှအနည်း ငယ်ရှိသည်ဟု ဖြေကြားထားပါသည်။	✓ လုပ်ငန်းခွင်တွင်းရှိဝန်ထမ်းများအား နှာခေါင်းစည်းများတပ်ဆင်စေပြီး အမှုန်အမွှားများကိုလည်း ပုံမှန်သန့် ရှင်းရေးလုပ်ပေးပါမည်။
၂.၅	လုပ်ငန်းခွင်လေဝင်/ လေထွက်စနစ်	အားလုံးမှအဆင်ပြေကြောင်းဆွေးနွေး ထားပါသည်။	✓ လုပ်ငန်းခွင်အတွင်း လေဝင်/လေ ထွက်ကောင်းမွန်စေရန် အိတ်ဇော စနစ်နှင့်လေအေးပေးစနစ်များ တပ် ဆင်ထားပါသည်။
(၃) လုပ်ငန်းခွင်လူမှုဆက်ဆံရေးအခြေအနေနှင့်စပ်လျဉ်း၍ အကြံပြုချက်			

စဉ်	ကိစ္စရပ်များ	အကြံပြုချက်များ/မှတ်ချက်များ	စက်ရုံဘက်မှတုံ့ပြန်ချက်များ
၃.၁	ဝန်ထမ်းအချင်းချင်း ပေါင်းသင်းဆက်ဆံရေး	<ul style="list-style-type: none"> <li>မိမိအထက်လူကြီးများနှင့် အဆင်ပြေကြောင်းဖော်ပြထားပါသည်။</li> </ul>	<ul style="list-style-type: none"> <li>✓ လုပ်ငန်းခွင်အသီးသီးမှဝန်ထမ်းများအား ကောင်းမွန်သောပူးပေါင်းဆောင်ရွက်မှုဖြင့် လုပ်ဆောင်စေပါသည်။</li> </ul>

### ၁-၈-၂။ သက်ဆိုင်ရာအစိုးရအဖွဲ့နှင့်စက်ရုံနီးချင်းများနှင့် တွေ့ဆုံညှိနှိုင်းဆွေးနွေးခြင်း

၂၀၂၁ခုနှစ်၊အောက်တိုဘာလ (၁၆) ရက်နေ့တွင် မင်္ဂလာဒုံစက်မှုဥယျာဉ်(MIP)၏စက်မှုဇုန်စီမံခန့်ခွဲမှုကော်မတီရုံး၌ လူထုတွေ့ဆုံဆွေးနွေးပွဲကို ကျင်းပပြုလုပ်ခဲ့ပါသည်။ ထိုအစည်းအဝေးပွဲသို့ ဇုန်ကော်မတီရုံးမှတာဝန်ရှိသူများ၊ သက်ဆိုင်ရာအစိုးရအဖွဲ့အစည်းများ၊ စက်ရုံအနီးတစ်ဝိုက်မှတာဝန်ရှိသူများ၊ စက်ရုံ(၂)ရုံလုံးတို့မှတာဝန်ရှိသူများနှင့် တတိယအဖွဲ့အစည်းတို့ တက်ရောက်ခဲ့ကြပြီး အကြံပြုစာများ ရယူခဲ့ပါသည်။





ပုံ ၁-၁၃ သက်ဆိုင်ရာအစိုးရအဖွဲ့နှင့်စက်ရုံနီးချင်းများနှင့် တွေ့ဆုံညှိနှိုင်းဆွေးနွေးခြင်းမှ ဓာတ်ပုံများ

ဇယား ၁-၆ အစည်းအဝေးပွဲမှဆွေးနွေးချက်များ

စဉ်	အကြံပြုဆွေးနွေးသူမှဆွေးနွေးချက်များ	ပြန်လည်ရှင်းလင်းဖြေကြားမှုများ
၁	<p>ဒေါ်ညိုလင်းထက် (ဒုတိယဦးစီးမှူး)                      ရန်ကုန်မြောက်ပိုင်းခရိုင်၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန</p> <ul style="list-style-type: none"> <li>ပတ်ဝန်းကျင်ဆိုင်ရာအဖွဲ့ကို စက်ရုံတွင်ဖွဲ့စည်းထားရန်နှင့် ယင်းအဖွဲ့အစည်းမှ ဝန်ထမ်းများသို့ ပတ်ဝန်းကျင် ဆိုင်ရာအသိပညာပေးဆောင်ရွက်မှုများနှင့် သင်တန်းပို့ချခြင်းများကို လုပ်ဆောင်သင့်ကြောင်း၊</li> <li>ပတ်ဝန်းကျင်ဆိုင်ရာထိန်းသိမ်းစောင့်ရှောက်မှုများနှင့်ပတ်သက်၍ ပိုမိုသိရှိလိုပါက ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၏ဝက်(ဘ်)ဆိုဒ်နှင့် လူမှုကွန်ယက်စာမျက်နှာများတွင် ဝင်ရောက်လေ့လာနိုင်ပါကြောင်း၊</li> <li>ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနမှချမှတ်</li> </ul>	<p>ဦးကျော်စိုးဝင်း (အုပ်ချုပ်မှုဒါရိုက်တာ)                      Green Myanmar Environmental Services Co., Ltd</p> <ul style="list-style-type: none"> <li>စက်ရုံများအနေဖြင့် မိမိတို့၏စက်ရုံတွင် Pollution Control Manager (သို့မဟုတ်) Safety Officer ကဲ့သို့သော ကျွမ်းကျင်ဝန်ထမ်းများကို ခန့်အပ်ထားရန်လိုအပ်ပါကြောင်း၊</li> <li>ထိုကျွမ်းကျင်ဝန်ထမ်းများအနေဖြင့် သက်ဆိုင်ရာစက်ရုံများရှိဝန်ထမ်းများ၏လုပ်ငန်းခွင်ဆိုင်ရာဘေးအန္တရာယ်ကင်းရှင်းရေးနှင့် ပတ်ဝန်းကျင်ဆိုင်ရာထိန်းသိမ်းစောင့်ရှောက်မှုများကို ဆောင်ရွက်ရန်လိုအပ်ပါကြောင်း၊</li> <li>ဆွေးနွေးပွဲသို့တက်ရောက်လာသူများအနေဖြင့်လည်း ကိုယ်တိုင်ကိုယ်ကျဆွေးနွေးလိုခြင်းမရှိပါ</li> </ul>

စဉ်	အကြံပြုဆွေးနွေးသူမှဆွေးနွေးချက်များ	ပြန်လည်ရှင်းလင်းဖြေကြားမှုများ
	<p>ထားသောလမ်းညွှန်ချက်များအတိုင်း လိုက်နာဆောင်ရွက်သင့်ပါကြောင်း၊</p> <ul style="list-style-type: none"> <li>စက်ရုံတွင်လုပ်ကိုင်နေကြသောဝန်ထမ်းများအတွက် ကျန်းမာရေးစောင့်ရှောက်မှုဆိုင်ရာ ကိစ္စရပ်များကို အလေးထားဆောင်ရွက်သင့်ပါကြောင်း၊</li> <li>စက်ရုံလုပ်ငန်းအတွက်လိုအပ်သောလုပ်ငန်း လိုင်စင်များကို သက်ဆိုင်ရာဌာနများသို့တင်ပြ၍ခွင့်ပြုချက်တောင်းခံပြီး လိုက်နာလုပ်ဆောင်သင့်ကြောင်း အကြံပြုအပ်ပါသည်။</li> </ul>	<p>က ဖြန့်ဝေထားသောအကြံပြုစာရွက်များတွင် အကြံပြုချက်များကိုရေးသားနိုင်ပါကြောင်း ပြောကြားခဲ့ပါသည်။</p>

ဇယား ၁-၇ အကြံပြုစာရွက်များမှဖော်ပြချက်များ

စဉ်	အမည်	အကြံပြုဆွေးနွေးချက်များ
၁	ဦးအောင်သူ	<ul style="list-style-type: none"> <li>ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုဆိုင်ရာအစီအစဉ်များသည် ကောင်းမွန်ပါသည်။</li> </ul>
၂	ဒေါ်မေမျိုးရွှေ	<ul style="list-style-type: none"> <li>ပတ်ဝန်းကျင်ထိခိုက်မှုမရှိစေရန် လုပ်ဆောင်ချက်များအဆင်ပြေပါသည်။</li> <li>အဘက်ဘက်မှပြည့်စုံပါသည်။</li> </ul>
၃	ဦးထွန်းလင်းကျော်	<ul style="list-style-type: none"> <li>ဝန်ထမ်းလုပ်သားများ၏လူမှုရေး၊ကျန်းမာရေးနှင့်အလုပ်အကိုင်များတည်တံ့ရေး၊ လုပ်ခလစာမပြတ်ရရှိနိုင်ရေးအတွက် ကြိုးပမ်းဆောင်ရွက်ပေးစေချင်ပါသည်။</li> </ul>
၄	ဦးသက်မျိုးထိုက်	<ul style="list-style-type: none"> <li>Wastewater treatment system ထားရှိသည်ကိုတွေ့ရှိရပါသည်။</li> <li>Green Myanmar ၏ Analysis အရ ရေ၏ pH level သည် ၆.၃၅ ဖြစ်နေပါသည်။</li> <li>Chemical များသုံးစွဲမှုရှိသဖြင့် Wastewater treatment system အား</li> <li>Plastic Injection စက်များလည်ပတ်နေပါသဖြင့် အနံ့အတွက် လေဝင်/လေထွက်စနစ်ကိုကောင်းမွန်စေပြီး ထိန်းသိမ်းမှုပြုလုပ်သင့်ပါသည်။</li> <li>လုပ်ငန်းခွင်နှင့်ပတ်ဝန်းကျင်ကိုထိန်းသိမ်းနိုင်ရန် Chemical management plan များရေးဆွဲအကောင်အထည်ဖော်ပြီး လုပ်ဆောင်သင့်ပါသည်။</li> </ul>
၅	ဒေါ်ဇင်မာလှိုင်	<ul style="list-style-type: none"> <li>အကြံပြုချက်များမရှိပါ။</li> </ul>
၆	ဒေါ်မေချမ်းနိုင်	<ul style="list-style-type: none"> <li>အကြံပြုချက်များမရှိပါ။</li> </ul>
၇	ဒေါ်မေအေး	<ul style="list-style-type: none"> <li>အစိုးရမှထုတ်ပြန်ထားသောဥပဒေများနှင့်စည်းမျဉ်းများအတိုင်း လိုက်နာဆောင်ရွက်ပေးပါရန်</li> </ul>
၈	ဒေါ်ညိုလင်းထက်	<ul style="list-style-type: none"> <li>ဓာတုပစ္စည်းများအသုံးပြုကိုင်တွယ်ခြင်းအတွက် သက်ဆိုင်ရာဌာနမှ လိုင်စင်လျှောက်ထားရယူရန်</li> <li>စွမ်းအင်အသုံးပြုမှု နေ့စဉ်/လစဉ်ပမာဏအား ထည့်သွင်းဖော်ပြရန်</li> <li>လုပ်ငန်းခွင်မှစွန့်ပစ်ရည်၊အခိုးအငွေ့ထုတ်လွှတ်မှုနှင့် ဆူညံသံများကို အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာအရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များနှင့်အညီ လိုက်နာဆောင်ရွက်ရန်</li> </ul>

စဉ်	အမည်	အကြံပြုဆွေးနွေးချက်များ
		<ul style="list-style-type: none"> <li>ဝန်ထမ်းများအား ပတ်ဝန်းကျင်ဆိုင်ရာအသိပညာများ ဖြန့်ဝေပေးရန်နှင့် ယင်းတို့ကို ရန်ကုန်တိုင်းဒေသကြီး၊ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၏ Facebook စာမျက်နှာပေါ်တွင် ဝင်ရောက်လေ့လာနိုင်ပါကြောင်း ဆွေးနွေး အကြံပြုပါသည်။</li> </ul>

### ၁-၉။ နိဂုံးနှင့်အကြံပြုချက်များ

ပတ်ဝန်းကျင်ဆိုင်ရာစီမံခန့်ခွဲမှုအစီအစဉ် (EMP) အစီရင်ခံစာကို ပြင်ဆင်စဉ်ကာလအတွင်း ပတ်ဝန်းကျင်အပေါ်ဆိုးကျိုးသက်ရောက်မှုများသည် ဒေသအတွင်းတွင်ဖြစ်ပေါ်နိုင်ကြောင်းနှင့် လုပ်ငန်းလည်ပတ်စဉ်စွန့်ပစ်ပစ္စည်းများထုတ်လွှတ်မှု၊ မီးလောင်လွယ်သောစွန့်ပစ်ပစ္စည်းများထွက်ရှိနိုင်မှုများကို တွေ့ရှိခဲ့သော်လည်း ယင်းတို့ကိုလုံလောက်သော ထိန်းသိမ်းဆောင်ရွက်မှုများရှိကြောင်းတွေ့ရှိရသဖြင့် ပတ်ဝန်းကျင်အပေါ် သက်ရောက်မှုများသည် လက်ခံနိုင်သည့်အတိုင်းအတာအတွင်းရှိကြောင်း တွေ့ရပါသည်။

အဆိုပြုစီမံကိန်းသည် လေထုညစ်ညမ်းမှုနှင့်အမှုန်အမွှားထွက်ရှိခြင်းတို့အပေါ် ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုခြင်းနှင့် ထိခိုက်မှုများကိုလျော့နည်းစေရန် ဆောင်ရွက်ခြင်းတို့ဖြင့် ဆိုးကျိုးတရားများကို လျော့နည်းစေပြီး လူမှုစီးပွားတိုးတက်စေမည့် စီမံကိန်းတစ်ခုဖြစ်ကြောင်း တင်ပြအပ်ပါသည်။



## 1.0 EXECUTIVE SUMMARY

### 1.1 Background

Myanmar Asia Optical International Company Limited (MAOI) is a wholly foreign owned investment by Asia Optical International Limited (99%) from British Virgin Island and Mr. Yuzo Asano (1%) from Japan. It is incorporated and registered in Myanmar having registration number of 147842228 (26.3.2003).

There are two factories:

- Factory-1 operates for manufacturing of all kinds of lens and
- Factory-2 operates for manufacturing of plastic parts for camera and self-focus lens array (SLA).

This environmental management plan (EMP) report is prepared for factory-1 and it is located at Plot No. (A2, A3), Mingaladon Industrial Park, Mingaladon Township, Yangon Region, Myanmar.

In February 2020, Green Myanmar Environmental Services Company Limited (GMES) was requested by Myanmar Asia Optical International Company Limited (MAOI) to provide professional consultation service to “Manufacturing of all kinds of Lens, Lens Units, Optical Apparatuses, Electronic Apparatuses, SLA, Plastic Parts for Electronic Apparatuses and other Apparatuses on CMP Basis” Project and assist the submission of the Environmental Management Plan (EMP) Report to the Environmental Conservation Department (ECD), Ministry of Natural Resources and Environmental Conservation (MONREC).

### 1.2 Proponent Information

1.	Project Name	Manufacturing of all kinds of Lens, Lens Units, Optical Apparatuses, Electronic Apparatuses, SLA, Plastic Parts for Electronic Apparatuses and other Apparatuses on CMP Basis
2.	Project Proponent	Myanmar Asia Optical International (MAOI) Company Limited
3.	Address of Project	Plot No. (A2, A3), Mingaladon Industrial Park, Mingaladon Township, Yangon Region, Myanmar
4.	Company Registration Number	147842228
5.	Established Time	26.3.2003
6.	Date of Test Run	March 2004
7.	Date of Commercial Run	1.7.2004
8.	Validity of Investment Permit	45 years
9.	Type of Proposed Business	Manufacturing
10.	Type of Investment	100% Foreign Investment

	Amount of Foreign Capital	USD 12.880 Million
	Total Amount of Investment	USD 23.558 Million
	Number of Sharers	45,123 Shares
	Type of Share	Ordinary (USD 6,000 per one share)
11.	Geographical Information	North Latitude 16° 56' 33.66" East Longitude 96° 09' 09.42"
12.	Type of Land	Industrial Land
13.	Land Acquisition	Lease Land
14.	Land Owner/Lessor	Mingaladon Industrial Park Co., Ltd.
15.	Lessee	Myanmar Asia optical International Co., Ltd. (MAOI)
16.	Factory Area	51,134.5 m <sup>2</sup>
17.	Surrounding Environment	<div>East Side      Famoso Clothing Co., Ltd., Matsuya R &amp; D (Myanmar) Co., Ltd., Kangaroo and SMK Mingaladon Garment Co., Ltd.</div> <div>West Side      No. 3 Main Road</div> <div>Left Side      MIP Centralized Wastewater Treatment Plant</div> <div>Right Side      MIP Office</div>
18.	Water Source	<div>Tube well (6" x 600')      4 units</div> <div>MIP Water Supply Tap      3 units</div>
19.	Source of Electrical Power	From National Grid
20.	Power Supply	<div>3 units of transformers</div> <div>Generators</div> <div>160 kVA      Diesel engine (one unit)</div> <div>550 kVA      Diesel engine (one unit)</div> <div>1,000 kVA      Diesel engine (one unit)</div> <div>1,250 kVA      Diesel engine (three units)</div> <div>1,400 kVA      Diesel engine (five units)</div>
21.	Raw Materials	<div>❖ Raw Materials for Optical Lens Processing</div> <div>➤ Optical Glass (Main Raw)</div> <div>➤ Dusper K3 Cleaning Paper</div> <div>➤ Dusper K4 Cleaning Paper</div> <div>➤ Finger Cots</div> <div>➤ Computer Paper</div> <div>➤ Vacuum Bag</div> <div>➤ Filter Paper/Glassing paper</div> <div>➤ Fill</div> <div>➤ Paper Tape/Masking Tape</div> <div>➤ Tape</div>

		<div><div>➤ Plastic Film</div><div>➤ Paper Box</div><div>➤ Paper Pad</div><div>➤ Silica Gel/ Desiccant</div></div> <div>Chemicals (68 kinds)</div>
22.	Raw Materials Imported from	China, Taiwan, Japan and Thailand
23.	Products	Various kinds of optical lens
24.	Products Exported to	China, Taiwan, Japan and Thailand
25.	Production Capacity	4,500,000 Pcs per month
26.	Work Force	Oversea Employees - 65 Local Employees - 3,454 Total - 3,519
27.	Working Hours  Working Days  Working Time	8 hours per day (Management Office and Factory)  6 days per week  <b>Management Office</b> One Shift 7:30 a.m. ~ 4:30 p.m. (Monday to Saturday) (Lunch Break: 11:30 a.m. ~ 12:30 p.m.)  <b>Factory Operation</b> Two Shift (Day Shift and Night Shift) <div><div><div><div><div></div><div><u>Day Shift</u></div></div><div>Monday~ Saturday</div><div>Break</div><div>Overtime (OT)</div></div><div><div>7:30 a.m.~4: 00 p.m.</div><div>11:30 a.m.~12:00 p.m.</div><div>4:00 p.m.~7:30 p.m.</div></div><div><div><u>Night Shift</u></div><div>7:30 p.m.~4:00 a.m.</div><div>11:30 p.m.~12:00 a.m.</div><div>4:00 a.m.~7:30 a.m.</div></div></div></div>
28.	List of Directors	<div><div>Name - Mr. Yuzo Asano</div><div>Citizenship - Japanese</div><div>Passport No. - TZ 1187753</div><div>Designation - Managing Director</div></div> <div><div>Name - Mr. Chen, Han-Jung</div><div>Citizenship - Chinese</div><div>Passport No. - 314993106</div><div>Designation Director</div></div>
29.	Contact Details	<div><div>Project</div><div>Address</div></div> <div><div>Plot No. (A2, A3), Mingaladon Industrial Park, Mingaladon Township, Yangon Region, Myanmar</div></div>

		Telephone	09-5173541
		Email	<a href="mailto:mao80@asiaoptical.com.mm">mao80@asiaoptical.com.mm</a> , <a href="mailto:maoiimexp2@gmail.com">maoiimexp2@gmail.com</a>
30.	Contact Person for EMP Report Preparation	Name	Daw May Chan Khine
		Designation	Line Leader (Admin Department, Import/Export Section)
		Telephone	09420092281
		Email	<a href="mailto:maoiimexp4@gmail.com">maoiimexp4@gmail.com</a>

### Environmental Management Plan (EMP) Study Team

Green Myanmar Environmental Services Company Limited (GMES) is Environmental Management Plan (EMP) study team, registered in ECD having Transitional Consultant Registration Number of Organization No.0006. GMES formed the EMP study team for this project as shown in the following Table.

Table 1-1 Organization of the GMES's EMP Study Team

Sr. No.	Title of Post	Terms of Reference	Nominee, Organization & Transitional Consultant Registration Number
1.	Team Leader	<ul style="list-style-type: none"> <li>Overall management of EMP operation</li> <li>Work plan</li> <li>Technical meeting &amp; workshop</li> <li>Document reviewing and process flow studying</li> <li>Lead and facilitation of public consultation</li> <li>Data compilation and analysis</li> <li>Coordination with stakeholders</li> </ul>	Engr. U Kyaw Soe Win Managing Director Green Myanmar Environmental Services Co., Ltd.  Experience in EMP processing  No.0019
2.	Technical Advisor	<ul style="list-style-type: none"> <li>Design of EMP</li> <li>Technical meeting and workshop</li> <li>Monitoring of EMP process</li> <li>Public consultation meeting</li> <li>Quality control and check</li> <li>Data compilation and analysis</li> </ul>	Daw Kyaw Kyaw Win Retired Director Myanmar Petrochemical Enterprise, Ministry of Electricity and Energy
3.	Environmental Consultant	<ul style="list-style-type: none"> <li>Advise on the design of EMP</li> <li>Develop term of reference for duty and responsibility among EMP team</li> <li>Advise on the environmental baseline</li> <li>Advise on the field survey</li> <li>Facilitate technical analysis</li> <li>Streamline the Environmental Management Plan (EMP)</li> </ul>	Engr. Daw Khin Swe Aye Former Lecturer, Chemical Engineering Dept., Yangon Technological University  No.0021
4.	Consultant	<ul style="list-style-type: none"> <li>Give advice on collecting field data</li> </ul>	Engr. U Sein Thauung Oo

Sr. No.	Title of Post	Terms of Reference	Nominee, Organization & Transitional Consultant Registration Number
	(Air Quality Management)	for air quality <ul style="list-style-type: none"> <li>Assist on air quality control system</li> <li>Give advice on air pollution evaluate and mitigation</li> <li>Give advice for data processing, computing, projection, modeling and analysis</li> <li>Give advice in report preparation</li> </ul>	Chairman Green Myanmar Environmental Services Co., Ltd.  No.0023
5.	Consultant (Wastewater Management)	<ul style="list-style-type: none"> <li>Collecting field data for project activities and municipal waste</li> <li>Assist in laboratory testing</li> <li>Data processing, computing, projection, modeling and analysis</li> <li>Assist in report preparation</li> </ul>	Engr. Daw Tin May Soe Retired Professor & Head, Chemical Engineering Dept., Mandalay Technological University  Experience in environmental toxicology and pollution control  No.0028
6.	Consultant (Laboratory Analysis)	<ul style="list-style-type: none"> <li>Advise on data processing and laboratory testing</li> <li>Prepare instruction for laboratory testing</li> <li>Check the result of environmental laboratory testing</li> <li>Compare the laboratory result and verification</li> </ul>	U Myo Myint Retired Factory Manager Ministry of Industry (1)  No.0026
7.	Consultant (Environmental Quality Management)	<ul style="list-style-type: none"> <li>Assist in preparation of guideline for environmental sampling of air and water quality</li> <li>Monitor the sample collection</li> <li>Register and inspect the sample collected</li> <li>Assist in report preparation for environmental baseline</li> </ul>	Daw Khin Shwe Htay Former Lecturer, Chemical Engineering Dept., Yangon Technological University  Environmental Engineer  No.0022
8.	Social Operation and Field Coordinator	<ul style="list-style-type: none"> <li>Facilitate the technical meeting and record keeping</li> <li>Assist in data mining and secondary data collection</li> <li>Coordinate with local authority and communities</li> </ul>	U Khin Aung Social Specialist Green Myanmar Environmental Services Co., Ltd.  No.0025
9.	Field Supervisor	<ul style="list-style-type: none"> <li>Develop operational checklist for environmental study</li> </ul>	U Kyi Han Bo B.E (Aerospace Fuel and



Sr. No.	Title of Post	Terms of Reference	Nominee, Organization & Transitional Consultant Registration Number
		<ul style="list-style-type: none"> <li>In charge for preliminary field visit</li> <li>Supervise field survey</li> <li>Finalize checking for report and report formatting</li> </ul>	Propellant Engineer)
10.	Environmental Experts	<ul style="list-style-type: none"> <li>Data collection</li> <li>Document reviewing</li> <li>Process studying</li> <li>Preparation of impact evaluation and assessment, and management plan</li> <li>Report preparing and formatting</li> </ul>	<p>Daw Aye Thuzar Hein B.E (Chemical)</p> <p>Daw Hnin Htet Htet Hlaing B.E (Port and Harbor)</p> <p>Daw Wai Wai Mon B.E (Port and Harbor)</p> <p>Daw No No Hnin Nu Nway B.E (Port and Harbor)</p>
11.	Environmental Monitoring Team	<ul style="list-style-type: none"> <li>Environmental baseline measuring</li> <li>Data analysis</li> <li>Environmental baseline mapping</li> <li>Environmental baseline report preparing and formatting</li> </ul>	<p>U Pyae Phyto Kyaw B.Sc (Forestry) (Monitoring Team Leader)</p> <p>U Myo Thet Naung B.E (Aerospace Fuel and Propellant Engineer) (Assistant Team Leader)</p> <p>U Aung Ko Min B.E (Chemical) (Monitoring Technician)</p> <p>U Thiha Zaw (Assistant Monitoring Technician)</p>
12.	Public Coordinator	<ul style="list-style-type: none"> <li>Assist in stakeholder meeting</li> <li>Document preparation and invitation</li> <li>Preparation of document for public consultation meeting</li> <li>Taking suggestion from public consultation meeting</li> </ul>	U Aung Kyaw Than B.E (Chemical)
13.	Laboratory Experts	<ul style="list-style-type: none"> <li>Preparation for water and wastewater sampling</li> <li>Preparation for laboratory testing</li> <li>Laboratory testing</li> <li>Reporting for laboratory results</li> </ul>	<p>Daw Cherry Thwin B.E (Chemical) Laboratory Manager</p> <p>U Thet Min Paing B.E (Chemical)</p>

Sr. No.	Title of Post	Terms of Reference	Nominee, Organization & Transitional Consultant Registration Number
			Laboratory Technician

### 1.3 Policy, Legal and Institutional Framework

Chapter 3 of EMP report is policy, legal and institutional framework and it contains

- **Background**
- **Policy Framework**
- **Myanmar Regulatory Framework in Environmental Assessment**  
[details in National Environmental Policy of Myanmar (2019); Myanmar Agenda 21 (1997); National Sustainable Development Strategy (2009); The Environmental Conservation Law (2012); The Environmental Conservation Rules (2014); Environmental Impact Assessment Procedure (2015) and National Environmental Quality (Emission) NEQ(E)G Guidelines (2015)]
- **Environmental -related Laws and Regulations in Myanmar**  
[3 numbers of Administrative Sector; 3 numbers of City Development Sector; 5 numbers of Environmental Conservation Sector; 1 number of Culture and Heritage Sector; 4 numbers of Biodiversity and Ecosystem Sector; 4 numbers of Land Management; 2 numbers of Emergency/ Disaster Sector; 3 numbers of Finance and Revenue Sector; 1 number of National Planning and Economic Development; 6 numbers of Industrial Sector; 4 numbers of Health Sector; 1 number of Transportation Sector and 9 numbers of Workforce Sector are shown]
- **International Conventions, Treaties and Agreements**  
There are 12 numbers of conventions, treaties and agreements in this heading.
- **Standards and Guidelines for the Surrounding Environment of the Project**
  - Air Quality
  - Water Quality
  - Noise Levels
  - Light Intensity

### 1.4 Description of the Current Environmental and Social Conditions

For preparation of this EMP report, there are two methodologies to collect the data to describe the current environmental and social conditions of the proposed project.

- (i) Primary Data Collection and Analysis
- (ii) Secondary Data Collection and Analysis

**Primary Data Collection and Analysis:** The objective of the EMP baseline data collection is to present the general description of the environment as primary data collection. The methodology is designed to assess the baseline data of the environmental quality factors for “Myanmar Asia Optical International (MAOI) Company Limited” Project. Baseline

environmental parameters are defined according to the guidelines, which apply to projects dedicated to the proposed project.

Environmental baseline data (primary data) such as air quality, light intensity, noise and vibration are measured by using instruments. For water quality, wastewater quality and soil quality, samples are collected and analyzed at the GMES laboratory and ALARM ecological laboratory. The results are mentioned in Chapter 5. All of the results are attached in Appendices.

All necessary criteria such as site selections for sampling and analysis of ambient air quality, workplace air quality, light intensity, noise level, water quality and soil quality were identified by GMES.

**Secondary Data Collection and Analysis:** Some data such as socioeconomic conditions, physical, biological environment and weather data are collected from the respective websites and reviewed by the EMP study team. The regional data of the Mingaladon Township was collected from the Township Data published by General Administration Department (GAD) in 2020.

## **1.5 Description of the Project**

There are three kinds of products manufactured in MAOI for export, which are various kind of optical lens, plastic parts for camera and self-focus lens array (SLA). Among them, various kinds of optical lens are manufactured at factory 1.

MAOI produces various kind of optical lens using in cameras, projectors, cell phones, car cameras, microscopes, telescope lens, laser rangefinders, etc.

Process flow diagram of optical lens manufacturing process in MAOI and a brief description of each process steps in general are shown as below.

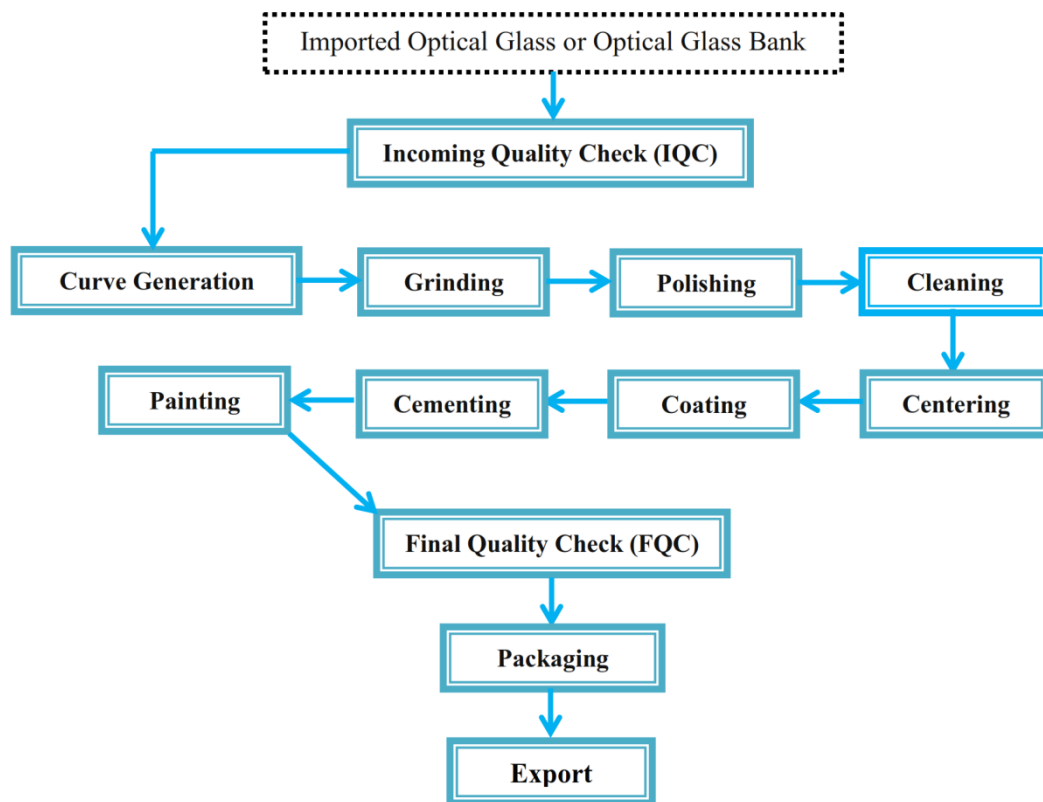


Figure 1-1 Process Flow Diagram of Optical Lens Manufacturing Process

### 1.5.1 Environmental Baseline Situation (Primary Data)

#### (a) Air Quality

Air quality measurement was taken at the project site. The sampling points were selected based on their locations relative to key community receptors, as well as their current or potential for impairments.

- 1) Ambient air quality at the project site was measured at only one sampling point
- 2) Workplace (indoor) air quality was measured at 17 points and
- 3) Stack emission from diesel generators.

#### 1) Ambient Air Quality

There are three descriptions about the ambient air quality as follows.

#### ❖ Measured Parameters for Ambient Air Quality

No.	Parameters	Analysis Methods
1.	Sulfur dioxide (SO <sub>2</sub> )	Electrochemical sensors
2.	Nitrogen dioxide (NO <sub>2</sub> )	Electrochemical sensors
3.	Carbon dioxide (CO <sub>2</sub> )	NDIR (optional sensor)
4.	Carbon monoxide (CO)	Electrochemical sensors
5.	Hydrogen Sulfide (H <sub>2</sub> S)	Electrochemical sensors
6.	Particulate matter 2.5 (PM <sub>2.5</sub> )	Infrared light scattering
7.	Particulate matter 10 (PM <sub>10</sub> )	Infrared light scattering

Ambient air quality at the project site was measured continuously at only one sampling point for 24 hours.

❖ **Location of Ambient Air Quality Measuring Point**

Sr. No.	Measuring Points	Geographic Information	Description
1.	AMP	16° 56' 28.67" N 96° 09' 12.48" E	Near the entrance of the office at MAOI-1

AMP = Ambient Air Quality Measuring Point



Figure 1-2 Location of Ambient Air Quality Measuring Point



Figure 1-3 Status of Ambient Air Quality Measurement



❖ **Measuring Results of Ambient Air Quality Baseline Data (AMP)**

Sr. No.	Parameters	Unit	Analysis Values		National Environmental (Emission) Quality Guidelines		Remarks
			Result Value	Average Period	Guideline Value	Average Period	
1.	Nitrogen Dioxide	µg/m <sup>3</sup>	42.35	24 hours	<b>200</b>	<b>1 hour</b>	10/2/2020 22:32-23:31 (Peak Hour)
2.	Sulfur Dioxide	µg/m <sup>3</sup>	0	24 hours	<b>20</b>	<b>24 hours</b>	-
3.	Particulate Matter PM <sub>10</sub>	µg/m <sup>3</sup>	139	24 hours	<b>50</b>	<b>24 hours</b>	-
4.	Particulate Matter PM <sub>2.5</sub>	µg/m <sup>3</sup>	86	24 hours	<b>25</b>	<b>24 hours</b>	-
5.	Ammonia	ppm	0.86	24 hours	<b>NG</b>	-	-
6.	Carbon Dioxide	ppm	278.76	24 hours	<b>NG</b>	-	-
7.	Carbon Monoxide	ppm	0.78	24 hours	<b>NG</b>	-	-
8.	Hydrogen Sulfide	ppb	3.93	24 hours	<b>NG</b>	-	-
9.	Methane	ppm	0	24 hours	<b>NG</b>	-	-
10.	Relative Humidity	%	59.58	24 hours	<b>NG</b>	-	-
11.	Temperature	°C	28.20	24 hours	<b>NG</b>	-	-

According to the above table, the particulate matters (PM<sub>10</sub> and PM<sub>2.5</sub>) were much higher than the guideline values because vehicles and humans are moving around the air measuring station. The other parameters of the ambient air quality are within the National Environmental Quality (Emission) Guidelines.

**2) Workplace Air Quality**

There are two descriptions about the workplace air quality as follows.

❖ **Locations of Workplace (Indoor) Air Quality Measuring Points**

Sr. No.	Measuring Points	Description
1.	ID-01	Front of Centering Department
2.	ID-02	Centering Department Point-1
3.	ID-03	Centering Department Point-2
4.	ID-04	Centering Department Point-3
5.	ID-05	Polishing Point-1
6.	ID-06	Polishing Point-2
7.	ID-07	Polishing Point-3
8.	ID-08	Grinding Point-1

Sr. No.	Measuring Points	Description
9.	ID-09	Grinding Point-2
10.	ID-10	Curved Generation Point-1
11.	ID-11	Curved Generation Point-2
12.	ID-12	Coating Room
13.	ID-13	Painting Room
14.	ID-14	Packaging Room
15.	ID-15	Chemical Store
16.	ID-16	Generator Room Point-1
17.	ID-17	Generator Room Point-2

❖ **Workplace Air Quality Measurement Results**

Sr. No.	Measuring Points	Parameter		
		VOC (ppm)	PM <sub>10</sub> (µg/m <sup>3</sup> )	PM <sub>2.5</sub> (µg/m <sup>3</sup> )
1.	ID-01	3.2	50	35
2.	ID-02	26.2	61	42
3.	ID-03	28.0	63	43
4.	ID-04	22.9	68	46
5.	ID-05	48.3	85	43
6.	ID-06	46.8	69	43
7.	ID-07	57	91	47
8.	ID-08	2.2	68	49
9.	ID-09	13.8	62	41
10.	ID-10	7.5	64	41
11.	ID-11	7.8	54	21
12.	ID-12	18.2	17	14
13.	ID-13	18.2	14	11
14.	ID-14	0.5	15	11
15.	ID-15	1.3	68	57
16.	ID-16	2	70	56
17.	ID-17	2.4	73	53

The workplace (indoor) air quality does not have the specific guidelines.

**3) Stack Emission Measurement**

There are three descriptions about the stack emission measurement.

❖ **Information of Generator**

Type: Diesel Generator

Capacity: one unit of 160 kVA, one unit of 550 kVA, one unit of 1,000 kVA, three units of 1,250 kVA and five units of 1,400 kVA.

Fuel Type: Diesel

❖ **Status of Stack Emission Measuring Point**



Figure 1-4 Status of Generator Stack Emission Measurement

❖ **Generator Stack Emission Measuring Result**

Sr. No.	Parameter	Unit	Measurement Results										Small Combustion Facilities Emission Guidelines
			Generator-1	Generator-2	Generator-3	Generator-4	Generator-5	Generator-6	Generator-7	Generator-8	Generator-9	Generator-10	
1.	O <sub>2</sub>	%	18.7	18.7	18.7	18.7	18.7	18.7	18.6	18.6	18.7	18.6	-
2.	CO	mg/Nm <sup>3</sup>	448	485	335	1050	580	783	782	757	1031	963	-
3.	CO <sub>2</sub>	%	1.64	1.67	1.67	1.65	1.68	1.67	1.68	1.75	1.76	1.78	-
4.	NO <sub>2</sub>	mg/Nm <sup>3</sup>	122	120	124	126	125	127	126	180	184	185	460
5.	SO <sub>2</sub>	mg/Nm <sup>3</sup>	10.1	9.8	9.5	10.5	10.2	9.8	10.2	10.9	11.4	11.5	2000

According to the measuring results, stack emission gases from generators are within the desirable limits.

(b) **Noise and Vibration**

1) **Ambient Noise Levels**

There are two descriptions about the noise as follows.

❖ **Location of Ambient Noise Levels Measuring Point**

Sr. No.	Measuring Points	Geographic Information	Description
1.	NMP	16° 56' 28.67" N 96° 09' 12.48" E	Near the entrance of the office at MAOI-1



Figure 1-5 Locations of Ambient Noise Level Measuring Points

❖ **Ambient Noise Level Measuring Results**

Sr. No.	Measuring Points	Measuring Results (dBA)	NEQG (dBA)	Remarks
1.	NMP	57.95	70	Day time (7:00 a.m. ~ 10:00 p.m.)
		58.47	70	Night time (10:00 p.m. ~ 7:00 a.m.)

As the project is located in industrial park, the observed values are compared with the guidelines for industrial area. The observed values of the ambient noise levels for daytime and nighttime are within the limit of Guidelines. Therefore, the human and the environment cannot be affected by the noise.

**2) Workplace (Indoor) Noise Levels**

There are two descriptions about the workplace (indoor) noise levels as follows.

❖ **Locations of Workplace (Indoor) Noise Level Measuring Points**

Sr. No.	Measuring Points	Description
1.	ID-01	Front of Centering Department
2.	ID-02	Centering Department Point-1
3.	ID-03	Centering Department Point-2
4.	ID-04	Centering Department Point-3
5.	ID-05	Polishing Point-1
6.	ID-06	Polishing Point-2
7.	ID-07	Polishing Point-3

Sr. No.	Measuring Points	Description
8.	ID-08	Grinding Point-1
9.	ID-09	Grinding Point-2
10.	ID-10	Curved Generation Point-1
11.	ID-11	Curved Generation Point-2
12.	ID-12	Coating Room
13.	ID-13	Painting Room
14.	ID-14	Packaging Room
15.	ID-15	Chemical Store
16.	ID-16	Generator Room Point-1
17.	ID-17	Generator Room Point-2

❖ **Measuring Results of Indoor (Workplace) Noise Levels**

Sr. No.	Measuring Points	Noise Measuring Results (Duration = 1hr) (dB[A])	OHS Guidelines (8 hr) (dB[A])
1.	ID-01	75.8	90
2.	ID-02	78.6	90
3.	ID-03	80.6	90
4.	ID-04	83.2	90
5.	ID-05	81.5	90
6.	ID-06	83.4	90
7.	ID-07	86.3	90
8.	ID-08	85.6	90
9.	ID-09	85.7	90
10.	ID-10	85.0	90
11.	ID-11	87.6	90
12.	ID-12	80.1	90
13.	ID-13	66.8	90
14.	ID-14	58.7	90
15.	ID-15	77.6	90
16.	ID-16	94.8	90
17.	ID-17	100.1	90

According to the measuring results of average noise levels at workplace, the noise levels except generator rooms were within the acceptable conditions. The major noise pollution source inside the factory may be happened due to operation of generators and they are used in case of emergency only when the electricity goes out.

(c) **Light Intensity**

There are two descriptions about the light intensity measurement as follows.

❖ **Locations of Light Intensity Measuring Points**

Sr. No.	Measuring Points	Location
1.	ID-01	Polishing Point-1
2.	ID-02	Grinding Point-1
3.	ID-03	Grinding Point-2
4.	ID-04	Curve Generation
5.	ID-05	Coating Room
6.	ID-06	Painting Room

❖ **Light Measurement Results**

Sr. No.	Measuring Points	Measured Values (Lux)	Guideline Values (Lux)
1.	ID-01	355	300-750
2.	ID-02	320	300-750
3.	ID-03	520	300-750
4.	ID-04	1813	1,500-3,000
5.	ID-05	165	300-750
6.	ID-06	565	300-750

According to the above table, the light levels at coating room was lower than the limits and the other were within the limits. Therefore, the project proponent should be arranged the suitable lightning system and monitored.

(d) **Water and Wastewater Quality**

There are two descriptions about the water and wastewater quality measurement as follows.

❖ **Locations of Water and Wastewater Sampling Points**

Sr. No.	Sampling Points	Description	Geographic Information	Remarks
1.	WSP-1	Treated Water Outlet	16° 56' 32.80" N 96° 09' 07.564" E	Water
2.	WSP-2	Treated Water Inlet	16° 56' 33.746" N 96° 09' 07.477" E	Water
3.	WSP-3	Raw Water	16° 56' 38.810" N 96° 09' 06.670" E	Water
4.	WSP-4	Wastewater Treatment Outlet	16° 56' 35.70" N 96° 09' 10.86" E	Wastewater
5.	WSP-5	Wastewater Treatment Inlet	16° 56' 34.579" N 96° 09' 11.694" E	Wastewater
6.	WSP-6	Drain 5 in front of the Factory	16° 56' 34.592" N 96° 09' 11.571" E	Wastewater
7.	WSP-7	Drain 3 in front of the Factory	16° 56' 30.880" N 96° 09' 12.293" E	Wastewater
8.	WSP-8	Tube Well Water	16° 56' 39.07" N 96° 09' 07.38" E	Water



Sr. No.	Sampling Points	Description	Geographic Information	Remarks
9.	WSP-9	Drain 1 in front of the Factory	16° 56' 28.59" N 96° 09' 13.00" E	Wastewater



Figure 1-6 Location of Water Sampling Points



Figure 1-7 Status of Water Sampling





Figure 1-8 Location of Wastewater Sampling Points





Figure 1-9 Status of Wastewater Sampling

### ❖ Result of Water Quality

Table 1-2 Result of Water Quality (GMES Laboratory)

Sr. No.	Parameter	Unit	Analysis Value				Drinking Water Standard
			WSP-1	WSP-2	WSP-3	WSP-8	WHO (2011)
1.	Aluminum	mg/l	0.02	0.02	0.01	0.01	<b>0.2</b>
2.	Arsenic	µg/l	0	0	0	0	<b>10</b>
3.	Chloride	mg/l	22	14	305	320	<b>250</b>
4.	Copper	mg/l	ND	ND	0.06	0.07	<b>2</b>
5.	Cyanide	mg/l	ND	ND	ND	ND	<b>0.07</b>
6.	Manganese	mg/l	ND	ND	1.05	0.95	<b>0.4</b>
7.	pH	-	6.33	6.83	6.18	5.34	<b>6.5~8.5</b>
8.	Sulfate	mg/l	ND	2.9	11.2	13.4	<b>250</b>
9.	Total Alkalinity	mg/l	28	55	65	88	<b>-</b>
10.	Total Dissolved Solids	mg/l	50	60	940	990	<b>600</b>
11.	Total Hardness	mg/l	14	39	289	302	<b>500</b>
12.	Total Iron	mg/l	<0.1	0.1	4	30	<b>0.3</b>
13.	Turbidity	NTU	9.27	10.8	16.4	58.1	<b>5</b>

According to the lab result, although the chloride and manganese, TDS, total iron and turbidity from WSP-3 (raw water) and WSP-8 (Tube well water) are higher than the WHO drinking water standards, it is found that these parameters are within the standards after treatment expect the turbidity values.

Table 1-3 Result of Wastewater Quality (GMES Laboratory)

Sr. No.	Parameter	Unit	Analysis Value					National Environmental Quality (Emission) Guidelines (2015) General Application
			WSP-4	WSP-5	WSP-6	WSP-7	WSP-9	
1.	Arsenic	mg/l	0.0375	0.0375	0	0	0	<b>0.1</b>
2.	Chemical Oxygen Demand (COD)	mg/l	1255	2010	160	930	2530	<b>250</b>
3.	Oil and Grease	mg/l	14	50	ND	ND	ND	<b>10</b>



Sr. No.	Parameter	Unit	Analysis Value					National Environmental Quality (Emission) Guidelines (2015) General Application
			WSP-4	WSP-5	WSP-6	WSP-7	WSP-9	
4.	pH	-	6.31	6.86	4.63	6.73	5.78	6~9
5.	Total Suspended Solids (TSS)	mg/l	54	820	26	38	20	50

ND - Not Detected

According to the lab result, pH values from WSP-6 (Drain 5 in front of the Factory) and WSP-9 (Drain 1 in front of the Factory) are a little lower than the guidelines and COD of all wastewater samplings, oil and grease from WSP-4 (Wastewater Treatment Outlet) and WSP-5 (Wastewater Treatment Inlet) and TSS values from WSP-4, WSP-5, WSP-7 (Drain 3 in front of the Factory) are higher than the guideline values. The other parameters are within the limits.

#### (e) Soil Quality

There are two descriptions about the soil quality measurement as follows.

##### ❖ Location of Soil Sampling

Sr. No.	Sampling Points	Geographic Information	Description
1.	SSP	16° 56' 36.40" N 96° 09' 10.77" E	Inside the factory-1

SSP = Soil Sampling Point



Figure 1-10 Location of Soil Sampling Points



Figure 1-11 Status of Soil Sampling

❖ **Results of Soil Quality**

Sr. No.	Parameter	Unit	Analysis Value
1.	Aluminum	mg/kg soil	0.05
2.	Arsenic	mg/kg soil	0
3.	Chloride	g/kg soil	0.034
4.	Copper	mg/kg soil	0.35
5.	Cyanide	mg/kg soil	0.1
6.	Extractable Acidity	cmol/kg soil	4.88
7.	Manganese	mg/kg soil	3.1
8.	P-Alkalinity	mmol/l extract	0
9.	pH	-	6.35
10.	Total Alkalinity	mmol/l extract	3.32
11.	Total Iron	g/kg soil	0.5

ND: Not Detected

The above results are noted as baseline data, and it will compare with the future results. Comparison will show better or worse.

**1.5.2 Natural Environment/ Physical Component (Secondary Data)****(a) Natural Environment/ Physical Component**

Physical environment essentially illustrates baseline conditions of climate, topography, geology, soils and hydrology of the project area, where necessary, of proposed project regardless of an assessment study. These data are extracted from the regional facts about Yangon Region, Mingaladon Township prepared by the Administrative Department of Township (2020) and study area is an area of that township.

There are 5 categories as follows.

- ❖ Climate
- ❖ Topography
- ❖ Geology
- ❖ Soil



- ❖ Hydrology

**(b) Biological Component**

At this heading, the natural vegetation and animals are shown, extracted from secondary data.

**(c) Socio-economic Status**

Socio-economic status of Mingaladon Township is summarized as

- ❖ Population and communities
- ❖ Religion
- ❖ Education Attainment
- ❖ Connectivity
- ❖ Health Facility
- ❖ Economy
- ❖ Land Use
- ❖ Workforce

## **1.6 Summary of Impacts and Mitigation Measures**

The MAOI Factory-1 has been already constructed factory buildings so that there is no need to consider the construction phase impacts.

The MAOI products are produced from recyclable materials (such as glass). However, as other products, these products may create various kinds of environmental impacts at different stages of the manufacturing processes. There may be some positive and negative impacts in the surrounding environment of the project site due to the implementation of the project. A major source of the environmental impacts is the consumption of energy required to produce these products and water during the manufacturing process from raw materials to the final products.

Mitigation describes the measure proposed in order to avoid, reduce and where practicable remedy significant adverse effects. The summary of mitigation measures for the identified effects for the various disciplines of the physical, biological and human environment during the operation phase and decommissioning phase are described in Chapter-6 and Chapter-7.

## **1.7 Monitoring Program**

### **Environmental Monitoring**

Monitoring is an essential and an integral part of the implementation of the proposed environmental mitigation measures. Environmental monitoring generates useful information and improves the quality of implementation of mitigation measures.

Monitoring involves the observation, review and assessment of onsite activities to ensure adherence to regulatory standards and the recommendations made to reduce negative impacts. The plan must be comprehensive and address relevant issues, with a reporting component that will be made available to the regulatory agencies based on a mutually agreed frequency.

According to the section 108 of EIA Procedure, the project proponent will submit the Monitoring Report prescribed in the schedule of the Environmental Management Plan to the Ministry every (6) month or as may be prescribed by the Ministry.

Table 1-4 Environmental Monitoring Plan for the Operation and Decommissioning Phases

Sr. No.	Category	Monitoring Items	Monitoring Frequency	Monitoring Method	Location	Responsibilities
<b>Operation Phase</b>						
1.	Air Quality	Ambient air quality	Once a Year	Measurement by equipment	Within the factory premise	EMT
		Indoor air quality	Twice a Year	Measurement by equipment	Workplace (Front of centering dept., 3 points in centering dept., 3 points in polishing dept., 2 points in grinding dept., 2 points in curve generation dept., coating room, painting room, packaging room, chemical store and 2 points in generator room)	EMT
		Generators' stack emission	Twice a Year	Measurement by equipment	All the generators' stack	EMT
		<ul style="list-style-type: none"> <li>▪ Inspection of the machinery, equipment, and vehicles</li> <li>▪ Inspection of the ventilation system</li> <li>▪ Inspection of the toilets and sewage system</li> <li>▪ Inspection of the waste disposal yards and waste bin</li> <li>▪ Preparation of inspection record / report</li> </ul>	Monthly	Inspection and checking	Workplace	EMT and Supervisors
2.	Noise Levels	Ambient noise level	Once a Year	Measurement of	Within the factory premise	EMT

Sr. No.	Category	Monitoring Items	Monitoring Frequency	Monitoring Method	Location	Responsibilities
				noise levels by equipment		
		Indoor noise level	Twice a Year	Measurement of noise levels by equipment	Workplace (Front of centering dept., 3 points in centering dept., 3 points in polishing dept., 2 points in grinding dept., 2 points in curve generation dept., coating room, painting room, packaging room, chemical store and 2 points in generator room)	EMT
		<ul style="list-style-type: none"> <li>Record the noise and vibration activities</li> <li>Inspection of the installation of sound barriers</li> <li>Regular supply of sufficient quantity of PPE</li> </ul>	Twice a year or according to instruction and compliance	Inspection and checking	Workplace	EMT and Supervisors
3.	Light Intensity	Light intensity	Twice a Year	Measurement by equipment	Workplace (Polishing point-1, grinding point-1, grinding point-2, curve generation, coating room and painting room)	EMT
4.	Water and Wastewater Quality	Tube well water quality	Once a Year	Laboratory Analysis	Treated water outlet, treated water inlet, raw water and tube well water	EMT
		Effluent water quality	Once a Year	Laboratory Analysis	Wastewater treatment outlet, wastewater treatment inlet, drain-5, drain-3 and drain-1 in front of the factory	EMT

Sr. No.	Category	Monitoring Items	Monitoring Frequency	Monitoring Method	Location	Responsibilities
		<ul style="list-style-type: none"> <li>▪ Inspection of the stormwater flowing</li> <li>▪ Inspection and maintenance of the screen to collect the solid waste</li> <li>▪ Inspection of the condition of concrete floor</li> <li>▪ Inspection of the leakage and spillage of oil, lubricant and fuel</li> <li>▪ Preparation of inspection record / report</li> </ul>	Monthly	Inspection and checking	Workplace and factory premises	EMT and Supervisors
5.	Soil Quality	Soil	Once a Year	Laboratory Analysis	Within the factory premise	EMT
6.	Waste Disposal	<ul style="list-style-type: none"> <li>▪ Separate bins for different kinds of wastes</li> <li>▪ Record the solid waste amount</li> <li>▪ Inspect the waste disposal system</li> <li>▪ Inspect storage system of waste</li> </ul>	Monthly	Inspection and checking	Factory compounds and surrounding environment	EMT
7.	Hazardous Chemical and Materials	<ul style="list-style-type: none"> <li>▪ Record the storage amount of hazardous waste</li> <li>▪ Inspect the disposal</li> </ul>	Monthly	Inspection and checking	Hazardous waste storage area	EMT



Sr. No.	Category	Monitoring Items	Monitoring Frequency	Monitoring Method	Location	Responsibilities
		system ▪ Inspect the hazardous wastes storage area				
8.	Water Consumption	▪ Record the amount of water usage	Daily/ Monthly	Records by water meter	Drinking water, process water and domestic water use	EMT
9.	Electricity Consumption	▪ Record electricity usage	Daily/ Monthly	Recording	electric meter	EMT
10.	Fuel Consumption	▪ Record diesel consumption	Daily/ Monthly	Recording	Generator	EMT
11.	Occupational Health and Safety	▪ Record the OHS ▪ Record the worker complains and conflict ▪ Inspect the PPE and record the details of PPE delivery ▪ Supply the first aid kits ▪ Inspect the worker rest camps and drinking water supplying situation ▪ Inspect the toilets and sewage system	Monthly	Inspection and checking	Factory compounds	HSE Officer and EMT
		▪ Regular medical checkup for employee at sensitive area ▪ Medical check-up record of each employee ▪ Give training for OHS and first aid	Once a year	Inspection and checking	Factory compounds	HSE Officer and EMT

Sr. No.	Category	Monitoring Items	Monitoring Frequency	Monitoring Method	Location	Responsibilities
12.	Social Consideration	<ul style="list-style-type: none"> <li>CSR activities</li> <li>Worker ware-fare activities</li> </ul>	Yearly	Records	Nearest local area and factory area	HR Manager and EMT
13.	Emergency Risks	<ul style="list-style-type: none"> <li>Inspect the firefighting equipment</li> <li>Record the training situation and trained person</li> <li>Record the hazardous materials handling and management</li> <li>Inspect and record the emergency response activities</li> <li>Inspect and record the situation of drain inside the project area</li> <li>Record the emergency response plan</li> <li>Record the inspection information</li> </ul>	Twice a year or if necessary	Inspection and checking	Factory compounds	Emergency Response Team and EMT
<b>Decommissioning Phase</b>						
1.	Air Quality	Ambient air quality	Once	Measurement by equipment	A suitable point on demolition site	Demolition Contractor
		Dust emission	Daily	Visual inspection	Demolition site	Demolition Contractor
		Exhaust Gases	Weekly	Visual inspection	Demolition site	Demolition Contractor

Sr. No.	Category	Monitoring Items	Monitoring Frequency	Monitoring Method	Location	Responsibilities
		Repair and maintenance of vehicles, machineries and equipment	As necessary	Record of repair and maintenance	Demolition site	Demolition Contractor
2.	Noise Levels	Ambient noise level	Once	Measurement of noise levels by equipment	Demolition site	Demolition Contractor
		Repair and maintenance of vehicles, machineries, and equipment	As necessary	Record of repair and maintenance	Demolition site	Demolition Contractor
3.	Water and Wastewater Quality	Water quality for drinking and domestic use	Once	Laboratory Analysis	Demolition site	Demolition Contractor
		Effluent water quality	Once	Laboratory Analysis	Effluent pit before discharge	Demolition Contractor
		Operation of temporary water ponds	Weekly	Visual inspection	Demolition site	Demolition Contractor
		Domestic wastewater collection	Monthly	Record of wastewater collection receipts	Installation areas of temporary septic tank	Demolition Contractor
4.	Soil Quality	Soil	Once	Laboratory Analysis	Demolition site	Demolition Contractor

Estimated Cost for Environmental Monitoring for operation phase and decommissioning phase are 22,830,000 MMK and 3,450,000 MMK respectively and information are shown at section 8.2.

## 1.8 Public Consultation and Information Disclosure

There are two group discussions: one for meeting with employees of the factory and another for consultation meeting with the relevant government organizations and local community in the vicinity of project.

### 1.8.1 Meeting with Factory Employees

On 12<sup>th</sup> March 2021, the consultation meeting for factory employees was held in factory's canteen of Myanmar Asia Optical International (MAOI) Company Limited. There are 242 employees attended and their suggested letters were collected.



Figure 1-12 Employees Discussion Program

The details of the discussion meeting with the employees are as follows.

Table 1-5 Excerpts from Suggestion of the Factory Employees

Sr. No.	Issues	Suggestions/ Comments	Responses of Factory In-charge
<b>1. Suggestion on Occupational Health and Safety</b>			
1.1	Personal Protective Equipment	▪ All persons mentioned that they were provided	✓ PPE is provided to all employees in the factory.

Sr. No.	Issues	Suggestions/ Comments	Responses of Factory In-charge
		adequately.	
1.2	Drinking Water	▪ All persons mentioned that they were provided with good drinking water.	✓ The company provides healthy drinking water. In addition, the water quality is monitored annually.
1.3	Sanitation System	▪ All persons recommended it is good and enough.	✓ There are hand basins, soaps and hand sanitizer in toilets, public areas and canteen entrances of the factory.
1.4	Cleaning System	▪ All staff members who attended the meeting stated those soap / hand sanitizers are provided for washing.	
2. Suggestion on Working Conditions in the Workplace			
2.1	Noise in Workplace	▪ The 40 persons mentioned there is no noise, but 7 persons mentioned there was a little noise.	✓ Noise is monitored monthly. ✓ Earplugs and ear masks are provided for employees who exceed the limit in the workplace.
2.2	Bad Odor	▪ The 45 persons mentioned there is no odor, but 2 persons mentioned there was a little odor.	✓ Ventilation system will be cleaned regularly every month.
2.3	Workplace Light Intensity	▪ All persons recommend.	✓ There are enough standard lamps in every workplace of the company.
2.4	Particles/dust in Workplace	▪ The 9 persons mentioned it was no particles, but 8 persons mentioned there was a little.	✓ Workers at the site will be fitted with a mask and regularly cleaned to remove particles.
2.5	Ventilation System in Workplace	▪ All persons recommend.	✓ There is adequate ventilation in the workplace. There are exhaust system and air conditioning system.
3. Suggestion on the Social Relation in Workplace			
3.1	Social Relation between Employees	▪ All persons mentioned it was convenient with upper level.	✓ Employees from different level work or act together with good collaboration

### 1.8.2 Consultation Meeting with the Relevant Government Organization and Neighbors of the Factory

On 16<sup>th</sup> October 2021, the public consultation meeting was held in Industrial Zone Management Committee Office of Mingaladon Industrial Park (MIP). That meeting was attended by the responsible person of Industrial Zone Management Committee, relevant to the government organization, responsible person from the vicinity of the factory, responsible persons from both factories and third-party organization and their suggestion letters are collected.





Figure 1-13 Consultation Meeting with the Relevant Government Organization and the Neighbors of the Factory

Table 1-6 Summary of Discussion in the Meeting

Sr. No.	Participants	Explanations/ Responses of Factory
1	<b>Daw Nyo Lin Htet</b> (Deputy Officer) Yangon Region (North district), Environmental Conservation Department <ul style="list-style-type: none"> <li>An environmental team must be formed at the factory.</li> <li>Trainings and the environmental awareness program should be provided to the workers by the team.</li> <li>For more information on environmental conservation, please visit the Department of Environmental Conservation's website and social media pages.</li> <li>The guidelines set by the Department of Environmental Conservation should be followed.</li> <li>Emphasis should be placed on health care for employees working in the factory.</li> <li>It is recommended that the required business licenses for the factory business be submitted to the relevant department for approval.</li> </ul>	<b>U Kyaw Soe Win</b> - Managing Director (Green Myanmar Environmental Services Co., Ltd) <ul style="list-style-type: none"> <li>The skilled staff such as Pollution Control Manager or Safety Officer will be appointed in their factories.</li> <li>The proponent to take care of the occupational safety and environmental protection of the employees in the relevant factories.</li> <li>Participants were also encouraged to submit comments on the suggestion letter if they did not wish to do so in person.</li> </ul>

Table 1-7 Description of Suggestion Letter from the Meeting

Sr. No.	Name	Comments
1	U Aung Thu	➤ Good environmental management arrangements
2	Daw May Myo Shwe	➤ Convenient to prevent environmental damage ➤ Complete in all respects
3	U Tun Lin Kyaw	➤ Social welfare of employees ➤ Health and employment ➤ Please try to get a regular salary
4	U Thet Myo Htike	➤ Wastewater treatment system is found at the factory ➤ Water pH is 6.35 according to Green Myanmar Analysis ➤ Wastewater treatment should be maintained regularly due to the use of chemicals ➤ Plastic Injection machines are running. Ventilation system should be provided for odors and should be maintained ➤ Chemical management plans should be developed and implemented to protect the workplace and the environment
5	Daw Zin Mar Hlaing	➤ No comments
6	Ma May Chan Khaing	➤ No comments
7	Daw May Aye	➤ Follow to the laws and regulations issued by the government

Sr. No.	Name	Comments
8	Daw Nyo Lin Htet	<ul style="list-style-type: none"> <li>➤ Apply for a license from the relevant department for handling and handling chemicals</li> <li>➤ Describe daily/monthly energy consumption in a report</li> <li>➤ There is follow to the national environmental quality (emission) guidelines for discharging of wastewater, emission of Exhaust fumes, Noise in workplace</li> <li>➤ It is suggested that staff be educated on environmental awareness dissemination and environmental awareness on the Environmental Conservation Department Yangon Region Facebook Page</li> </ul>

## 1.9 Conclusions and Recommendations

During the preparation of EMP report, it was observed that most of the negative impacts on the environment are largely localized. The negative environment impacts that will result from the project include waste generation, emissions and fire hazards during operation which, however, can be mitigated if adequate control measures are taken into account. Based on this environmental study, environmental management and mitigation measures are proposed to ensure that there are no environmental impacts that exceed acceptable levels.

In conclusion, the project will have overall beneficial impacts in reducing air pollution, dust, and improving socioeconomic conditions along the project corridor, and will have insignificant negative impacts, which will be carefully monitored and adequately mitigated.

## 2.0 INTRODUCTION

### 2.1 Background

Myanmar Asia Optical International Company Limited (MAOI) is a wholly foreign owned investment by Asia Optical International Limited (99%) from British Virgin Island and Mr. Yuzo Asano (1%) from Japan. It is incorporated and registered in Myanmar having registration number of 147842228 (26.3.2003).

There are two factories:

- Factory-1 operates for manufacturing of all kinds of lens and
- Factory-2 operates for manufacturing of plastic parts for camera and Self-focus Lens Array (SLA).

This report is prepared for factory-1, which is located at Plot No. (A2, A3), Mingaladon Industrial Park, Mingaladon Township, Yangon Region, Myanmar.

In February 2020, Green Myanmar Environmental Services Company Limited (GMES) was requested by Myanmar Asia Optical International Company Limited (MAOI) to provide professional consultation service to “**Manufacturing of all kinds of Lens, Lens Units, Optical Apparatuses, Electronic Apparatuses, Self-focus Lens Array (SLA), Plastic Parts for Electronic Apparatuses and other Apparatuses on CMP Basis**” Project and assist the submission of the Environmental Management Plan (EMP) Report to the Environmental Conservation Department (ECD), Ministry of Natural Resources and Environmental Conservation (MONREC).

This report is prepared for assessing the environmental impact due to factory operation. Thus, it is prepared in accordance with the existing policy, laws, rules and instructions and submitted as a requirement to receive the Environmental Compliance Certificate (ECC) from the Ministry of Natural Resources and Environmental Conservation (MONREC).

### 2.2 Type of EMP/IEE and EIA Requirement

**Type of Project:** Manufacturing of all kinds of Lens, Lens Units, Optical Apparatuses, Electronic Apparatuses, SLA, Plastic Parts for Electronic Apparatuses and other Apparatuses on CMP Basis

**Total Production Capacity:** Optical lens - about 4,500,000 pcs/month

**Total Project Area:** 51,134.5 m<sup>2</sup>

Myanmar Asia Optical International Company Limited (MAOI) had already implemented prior to the issuance of Environmental Conservation Law (2012), Environmental Conservation Rules (ECR), and EIA Procedures (2015) and had been conducting factory operation since 2003.

However, in session (9) of EIA Procedures (2015) by MONREC, it is stated that “Any project/ business already in existence prior to the issuance of the Rules, or the construction of which has already commenced prior to the issuance of the Rules, and which,

in either case, shall be required to undertake within the timeframe prescribed by the Department, an environmental compliance audit, including on-site assessment, to identify past and/or present concerns related to that project 's environmental impacts, and to:

- develop an EIA or IEE or EMP;
- obtain an ECC; and
- take appropriate actions to mitigate adverse impacts in accordance with the law, rules and other applicable laws.

On July 24, Regional Deputy Office of Environmental Conservation Department (ECD) at Yangon Region issued the Letter No. YaKa- 1/3/4(EIA) (1332/2019) to undertake Environmental Management Plan (EMP) and submit this EMP to ECD, MONREC. (See in **Appendix 1**)

## **2.3 Objectives of the EMP**

The main objective of the EMP is to identify impacts from the project implementation on physical, biological, socio-economic, and cultural environment of the project area, and to propose measures to avoid, minimize, mitigate, and compensate such impacts. The specific objectives of the proposed EMP are to:

- Establish baseline data of the proposed work area,
- Identify major issues that may arise as a result of the proposed works on biophysical, socio-economic and cultural environment of the project area,
- Recommend practical and site-specific environmental mitigation and enhancement measures, and prepare and implement environmental management and monitoring plan, and
- Confirm that EMP is sufficient for the proposed work.

## **2.4 Methodology Adopted**

The methodology used in the preparation of the EMP report is

- (1) Desk review of information such as maps, reports, research data and related ministries' webpage, etc. for the project,
- (2) Preparation for collecting project related information,
- (3) Review of international and local laws, regulations and procedures relating to environment, health and safety, etc.,
- (4) Field visit and survey to collect data related to baseline conditions of the study area and
- (5) Public meetings with the representatives of the project and local community.

## **2.5 Identification of the Project Proponent**

### **2.5.1 Proponent Information**

The proposed project is developed by Myanmar Asia Optical International Company Limited (MAOI) in 2003 with 100% of foreign investment. The objective of this company is to manufacture various kinds of optical lens on CMP Basis at factory-1 as per MIC Permit.



Table 2-1 Proponent Information

Company Registration Number	147842228
Established Time	26.3.2003
Date of Test Run	March 2004
Date of Commercial Run	1.7.2004
Proposed Duration of Investment	45 years
<b>Contact Person</b>	
Name	Daw May Chan Khine
Designation	Line Leader (Admin Department, Import/Export Section)
Telephone	09420092281
Email	<a href="mailto:maoiimexp4@gmail.com">maoiimexp4@gmail.com</a>
<b>Contact Detail</b>	
Factory Address	Plot No. (A2, A3), Mingaladon Industrial Park, Mingaladon Township, Yangon Region, Myanmar
Telephone	095173541
Email	<a href="mailto:mao80@asiaoptical.com.mm">mao80@asiaoptical.com.mm</a> , <a href="mailto:maoiimexp2@gmail.com">maoiimexp2@gmail.com</a>

### 2.5.2 List of Stakeholders

The stakeholders of MAOI are listed in **Table 2-2**.

Table 2-2 List of Stakeholders

Sr. No.	Name	Place of Incorporation & Registration Number / Citizenship & Passport	Address	Shares Holding Ratio
1.	Asia Optical International Limited	England 155129	Palm Grove House, PAO Box 438, Road Town, Tortola, British Virgin Islands.	99%
2.	Mr. Yuzo Asano	Japanese TZ 1187753	1-17-1-516, Hisamoto Takatsuku, Kawasaki City, Kanagawa, Japan.	1%

### 2.5.3 List of Directors and Executives

The directors and executives of MAOI are listed in **Table 2-3**.

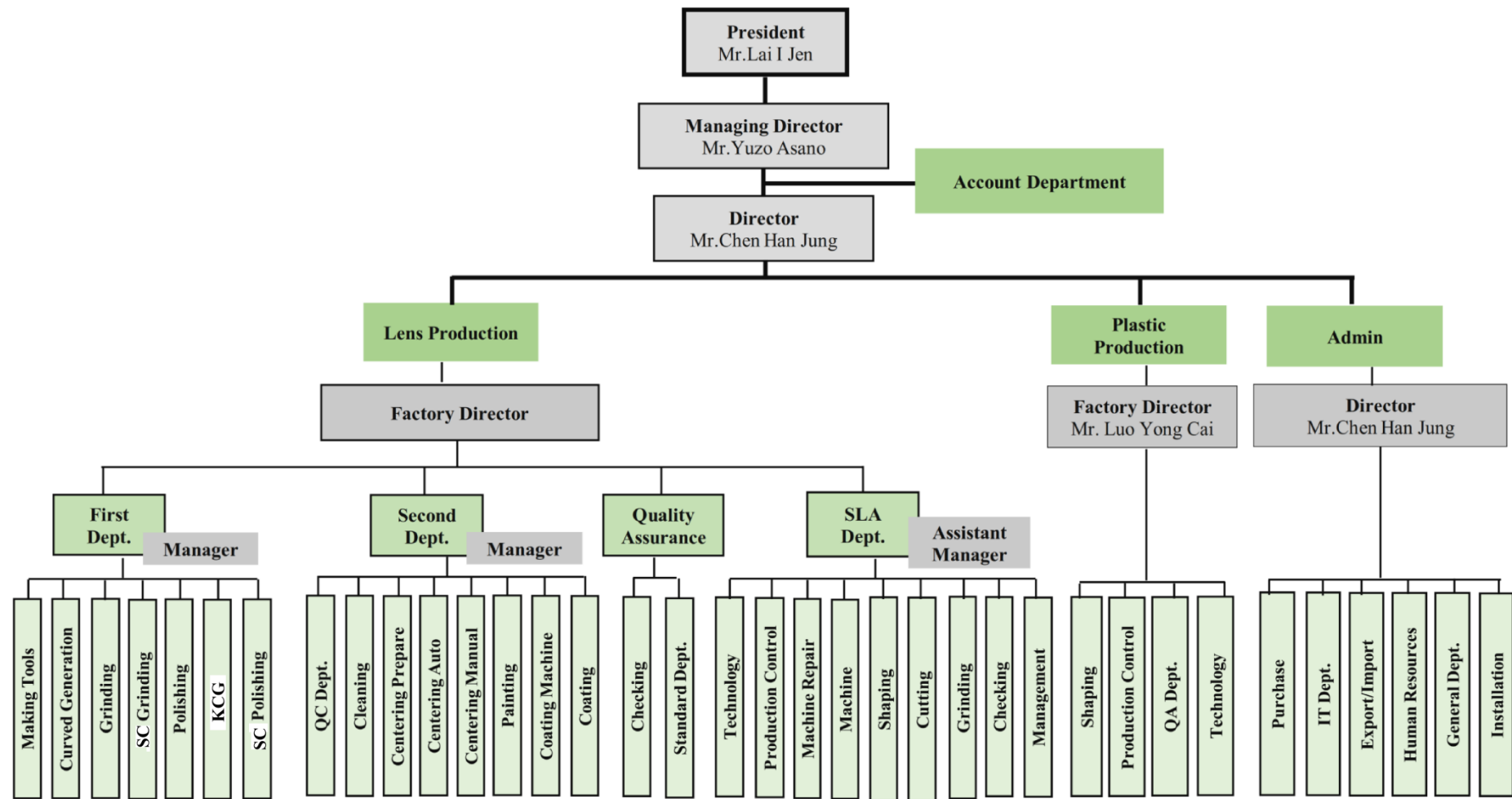
Table 2-3 List of Directors and Executives

Sr. No.	Name	Citizenship & Passport	Date of Birth	Designation
1.	Mr. Yuzo Asano	Japanese TZ 1187753	01.03.1948	Managing Director
2.	Mr. Chen, Han-Jung	Chinese 314993106	20.03.1967	Director



#### **2.5.4 Organization of Management**

The organization is structured to provide flexibility, a high level of personal accountability and responsibility while also motivating cross training and sharing of responsibilities, the need arises and circumstances permit. The following figure describes the organization chart of the project proponent. The following figure shows the organization chart of MAOI.



SC = Special Case, KCG = Multiple Lens Processing

Figure 2-1 Organization Chart of the Project Proponent

## 2.6 Environmental Management Plan (EMP) Study Team

The planning and conduct of the EMP report of the Proposed Project was carried out by a team of Green Myanmar Environmental Services Company Limited (GMES) which is registered in ECD having with Transitional Consultant Registration Number of Organization No.0006, together with the support of Daw May Chan Khine, Line Leader (Admin Department, Import/Export Section) from Myanmar Asia Optical International Company Limited (MAOI).

The details of Information of the study team are described in **Table 2-4** and **Table 2-5**. The transitional consultant registration certificates for organization and personal are attached in **Appendix 2** and **Appendix 3**.

Table 2-4 Organization in charge of EMP Implementation

<b>Organization Name</b>	Green Myanmar Environmental Services Co., Ltd. (GMES)
<b>Transitional Consultant Registration Number</b>	0006
<b>Company Registration Number</b>	110299931
<b>Office Address</b>	No. 115, Kanaung Min Thar Gyi Road, Hlaing Thar Yar Industrial City, Industrial Zone (1), Hlaing Thar Yar Township, Yangon Region, Myanmar.
<b>Telephone</b>	+95-9-897 978 296
<b>Email</b>	<a href="mailto:info@gmes-mm.com">info@gmes-mm.com</a> , <a href="mailto:gmescompany@gmail.com">gmescompany@gmail.com</a>

Table 2-5 Organization of the GMES's EMP Study Team

Sr. No.	Title of Post	Terms of Reference	Nominee, Organization & Transitional Consultant Registration Number
1.	Team Leader	<ul style="list-style-type: none"> <li>▪ Overall management of EMP operation</li> <li>▪ Work plan</li> <li>▪ Technical meeting &amp; workshop</li> <li>▪ Document reviewing and process flow studying</li> <li>▪ Lead and facilitation of public consultation</li> <li>▪ Data compilation and analysis</li> <li>▪ Coordination with stakeholders</li> </ul>	Engr. U Kyaw Soe Win Managing Director Green Myanmar Environmental Services Co., Ltd.  Experience in EMP processing  No.0019
2.	Technical Advisor	<ul style="list-style-type: none"> <li>▪ Design of EMP</li> <li>▪ Technical meeting and workshop</li> <li>▪ Monitoring of EMP process</li> <li>▪ Public consultation meeting</li> <li>▪ Quality control and check</li> <li>▪ Data compilation and analysis</li> </ul>	Daw Kyaw Kyaw Win Retired Director Myanmar Petrochemical Enterprise, Ministry of Electricity and Energy
3.	Environmental Consultant	<ul style="list-style-type: none"> <li>▪ Advise on the design of EMP</li> <li>▪ Develop term of reference for duty</li> </ul>	Engr. Daw Khin Swe Aye Former Lecturer,

Sr. No.	Title of Post	Terms of Reference	Nominee, Organization & Transitional Consultant Registration Number
		and responsibility among EMP team <ul style="list-style-type: none"> <li>Advise on the environmental baseline</li> <li>Advise on the field survey</li> <li>Facilitate technical analysis</li> <li>Streamline the Environmental Management Plan (EMP)</li> </ul>	Chemical Engineering Dept., Yangon Technological University  No.0021
4.	Consultant (Air Quality Management)	<ul style="list-style-type: none"> <li>Give advice on collecting field data for air quality</li> <li>Assist on air quality control system</li> <li>Give advice on air pollution evaluate and mitigation</li> <li>Give advice for data processing, computing, projection, modeling and analysis</li> <li>Give advice in report preparation</li> </ul>	Engr. U Sein Thaung Oo Chairman Green Myanmar Environmental Services Co., Ltd.  No.0023
5.	Consultant (Wastewater Management)	<ul style="list-style-type: none"> <li>Collecting field data for project activities and municipal waste</li> <li>Assist in laboratory testing</li> <li>Data processing, computing, projection, modeling and analysis</li> <li>Assist in report preparation</li> </ul>	Engr. Daw Tin May Soe Retired Professor & Head, Chemical Engineering Dept., Mandalay Technological University  Experience in environmental toxicology and pollution control  No.0028
6.	Consultant (Laboratory Analysis)	<ul style="list-style-type: none"> <li>Advise on data processing and laboratory testing</li> <li>Prepare instruction for laboratory testing</li> <li>Check the result of environmental laboratory testing</li> <li>Compare the laboratory result and verification</li> </ul>	U Myo Myint Retired Factory Manager Ministry of Industry (1)  No.0026
7.	Consultant (Environmental Quality Management)	<ul style="list-style-type: none"> <li>Assist in preparation of guideline for environmental sampling of air and water quality</li> <li>Monitor the sample collection</li> <li>Register and inspect the sample collected</li> <li>Assist in report preparation for environmental baseline</li> </ul>	Daw Khin Shwe Htay Former Lecturer, Chemical Engineering Dept., Yangon Technological University  Environmental Engineer  No.0022

Sr. No.	Title of Post	Terms of Reference	Nominee, Organization & Transitional Consultant Registration Number
8.	Social Operation and Field Coordinator	<ul style="list-style-type: none"> <li>Facilitate the technical meeting and record keeping</li> <li>Assist in data mining and secondary data collection</li> <li>Coordinate with local authority and communities</li> </ul>	U Khin Aung Social Specialist Green Myanmar Environmental Services Co., Ltd. No.0025
9.	Field Supervisor	<ul style="list-style-type: none"> <li>Develop operational checklist for environmental study</li> <li>In charge for preliminary field visit</li> <li>Supervise field survey</li> <li>Finalize checking for report and report formatting</li> </ul>	U Kyi Han Bo B.E (Aerospace Fuel and Propellant Engineer)
10.	Environmental Experts	<ul style="list-style-type: none"> <li>Data collection</li> <li>Document reviewing</li> <li>Process studying</li> <li>Preparation of impact evaluation and assessment, and management plan</li> <li>Report preparing and formatting</li> </ul>	Daw Aye Thuzar Hein B.E (Chemical)  Daw Hnin Htet Htet Hlaing B.E (Port and Harbor)  Daw Wai Wai Mon B.E (Port and Harbor)  Daw No No Hnin Nu Nway B.E (Port and Harbor)
11.	Environmental Monitoring Team	<ul style="list-style-type: none"> <li>Environmental baseline measuring</li> <li>Data analysis</li> <li>Environmental baseline mapping</li> <li>Environmental baseline report preparing and formatting</li> </ul>	U Pyae Phyoo Kyaw B.Sc (Forestry) (Monitoring Team Leader)  U Myo Thet Naung B.E (Aerospace Fuel and Propellant Engineer) (Assistant Team Leader)  U Aung Ko Min B.E (Chemical) (Monitoring Technician)  U Thiha Zaw (Assistant Monitoring Technician)
12.	Public Coordinator	<ul style="list-style-type: none"> <li>Assist in stakeholder meeting</li> <li>Document preparation and invitation</li> <li>Preparation of document for public consultation meeting</li> </ul>	U Aung Kyaw Than B.E (Chemical)

Sr. No.	Title of Post	Terms of Reference	Nominee, Organization & Transitional Consultant Registration Number
		<ul style="list-style-type: none"> <li>▪ Taking suggestion from public consultation meeting</li> </ul>	
13.	Laboratory Experts	<ul style="list-style-type: none"> <li>▪ Preparation for water and wastewater sampling</li> <li>▪ Preparation for laboratory testing</li> <li>▪ Laboratory testing</li> <li>▪ Reporting for laboratory results</li> </ul>	Daw Cherry Thwin B.E (Chemical) Laboratory Manager  U Thet Min Paing B.E (Chemical) Laboratory Technician

## 2.7 Structure of the Report

This report was compiled and presented in (13) chapters including executive summary as shown below. An Executive Summary is also prepared and presented in both Myanmar and English Languages in the report.

Table 2-6 Structure of the Report

Sr. No.	Chapter	Content
1.	Chapter 1	<b>Executive Summary</b> Provides an overview of the main findings of the study. (Both in Myanmar and English Languages)
2.	Chapter 2	<b>Introduction</b> Provides the details of the project proponent and the study team, the methodology and scope of work.
3.	Chapter 3	<b>Policy, Legal and Institutional Framework</b> In accordance with the EMP Regulations, all legislation and guidelines that have been considered in this Chapter.
4.	Chapter 4	<b>Description of the Project</b> Provides an overview of the proposed project, project location, project activities (technical design specifications), and the details of the project, waste management and so on.
5.	Chapter 5	<b>Description of the Surrounding Environment</b> This Chapter provides a description of the environment to be affected by project.
6.	Chapter 6	<b>Summary of Impact</b> The Chapter describes key Environmental issues associated with the proposed project and summarized the impacts.
7.	Chapter 7	<b>Description of the Proposed Mitigation Measures</b> The Chapter describes the mitigation measures relevant to the operation and were subjected to the impact assessment.
8.	Chapter 8	<b>Monitoring Program</b> This chapter describes the roles and responsibilities of stakeholders involved in the implementation of the environmental management



Sr. No.	Chapter	Content
		plan and monitoring plans during operation and decommissioning phases are described.
9.	Chapter 9	<b>Emergency Plan</b> The emergency plan implemented in the factory is described in this chapter.
10.	Chapter 10	<b>Capacity Development and Training</b> Capacity development and training have been a critical and central component of the work. Thus these are described in this chapter.
11.	Chapter 11	<b>Public Consultation and Disclosure</b> This chapter describes the employee discussion program with workers/employees and public consultation meeting with local residents.
12.	Chapter 12	<b>Workplan and Implementation Schedule</b> This chapter describes workplan and implementation schedule.
13.	Chapter 13	<b>Conclusions and Recommendations</b> This chapter presents the main conclusions of the report and recommendations of future action to be taken.

A number of appendices contain additional information and details referred to in the main text.

### **3.0 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK**

#### **3.1 Background**

The emerging environmental scenario calls for attention on conservation and judicious use of natural resources. There is a need to integrate the environmental consequences of the development activities and for planning suitable measures in order to ensure sustainable development. The environmental considerations in any developmental process have become necessary for achieving sustainable development. To achieve such goals, the basic principles to be adopted are:

- To enhance the quality of environment in and around the project area by adopting proper measures for conservation of natural resources,
- To prevent adverse environmental and social impact to the maximum possible extent,
- To mitigate the possible adverse environmental and socio-economic impact on the project-affected areas.

Policy, legal and institutional framework of the proposed project relating to the environmental, social, health and economic conditions are discussed in this section.

#### **3.2 Policy Framework**

This section highlights the relevant environmental policies established by the Government of Myanmar for purposes of environmental protection towards the process of sustainable development. The Government, through the Ministry of Natural Resources and Environmental Conservation (MONREC), has established environmental policies which broadly aim at:

- Encouraging respect for the environment by all and being mindful and taking care of the environment,
- Ensuring environmental issues are integrated with economic matters to attain sustainable development,
- Reviewing and evaluating development plans to ensure they follow the set environmental guidelines/policies,
- Encouraging the public to take part in environmental matters so as to enlighten them on the same hence improve on environmental performance.

#### **3.3 Myanmar Regulatory Framework for Environmental Assessment**

Myanmar Government issued:

- National Environmental Policy in 2019,
- Myanmar Agenda 21 in 1997,
- National Sustainable Development Strategy in 2009,
- The Environmental Conservation Law in 2012,
- The Environmental Conservation Rules in 2014,

- Environmental Impact Assessment Procedure and National Environmental Quality (Emission) Guidelines in 2015.

### **3.3.1 National Environmental Policy of Myanmar (2019)**

Myanmar National Environmental Policy, which already included for social policy, subsequently gazette on 10th June 2019 is as follows:

To establish sound environment policies in the utilization of water, land, forests, marine resources and other natural resources in order to conserve the environment and prevent its degradation, the Government of the Union of Myanmar hereby adopts the following policy:

*“The wealth of a nation is its people, its cultural heritage, its environment and its natural resources.”*

The objective of Myanmar’s environment policy is aimed at achieving harmony and balance between these through the integration of environmental considerations into the development process to enhance the quality of the life of all citizens.

Every nation has the sovereign right to utilize its natural resources in accordance with its environmental policies, but great care must be taken not to exceed its jurisdiction or infringe upon the interests of other nations. It is the responsibility of the state and citizen to preserve its natural resources in the interest of present and future generations. Environmental protection should always be the primary objective in seeking development.”

### **3.3.2 Myanmar Agenda 21 (1997)**

The commission also formulated a blueprint, the Myanmar Agenda 21, in 1997 as a follow up of national environmental policy in response to the call of the Earth Summit to develop national strategies to implement the Global Agenda 21. Myanmar Agenda 21 serves as a framework for integrating environmental considerations in future national development plans as well as sectorial and regional development plans in Myanmar and recognizes the need of environmental impact assessment, integrated economic development and sustainable social development respectively.

### **3.3.3 National Sustainable Development Strategy (2009)**

National Sustainable Development Strategy was formulated to implement the National Environmental Policy in 2009 by Ministry of Forestry with the vision of wellbeing and happiness of Myanmar people. Three overarching goals identified are sustainable management of natural resources; integrated economic development and sustainable social development. In order to achieve these goals, a series of objectives are set along with activities. In addition, leading institution and collaboration institutions are identified to perform the activities.

### **3.3.4 The Environmental Conservation Law (2012)**

The principle law governing environmental management in Myanmar is the Environmental Conservation Law, which was issued in March, 2012 (The Pyidaungsu Hluttaw Law No.9/2012). The law stipulates that government bodies are in charge of environmental conservation as well as their relevant roles and responsibilities. It touches on water, noise, vibration and solid waste qualities but does not provide specific standards to be met.

It also mentions that any new development project must perform a system of Environmental Impact Assessment (EIA) and Social Impact Assessment (SIA) in order to find out whether or not a project or activity to be undertaken by any government department, organization or person may cause a significant impact on the environment or not. In the context of project development, it is important to note that the law adopts the notion of ‘Polluter Pays Principle’ as it implies that the project proponents are responsible for covering all environmental and social costs generated by the project.

The law serves as the basic for founding of Environmental Conservation Department (ECD) under the Ministry of Natural Resources and Environmental Conservation (MONREC), both of which will be explained later. Following the Environmental Conservation Law are two legal instruments: Environmental Conservation Rules (2014) and EIA Procedures (2015).

The main objectives of Environmental Conservation Law related to this Project are abstracted from **Section 3** as follows.

- (a) To enable to emerge a healthy and clean environment and to enable to conserve natural and cultural heritage for the benefit of present and future generations;
- (b) To reclaim ecosystems as may be possible which are starting to generate and disappear;
- (c) To enable to manage and implement for decrease and loss of natural resources and for enabling the sustainable use beneficially;

As the important reference, the following sections are excerpted: Section 7 for provisions of duties and powers of MONREC, Section 10 for Environmental Quality Standards, Section 13 for monitoring as well as Section 14 and Section for polluter’s responsible.

#### ***Section 7: Duties and Powers relating to the Environmental Conservation of the Ministry***

- (g) To specify categories and classes of hazardous wastes generated from the production and use of chemicals or other hazardous substances in carrying out industry, agriculture, mineral production, sanitation and other activities;
- (h) To prescribe categories of hazardous substances that may affect significantly at present or in the long run on the environment;

- (i) To promote and carry out the establishment of necessary factories and stations for the treatment of solid wastes, effluents and emissions which contain toxic and hazardous substances;
- (j) To prescribe the terms and conditions relating to effluent treatment in industrial estates and other necessary places and buildings and emissions of machines, vehicles and mechanisms;
- (m) To lay down and carry out a system of EIA and SIA as to whether or not a project or activity to be undertaken by any Government department, organization or person may cause a significant impact on the environment;
- (o) To manage to cause the polluter to compensate for environmental impact, cause to contribute fund by the organizations which obtain benefit from the natural environmental service system, cause to contribute a part of the benefit from the businesses which explore, trade and use the natural resources in environmental conservation works.

#### ***Section 10: Environmental Quality Standards***

The Ministry may, with the approval of the Union Government and the Committee, stipulate the following environmental quality standards:

- (a) Suitable surface water quality standards in the usage in rivers, streams, canals, springs, marshes, swamps, lakes, reservoirs and other inland water sources of the public;
- (b) Water quality standards for coastal and estuarine areas;
- (c) Underground water quality standards;
- (d) Atmospheric quality standards;
- (e) Noise and vibration standards;
- (f) Emissions standards;
- (g) Effluent standards;
- (h) Solid wastes standards;
- (i) Other environmental quality standards stipulated by the Union Government.

#### ***Section 13: Monitoring***

The Ministry shall, under the guidance of the Committee, maintain a comprehensive monitoring system and implement by itself or in co-ordination with relevant Government departments and organizations in the following matters:

- (a) The use of agro- chemicals which cause to impact on the environment significantly;
- (b) Transport, storage, use, treatment and disposal of pollutants and hazardous substances in industries;
- (c) Disposal of wastes come out from exploration, production and treatment of minerals, industrial mineral raw materials and gems;
- (d) Carrying out waste disposal and sanitation works;
- (e) Carrying out development and constructions;

(f) Carrying out other necessary matters relating to environmental pollution.

**Section 14:** A person causing a point source of pollution shall treat, emit, discharge and deposit the substances which cause pollution in the environment in accord with stipulated environmental quality standards.

**Section 15:** The owner or occupier of any business, material or place which causes a point source of pollution shall install or use an on-site facility or controlling equipment in order to monitor, control, manage, reduce or eliminate environmental pollution. If it is impracticable, it shall be arranged to dispose the wastes in accord with environmentally sound methods.

### **3.3.5 The Environmental Conservation Rules (2014)**

Environmental Conservation Rules provide a platform to bridge the Environmental Conservation Law with more specific and practical rules and guidelines including EIA Procedures and environmental quality standards, the rules stipulate that the Ministry of Environmental Conservation and Forestry will adopt and carry out the environmental impact assessment system which includes determination of categories of plans, business or activity that requires Environmental Impact Assessment (EIA).

**Rule 61:** The Ministry may approve and reply on the EIA report or IEE or EMP with the guidance of the Committee.

### **3.3.6 Environmental Impact Assessment Procedure (2015)**

The objectives of the EIA procedures are to provide a common framework for EIA reporting and to ensure that EIA reporting is in line with legal requirements, good practices and professional standards.

**Section 76:** For Project types, which require EMP according to the Article 55 (a) of the Rules or Article 24 of the Procedure, the Project Proponent may prepare an EMP by itself or may appoint a person or organization who/which is registered according to the Article 18.

**Section 77:** The Project Proponent shall issue a letter of endorsement in a format prescribed by the Ministry according to the Article 63. Such letter shall be submitted to the Department prepared either in the Myanmar language, or in the English language or both. The Project Proponent shall submit the EMP to the Department in both digital form and complete paper copies, together with the required service fee as prescribed by the Department, and confirming that:

- (d) the accuracy and completeness of the EMP;
- (e) the EMP has been prepared in strict compliance with applicable laws including this Procedure; and
- (f) the Project will at all times comply fully with the commitments, mitigation measures, and plans in the EMP.



**Section 78:** Upon Receipt of the EMP from the Project Proponent, the Department shall review and submit to the Ministry to enable it to make a final decision on approval of the EMP.

**Section 79:** If it is determined by the Ministry that the EMP does not satisfy requirements, then the Project Proponent shall be called upon by the Department to undertake necessary amendments and/or to provide supplementary information as directed by the Ministry.

**Section 80:** Upon completion of its review of the EMP, the Ministry shall;

- (a) approve the EMP, subject to any conditions it may prescribe, and issue an ECC; or
- (b) require that the Project carry out an IEE or EIA, citing the reasons for this decision and informing the Project Proponent of its decision; and, in either case
- (c) publicly disclose its decision.

**Section 81:** The Department shall deliver the final decision of the Ministry within thirty (30) working days of receipt of an EMP. If the Ministry requires an EMP to be amended, then the due date for delivery of the Ministry's decision shall be extended accordingly

### **3.3.7 National Environmental Quality (Emission) Guidelines (2015)**

The objective of these national guidelines is to provide the basis for regulation and control of noise and vibration, air emissions, liquid discharges from various sources. According to these guidelines, all projects subject to EIA procedure have to comply with and refer to applicable national guidelines standards or international standards adopted by the Ministry. In addition, a project proponent shall be responsible for the monitoring of their compliance with general and applicable industry- specific guidelines as specified in the EMP and ECC (Environmental Compliance Certificate). In addition, the Project Proponent is responsible to monitor the environmental quality based on the developed EMP as specified in the following sections.

**Section 12:** As specified in the EIA Procedure, projects shall engage in continuous, proactive and comprehensive self- monitoring of the project and comply with applicable guidelines and standards. For purposes of these Guidelines, projects shall be responsible for the monitoring of their compliance with general and applicable industry- specific Guidelines as specified in the EMP and ECC.

**Section 13:** Air emissions, noise, odor, and liquid/ effluent discharges will be sampled and measured at points of compliance as specified in the project EMP and ECC.

## **3.4 Environmental-related Laws and Regulations in Myanmar**

There are several laws and regulations relating to the environmental matters administered by various relevant ministries in Myanmar. The environmental-related laws and regulations are tabulated with their main purposes/description in following table.

Table 3-1 Environment-Related Laws and Rules

Sr. No.	Laws and Regulation	Year	Description/Purpose
<b>I.</b>	<b>Administrative Sector</b>		
1.1	The Towns Act	1907	Provisions on offences which affect the human environment.
1.2	The Police Act	1945	Provisions on offences which affect the human environment.
1.3	The Ward or Village Tracts Administration Law	2012	Provisions on offences which affect the human environment.
<b>II.</b>	<b>City Development Sector</b>		
2.1	The Water Power Act	1927	Prohibitions on the pollution of public water.
2.2	The Underground Water Act	1930	This Act provides the requirement for systematic use of ground water toward sustainable purpose.
2.3	The Yangon City Development Law	2018	Provisions relating to environmental sanitation, pollution of air and water, and public health.
<b>III.</b>	<b>Environmental Conservation Sector</b>		
3.1	Constitution	2008	The Union shall protect and conserve natural environment. Every citizen has the duty to assist the Union carrying out the environmental conservation
3.2	Environmental Conservation Law	2012	To implement National Environmental Policy; to set up basic principles and guidelines for sustainable development and systematic integration of environmental conservation; to conserve the clean environment, natural and cultural heritage for present and future generation, to prevent degradation of natural resources and for sustainable use, to build up public understanding on environmental awareness.
3.3	Environmental Conservation Rules	2014	The Rules reinforce the obligation for project developers to submit an EIA or an IEE. It aims to establish and adopt the necessary programs for the conservation and enhancement of environment, protection, control and reduction of pollution in environment, and conservation.
3.4	Environmental Impact Assessment Procedures	2015	To establish types of project that needed to submit an EIA or an IEE or an EMP. Also, to establish the environmental assessment process and to issue the environmental compliance certificate.
3.5	National Environmental Quality (Emission) Guidelines	2015	To provide the basis for regulation and control of noise and vibration, air emissions, and liquid discharges from various sources in order to

Sr. No.	Laws and Regulation	Year	Description/Purpose
			prevent pollution for purposes of protection of human and ecosystem health.
<b>IV.</b>	<b>Culture and Heritage Sector</b>		
4.1	The Protection and Preservation of Cultural Heritage Regions Law	2019	To implement the protection and preservation policy with respect to perpetuation of cultural heritage that has existed for many years. Provisions to protect ancient sites and regions and cultural heritage areas from any adverse impacts due to industrialization, tourism and urbanization. To protect and preserve the cultural heritage and new project in such sensitive areas is required to get prior approval from the Culture.
<b>V.</b>	<b>Biodiversity and Ecosystem Sector</b>		
5.1	The Forest Law	2018	Provisions to conserve water, soil, biological diversity and the environment; sustain forest produce yields; protect forest cover; establish forest and village firewood plantations; sustainably extract and transport forest products.
5.2	The Protection of Wildlife and Wild Plants and Conservation of Natural Areas Rules	1994	To protect wildlife, wild plants and conserve natural areas, to contribute towards works of natural scientific research, and to establish zoological gardens and botanical gardens. The Law highlights habits maintenance and restoration, protection of endangered and rare species of both fauna and flora, establishment of new parks and protected areas, and buffer zone management.
5.3	Protection of Biodiversity and Protected Areas Law	2018	To provide opportunities for more effective conservation of forests while recognizing the rights and the potential roles of local communities.
5.4	The Conservation of Water Resources and Rivers Law	2006	Protection and maintenance of river bank and river water quality by defining area of river bank and forbidding substance which are harmful.
<b>VI.</b>	<b>Land Management</b>		
6.1	Constitution	2008	The Union is the ultimate owner of all lands and all natural resources above and below the ground, above and beneath the water and in the atmosphere in the Union.
6.2	Land Acquisition Act	1984	This is basic legal framework for land acquisition providing government to acquire the land from landowner. Major elements include demarcation of boundary, declaration of action and role and responsibility of collectors.

Sr. No.	Laws and Regulation	Year	Description/Purpose
6.3	Farmland Law	2012	This law focuses on land use right of farmers and details the process of permission to potential farmers who are eligible. Under this law. Land can be sold, leased and transferred freely by legitimate land owner. Role and responsibility of farmland administrative bodies of various levels are defined in detail.
6.4	Vacant, Fallow and Virgin Land Law	2012	This law aims at providing framework for effective use of land. Investor can apply land right to the government for basic structure or other investment which would benefit for the sake of state.
6.5	National Land Use Policy	2016	This policy was released recently to ensure the systematic land use management and administration of present and future so as to improve food security, water resource development, transportation, business development and to protect environment and cultural heritage.
<b>VII. Emergency/ Disaster Sector</b>			
7.1	Natural Disaster Management Law	2013	To implement natural disaster management programs systematically and expeditiously in order to reduce disaster risks, to conserve and restore the environmental affected by natural disasters and to provide health, education, social and livelihood programs in order to bring about living conditions for victims.
7.2	The Myanmar Fire Brigade Law	2015	Provisions to protect and to prevent from fire disaster and natural disaster, which insures losses, and endanger.
<b>VIII. Finance and Revenue Sector</b>			
8.1	The Myanmar Insurance Law	1993	Requires any business which may pollute the environment to effect compulsory general liability insurance.
8.2	The Income Tax Law	1974 (Amendment in 2011)	Income gained from the economic business shall be levied under the heading of economic business. [section 11 (a)] An entrepreneur shall send income annual list annually within three months after the end of the income year. [section 18]
8.3	The Commercial Tax Law	1990 (Amendment in 2014)	Whoever carries out the production in the country commercial business shall be levied tax stated in the schedule of this law. [section 4] Whoever carries out the production business or

Sr. No.	Laws and Regulation	Year	Description/Purpose
			service business shall register to the township income tax officer as prescribed in the regulations. [section 11]
<b>IX.</b>	<b>National Planning and Economic Development</b>		
9.1	Myanmar Investment Law Myanmar Investment Rules	2016 2017	To protect the investors and their businesses in accordance with law, to create job opportunities for the people, to develop high functioning production, service, and trading sectors.
<b>X.</b>	<b>Industrial Sector</b>		
10.1	The Export and Import Law	2012	No one shall import or export the prohibited goods. [section 5] No one shall import or export the goods without permit which are prescribed to obtain permit. [section 6]
10.2	The Electricity Law	2014	The law elaborates the responsibilities of the Inspectorate under the Ministry of Industry for ensuring safety in electricity in generation, transmission and distribution. It includes the testing of all electrical goods produced domestically or imported. If safety is at risk the Inspector has the authority to disconnect supply to any customer. The Inspector also is responsible for determining cause of any injury or death caused by electricity, issuing electrician registration certificates, and establishing standards.
10.3	The Petroleum Act The Petroleum Rules	1934 1937	Provisions to regulate production, storage, and transport of oil so as not to cause pollution or the outbreak of fires
10.4	The Factories Act	1951 (Amendment in 2016)	Provisions for the proper disposal of waste and effluents in factories; treatment of wastewater; regulations for health and cleanliness in factories, and the prevention of hazards
10.5	The Private Industrial Enterprise Law	1990	Provision to avoid environmental pollution
10.6	The Prevention of Hazard from Chemical and Related Substances Law	2013	To protect from being damaged the natural environment resources and being hazardous any living beings by chemical and related substances To perform the sustainable development for the occupational safety, health and environmental conservation
<b>XI.</b>	<b>Health Sector</b>		
11.1	The Penal Code of Offences Affecting the	1961	Provisions related to prohibitions against contaminating public springs or reservoirs and



Sr. No.	Laws and Regulation	Year	Description/Purpose
	Public Health, Safety Convenience, Decency and Morals		“making atmosphere noxious to health”.
11.2	Public Health Law	1972	To promote and safeguard public health and to take necessary measures in respect of environmental health
11.3	Prevention and Control of Communicable Diseases Law	1995 (Amendment in 2011)	The Law highlights the functions and responsibilities of health personnel and citizens in relation to prevention and control of communicable diseases. It also describes measures to be taken in relation to environmental sanitation, reporting and control of outbreaks of epidemics and penalties for those failing to comply. The law also authorizes the Ministry of Health to issue rules and procedures when necessary with approval of the government.
11.4	The Control of Smoking and Consumption of Tobacco Product Law	2006	To protect from the danger which affects public health adversely by creating tobacco smoke-free environment; To uplift the health, economy and social standard of the public through control of smoking and consumption of tobacco product
<b>XII. Transportation Sector</b>			
12.1	The Motor Vehicles Law	2015	Provisions to control vehicle engine emissions and the leakage of fuel or oil.
<b>XIII. Workforce Sector</b>			
13.1	The Workmen’s Compensation Act	1923 (Amendment in 2011)	To make payments out-of-pocket to employees who become injured or who die in any accidents arising during and in consequence of their employment. Such compensation also must be made for diseases, which arise as a direct consequence of employment, such as carpal tunnel syndrome.
13.2	The Leave and Public Holidays Act	1951	To allow worker for leave and holiday allowances, religious or social activities with earn allowance, and benefits for Health allowances. Concerned workers: Daily wage workers/temporary workers/permanent workers.
13.3	The Labor Organization Law	2011	The objectives of this law are: <ul style="list-style-type: none"> <li>▪ To protect the rights of the workers in accordance with section 24 of the Constitution</li> <li>▪ To promote good relations between the employer and the worker</li> <li>▪ To enable to workers to form and carry out</li> </ul>

Sr. No.	Laws and Regulation	Year	Description/Purpose
			the labor organizations systematically and independently.
13.4	The Settlement of Labor Dispute Law	2012	<p>The objectives of this law are:</p> <ul style="list-style-type: none"> <li>▪ For safeguarding the rights of workers,</li> <li>▪ Promoting a good relationship between employer and workers and creating a peaceful workplace,</li> <li>▪ Obtaining the rights fairly, rightfully and quickly by settling disputes between employer and worker justly.</li> </ul>
13.5	The Social Security Law	2012	The objective of this law is to get benefit for sickness, maternity, death, employment injury, invalidity benefit, superannuation benefit by: giving medical treatment, providing cash benefit or granting a right to residency.
13.6	The Development of Employment and Skill Law	2013	To fulfill the basic needs of the workers and their families who are working in commercial establishments, production and servicing establishments, agriculture and livestock and to develop the work performance and competitiveness of workers.
13.7	The Minimum Wage Law	2013	<p>To fulfill the basic needs of the workers and their families who are working in commercial establishments, production and servicing establishments, agriculture and livestock.</p> <p>To develop the work performance and competitiveness of workers.</p>
13.8	The Payment of Wage Law	2016	Receipt of wages is made regularly. Unlawful deductions are not to be made.
13.9	Occupational Health and Safety Law	2019	<p>The objectives of this law are:</p> <ul style="list-style-type: none"> <li>▪ To effectively implement measures related to safety and health in every industry;</li> <li>▪ To establish the duties and responsibilities of those who are responsible under this law, including workers and employers, so as to reduce workplace accidents and occupational diseases;</li> <li>▪ To work with employees, workers and others who are responsible under this law to prevent accidents and occupational diseases in the increasing number of workplaces as a result of economic growth;</li> <li>▪ To set occupational safety and health</li> </ul>

Sr. No.	Laws and Regulation	Year	Description/Purpose
			standards which reflect the context of Myanmar while conforming with the regional and internal ones so as to create safe and health workplaces.

### 3.5 International Conventions, Treaties and Agreements

Myanmar has signed several international treaties related to the environment. **Table 3-2** presents a list of the conventions signed by Myanmar to date that are potentially relevant to the Project.

Table 3-2 International Treaties and Conventions

1	Convention Concerning the Protection of the World Cultural and Natural Heritage
2	Montreal Protocol on Substances that Deplete the Ozone Layer & All Amendments
3	Stockholm Convention on Persistent Organic Pollutants
4	Convention on Biological Diversity
5	Cartagena Protocol on Biosafety
6	International Tropical Timber Agreement
7	Ramsar Convention on Wetlands
8	Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
9	ASEAN Agreement on the Conservation of Nature and Natural Resources
10	United Nations Convention to Combat Desertification
11	United Nations Framework Convention on Climate Change (UNFCCC) and Kyoto Protocol
12	Global Tiger Forum, India in August 1994

### 3.6 Standards and Guidelines for Surrounding Environment of the Project

According to Article 10 of the Environmental Conservation Law (2012), (now MONREC set up some environmental quality standards, with the approval of the Union Government and the Committee. (See in section 3.3.4)

As of 29 December 2015, emission guideline and target values of ambient air quality, air emission, wastewater, and noise levels were set in NEQG, while other standards have not been set yet by MONREC.

In this Project, the Project Proponent, MAOI basically apply the NEQG and in case of no quantitative target values in NEQG, the quantitative target values of other country and international organizations will be referred. Each quantitative target value to be applied is described below sections.

#### 3.6.1 Air Quality

Since there is no ambient air quality standard in Myanmar and only air emission guideline values in National Environmental Quality Emission Guidelines (NEQG) (2015) referred from WHO's air quality guidelines, these guideline values

shown in below table will be set as target values for both ambient and emission air quality for operation and closing phases.

Table 3-3 Ambient Air Quality Guidelines for Operation and Decommissioning Phases

Sr. No.	Parameter	Averaging Period	Guideline Value ( $\mu\text{g}/\text{m}^3$ )
1.	Nitrogen dioxide	1-year	40
		1-hour	200
2.	Ozone	8-hour daily maximum	100
3.	PM <sub>10</sub>	1-year	20
		24-hour	50
4.	PM <sub>2.5</sub>	1-year	10
		24-hour	25
5.	Sulfur dioxide	24-hour	20
		10-minutes	500

Source: National Environmental Quality (Emission) Guidelines (NEQG) (29 Dec 2015)

Since there are any combustion facilities designed to deliver electrical or mechanical power, steam, heat or any combination of these, it is necessary to set the target value for air emission level from combustion facilities in this project.

Table 3-4 Small Combustion Facilities Emission Guidelines

Sr. No.	Combustion Technology /Fuel	Particulate Matter PM <sub>10</sub> <sup>a</sup>	Sulfur Dioxide	Nitrogen Oxides
1.	Gas	-	-	200 <sup>b</sup> mg/Nm <sup>3c</sup> 400 <sup>d</sup> mg/Nm <sup>3</sup> 1,600 <sup>e</sup> mg/Nm <sup>3</sup>
2.	Liquid	100	3	1,600-1,850 <sup>f</sup> mg/Nm <sup>3</sup>
3.	Natural gas (3-<15 MW <sup>g</sup> )	-	-	90 <sup>h</sup> mg/Nm <sup>3</sup> 210 <sup>i</sup> mg/Nm <sup>3</sup>
4.	Natural gas (15-<50 MW)	-	-	50 mg/Nm <sup>3</sup>
5.	Fuels other than natural gas (3-<15 MW)	-	0.5 % sulfur	200 <sup>h</sup> mg/Nm <sup>3</sup> 310 <sup>j</sup> mg/Nm <sup>3</sup>
6.	Fuels other than natural gas (15-<50 MW)	-	0.5 % sulfur	150 mg/Nm <sup>3</sup>
7.	Gas	-	-	320 mg/Nm <sup>3</sup>
8.	Liquid	150 mg/Nm <sup>3</sup>	2,000 mg/Nm <sup>3</sup>	460 mg/Nm <sup>3</sup>
9.	Solid <sup>j</sup>	150 mg/Nm <sup>3</sup>	2,000 mg/Nm <sup>3</sup>	650 mg/Nm <sup>3</sup>

<sup>a</sup> Particulate matter 10 micrometers or less in diameter, <sup>b</sup> Spark ignition, <sup>c</sup> Milligrams per normal cubic meter at specified temperature and pressure, <sup>d</sup> dual fuel, <sup>e</sup> compression ignition, <sup>f</sup> higher value applies if bore size > 400 m,

<sup>g</sup> Megawatt, <sup>h</sup> Electric generation, <sup>i</sup> mechanical drive, <sup>j</sup> Includes biomass

Source: National Environmental Quality (Emission) Guidelines (NEQG) (29 Dec 2015)

### 3.6.2 Water Quality

According to International Water Quality Guidelines Study report published by United Nation Environment Program, there are various water quality standards and they are:

- a) Water Quality Standards
  - ❖ Water Quality Standards for Conservation of the living Environment (Rivers)
  - ❖ Water Quality Standards for Conservation of the living Environment (Lakes)
  - ❖ Water Quality Standards for Protecting Human Health (Rivers and Lakes)
- b) Ground Water Quality Standards
- c) Coastal Water Quality Standards
  - ❖ Coastal Water Quality Standards for Conservation of the Living Environment
  - ❖ Coastal Water Quality Standards for the Protection of Human Health
- d) Drinking Water Quality Standards

Although the water quality standards are widespread, for this EMP, Study GMES EMP Team selected WHO Drinking Water Standards - 2011 and also selected National Environmental Quality (Emission) Guidelines (2015) as effluent water standards for general effluent runoff.

Table 3-5 WHO Drinking Water Standards (2011)

Sr. No.	Parameter	Guideline Values	Unit
1.	Aluminum	0.2	mg/l
2.	Arsenic	10	µg/l
3.	Chloride	250	mg/l
4.	Copper	2	mg/l
5.	Cyanide	0.07	mg/l
6.	Manganese	0.4	mg/l
7.	pH	6.5~8.5	-
8.	Sulfate	250	mg/l
9.	Total Alkalinity	-	mg/l
10.	Total Dissolved Solids	600	mg/l
11.	Total Hardness	500	mg/l
12.	Total Iron	0.3	mg/l
13.	Turbidity	5	NTU

The following NEQG general guideline values will be applied for general effluent runoff emitted from utility operations, sewage treatment plant, wastewater treatment plant, and storm water runoff during the operation stage of the project.

Table 3-6 Standards for Wastewater, Stormwater Runoff, Effluent and Sanitary Discharges (General Application)

Sr. No.	Parameter	Guideline Values	Unit
1.	5-day Biochemical oxygen demand	50	mg/l
2.	Ammonia	10	mg/l

Sr. No.	Parameter	Guideline Values	Unit
3.	Arsenic	0.1	mg/l
4.	Cadmium	0.1	mg/l
5.	Chemical oxygen demand	250	mg/l
6.	Chlorine (total residual)	0.2	mg/l
7.	Chromium (hexavalent)	0.1	mg/l
8.	Chromium (total)	0.5	mg/l
9.	Copper	0.5	mg/l
10.	Cyanide (free)	0.1	mg/l
11.	Cyanide (total)	1	mg/l
12.	Fluoride	20	mg/l
13.	Heavy metals (total)	10	mg/l
14.	Iron	3.5	mg/l
15.	Lead	0.1	mg/l
16.	Mercury	0.01	mg/l
17.	Nickel	0.5	mg/l
18.	Oil and grease	10	mg/l
19.	pH	6-9	S.U. <sup>a</sup>
20.	Phenols	0.5	mg/l
21.	Selenium	0.1	mg/l
22.	Silver	0.5	mg/l
23.	Sulfide	1	mg/l
24.	Temperature increases	<3 <sup>b</sup>	°C
25.	Total coliform bacteria	400	100 ml
26.	Total phosphorus	2	mg/l
27.	Total suspended solids	50	mg/l
28.	Zinc	2	mg/l

<sup>a</sup> Standard unit

<sup>b</sup> 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 from the point of discharge

Source: National Environmental Quality (Emission) Guidelines (NEQG) (29 Dec 2015)

### 3.6.3 Noise Levels

According to the NEQG, the noise levels are set as shown in the following table and noise prevention and mitigation measures should be taken by all projects where predicted or measured noise impacts from a project facility or operation exceed the applicable noise level guideline at the most sensitive point of reception. Noise impacts should not exceed the levels shown below, or result in a maximum increase in background levels of three decibels at the nearest receptor location off-site.

Since the project is located in Mingaladon Industrial Park and surrounding receptors are industrial and commercial areas, the target noise level targeted to industrial and commercial receptors will be applied during operation phase of the project.



Table 3-7 Ambient Noise Level Standards for Operation Phase

Receptor	One Hour $L_{Aeq}$ , dB (A)	
	Day time 07:00-22:00 (10:00-22:00 for Public holidays)	Night time 22:00-07:00 (22:00-10:00 for Public holidays)
Resident, Institutional, Educational	55	45
Industrial Commercial	70	70

Source: National Environmental Quality (Emission) Guidelines (NEQG) (29 Dec 2015)

Table 3-8 OHS Noise Exposure Limits for the Work Environment (Noise Exposures in dBA)

Sr. No.	Noise (dBA)	Permissible exposure Noise (hours and minutes)
1	85	16 hrs
2	87	12 hrs 6 min
3	90	8 hrs
4	93	5 hrs 18 min
5	96	3 hrs 30 min
6	99	2 hrs 18 min
7	102	1 hrs 30 min
8	105	1 hr
9	108	40 min
10	111	26 min
11	114	17 min
12	115	15 min
13	118	10 min
14	121	6.6 min
15	124	4 min
16	127	3 min
17	130	1 min

Note: Exposures above or below the 90 dB limit have been "time weighted" to give what OHSA believes are equivalent risks to a 90 dB eight-hour exposure. [Source: Marsh (9)]

### 3.6.4 Light Intensity

Work area light intensity should be adequate for the general purpose of the location and type of activity, and should be supplemented with dedicated work station illumination, as needed.

The typical light levels are described in **Table 3-9**.

Table 3-9 Typical Light Levels

Lux Level	Factories
20-75	Emergency Stairs, Warehouse
75-150	Exit/Entrance Passages
150-300	Packing Work
300-750	Visual Work: Production Line

750-1,500	Typesetting: Inspection Work
1,500-3,000	Electronic Assembly, Drafting
<b>Lux Level</b>	<b>Office</b>
75-150	Indoor Emergency Stairs
100-200	Corridor Stairs
200-750	Conference, Reception Room
750-1,500	Clerical Work
1,500-2,000	Typing, Drafting

### 3.7 Institutional Arrangement for Environmental Management

#### 3.7.1 Institutional Arrangement during Operation Phase

During the operation phase, the project proponent, Myanmar Asia Optical International Co., Ltd. is fully responsible for implementation of environmental management, mitigation and monitoring activities and submission of environmental monitoring report to Environmental Conservation Department (ECD), Yangon Region under MONREC. Operations Department under MAOI is in-charged department for environment, security and safety concerned issues throughout the operation stage. The proposed institutional arrangement to implement EMP during the operation phase is shown in **Figure 3-1**.

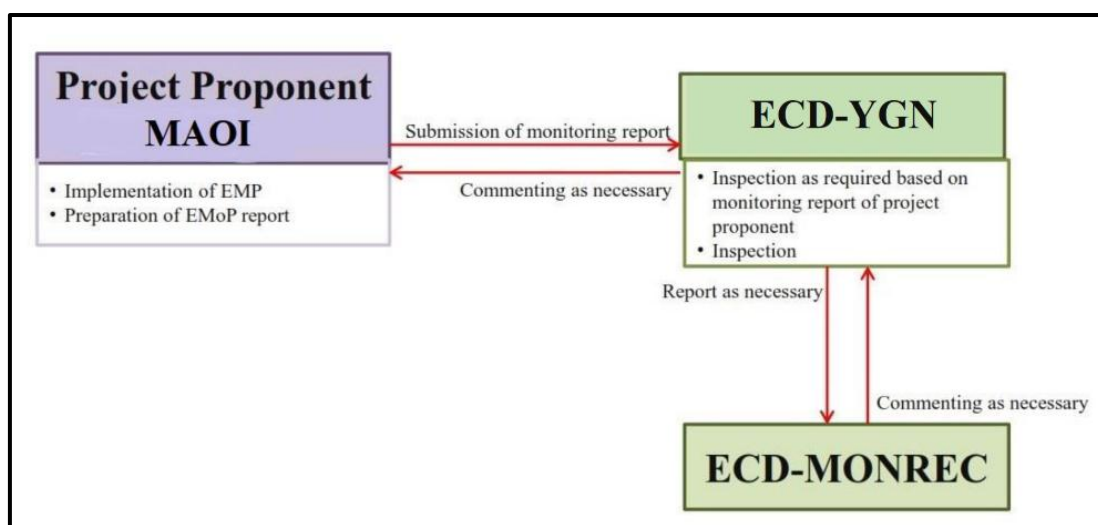


Figure 3-1 Institutional Arrangement during the Operation Phase

#### 3.7.2 Institutional Arrangement during Decommissioning Phase

During the decommissioning phase, the demolition contractor will establish temporary project office to implement demolition works. The contractor is responsible to implement environmental management, mitigation and monitoring activities and submission of environmental monitoring report to the project proponent, MAOI. The project proponent is responsible for the supervision of overall environmental management activities done by construction contractor, and for the submission of environmental monitoring report to Environmental Conservation Department (ECD), Yangon Region under MONREC. The proposed institutional

arrangement to implement EMP during the decommissioning phase is shown in Figure 3-2.

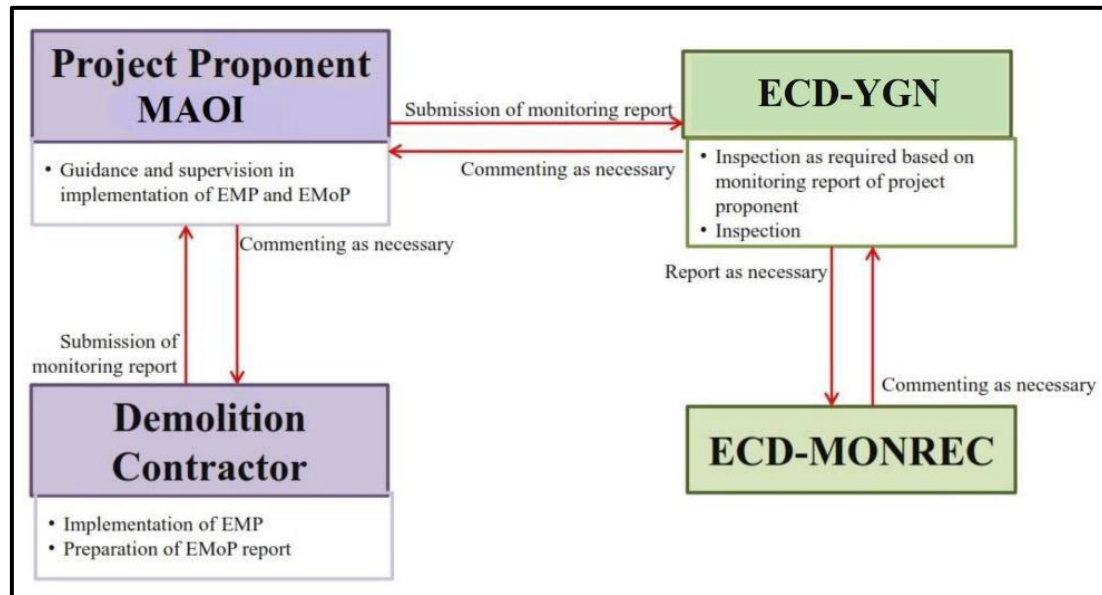


Figure 3-2 Institutional Arrangement during the Decommissioning Phase

### 3.8 Key Commitment of Proponent for Environmental Management

The general commitments by Myanmar Asia Optical International Company Limited are as follows:

- ❖ To comply with all Myanmar laws, rules and regulations and Environmental Conservation Law (2012)
- ❖ To ensure that legal requirements are incorporated in designs for construction phase and in production procedures for operational phase
- ❖ To ensure that all contractors and sub-contractors follow strictly relevant legal and other requirements during construction phase
- ❖ To ensure all relevant legally required documents are readily available on site by the project proponent's personnel, contractors and sub-contractors such as licenses, permits, approval applications
- ❖ To conduct environmental compliance audit at least annually during operational phase
- ❖ To ensure implementation of company's CSR program
- ❖ To ensure compliance with company's OSH policy
- ❖ To submit the environmental monitoring report biannually.

The commitments regarding with environmental, social and health related considerations by Myanmar Asia Optical International Company Limited and its principal contractor for respective environmental components are described in below table.

Table 3-10 List of Key Commitments

Sr. No.	Field	No.	Commitment	EMP Reference	Responsible Organization	
					MAOI	Contractor
<b>I</b>	<b>General</b>	1	The relevant Myanmar laws, rules and regulations as follows will be complied with: ➤National Environmental Policy (2019) ➤Environmental Conservation Law (2012) ➤Environmental Conservation Rules (2014) ➤EIA Procedures (2015) ➤National Environmental Quality (Emission) Guidelines (2015)	Chapter-3	√	√
		2	MAOI/ Contractor will comply with relevant targeted air quality, water quality and noise level.	Chapter-3	√	√
		3	MAOI/ Contractor will comply and implement the environmental management plan (EMP), mitigation measures and monitoring plan formulated from this EMP for operation and decommissioning phases.	Chapter-7 and Chapter-8	√	√
		4	The company will implement all of the items in the list of commitments	Chapter-3	√	√
<b>II</b>	<b>Air Quality</b>	1	The project proponent set the target values of ambient air quality in accordance with the NEQG and US - EPA Guidelines.	Chapter-3	√	√
		2	To prevent air contaminants such as dust, particulate matters and exhaust gases during operation and decommissioning phases, the adequate mitigation measures will be implemented at both operation and decommissioning phases of the project.	Chapter-7 and Chapter-8	√	√
		3	Monitoring of air quality will be conducted in accordance with	Chapter-8	√	

Sr. No.	Field	No.	Commitment	EMP Reference	Responsible Organization	
					MAOI	Contractor
			the EMP during both operation and decommissioning phases and respective monitoring reports will be submitted accordingly to ECD.			
III	Water and Wastewater Quality	1	During operation phase, the domestic wastewater will be discharged into the river through the drainage only after doing test to comply with NEQG target values for effluent.	Chapter-3, Chapter-5 and Chapter-5	√	
		2	During operation phase, the wastewater generated from factory operations, repair and maintenance activities will be collected into the wastewater treatment plant and only effluent from this plant after removing the oil wastes and slugs collected by outsourced contractor will be discharged into the river.	Chapter-2, Chapter-4 and Chapter-8	√	
		3	During decommissioning phase, wastewater generated from the domestic activities will be discharged into septic tank and collected by outsourced contractor. The wastewater from demolition activities will be discharged into the drainage only after passing through the settling ponds and inspection pit.	Chapter-8		√
		4	Direct discharges of all kinds of wastewater into the drainages will be strictly prohibited at both operation and decommissioning phases of the project.	Chapter-8	√	√
		5	Monitoring of water quality will be conducted in accordance with the EMP during operation and decommissioning phases to comply with target values set and respective monitoring reports will be submitted	Chapter-3 and Chapter-8	√	√

Sr. No.	Field	No.	Commitment	EMP Reference	Responsible Organization	
					MAOI	Contractor
			accordingly to ECD, Yangon Region.			
IV	Noise and Vibration	1	Adequate mitigation measures would be adopted and implemented at both operation and decommissioning phases of the project to comply with target noise and vibration levels set for the project.	Chapter-3 and Chapter-8	√	√
		2	During operation phase, the project proponent set the target value of Noise level in accordance with the NEQG Guidelines for ambient noise level.	Chapter-3 and Chapter-5	√	
		3	For noise and vibration control, setting the speed limit for vehicles, proper repair and maintenance of demolition-related vehicles during decommissioning phase.	Chapter-7		√
		4	Checking the operation of temporary septic tanks and temporary waste storage areas will be implemented during decommissioning phase.	Chapter-7		√
V	Soil Contamination	1	Soil contamination due to accidental leakage and spillage of diesel and oil can be mitigated by paving with concrete floor and by applying systematic fueling system.	Chapter-7	√	√
VI	Wastes	1	For operation phase, MAOI is committed to follow the waste management plan and the brief descriptions of it is:  <b>Waste segregation</b> ➤ Food waste ➤ Hazardous waste ➤ Non-hazardous waste <b>Waste minimization</b> ➤ Reuse and recycle where	Chapter-4, Chapter-7 and Chapter-8	√	



Sr. No.	Field	No.	Commitment	EMP Reference	Responsible Organization	
					MAOI	Contractor
			possible <b>Waste disposal</b> ➤ Dispose and handle according to ECD Guideline ➤ Dispose by the authorized waste collector ➤ Sell to recycler for recyclable waste			
		2	For decommissioning phase, contractor will follow the waste segregation plan, waste disposal plan and waste handling procedures described in EMP.	Chapter-8		√
VII	Local Economy and Social Consideration	1	Number of local staff and workers in MAOI will be recorded as necessary to know the job employment for local people.	Chapter-7	√	
		2	The project proponent must give employees compensation for suffering during decommissioning phase.	Chapter-7	√	
VIII	CSR Activities	1	Donations at wards and villages nearby and Social Welfare Programs, etc. will be recorded yearly.	Chapter-10	√	
IX	Occupational Health and Safety	1	The relevant regulations/ rules of labors' rights, health and safety as follows will be complied with: ▪ The Workmen's Compensation Act (1923, Amendment in 2011) ▪ The Leave and Holiday Act (1951, Partially Amendment in 2014) ▪ The Labor Organization Law (2011) ▪ The Labor Organization Rule (2012) ▪ The Labor Dispute Settlement Law (2012, Amendment in	Chapter-3	√	√

Sr. No.	Field	No.	Commitment	EMP Reference	Responsible Organization	
					MAOI	Contractor
			2019) ▪ The Social Security Law (2012) ▪ The Employment and Skill Development Law (2013) ▪ The Minimum Wage Law/Rules (2013) ▪ The Social Security Rules (2014) ▪ The Payment of Wages Law (2016) ▪ The Myanmar Occupational Health and Safety Law (2019)			
		2	The adequate measures and plans for occupational health and safety of staff and factory workers will be implemented in accordance with EMP to comply with Myanmar laws and regulations and other international practices for OHS during operation and decommissioning phases of the project.	Chapter-7	√	√
		3	Accidents and incidents, OHS trainings and drills, Health Check-up and other OHS concerned issues will be recorded and prepared the report yearly. Reports for claims from workers will be prepared monthly during operation stage.	Chapter-9	√	
<b>X</b>	Community Health and Safety	1	Ensuring that vehicles are delivering materials preferably during weekend and off-peak hours as much as possible when traffic volume is low. Covering of materials is to be done during transportation. Strict enforcement of on-site speed controls.	Chapter-7	√	√

Sr. No.	Field	No.	Commitment	EMP Reference	Responsible Organization	
					MAOI	Contractor
XI	Emergency Risks	1	Occurrences of the risks of flood, fire and earthquake will be recorded at the time of occurrence and included in the monitoring report to be submitted to ECD, Yangon Region.	Chapter-9	√	√
		2	MAOI has installed suitable firefighting system and established the emergency response team for the fire and natural disaster emergency.	Chapter-8 and Chapter-9	√	
XII	Training and Education	1	MAOI will implement <ul style="list-style-type: none"> <li>▪ the training program for new workers</li> <li>▪ Other capacity building program for skill workers and</li> <li>▪ Emergency response training for all workers for fire and natural emergency.</li> </ul>	Chapter-10	√	
XIII	Reporting	1	MAOI and demolition contractor will submit monitoring reports during operation and decommissioning phases regularly to the ECD, Yangon Region according to the EIA procedure or as necessary.	Chapter-8	√	√

## 4.0 DESCRIPTION OF THE PROJECT

### 4.1 Project Location

The factory-1 of Myanmar Asia Optical International Company Limited is located at Plot No. (A2, A3), Mingaladon Industrial Park, Mingaladon Township, Yangon Region, Myanmar. It is located in the Mingaladon Industrial Park and the geographical coordinates of project site is as follows:

Latitude: 16° 56' 33.66" N

Longitude: 96° 09' 09.42" E



Figure 4-1 Location of the Factory

## 4.2 Area and Land Ownership

The area and land ownership of the factory-1 is as follow:

Factory Area:	51,134.5 m <sup>2</sup>
Type of Land:	Industrial Land
Land Acquisition:	Lease Land
Owner/Lessor of the Land:	Mingaladon Industrial Park Co., Ltd.
Lessee of the Land:	Myanmar Asia optical International Co., Ltd. (MAOI)

## 4.3 Site Description

### 4.3.1 Site Accessibility

Mingaladon Industrial Park (MIP) is located just beside the No.3 Main Road.

The factory is located just near the main gate entrance of the MIP. As soon as it is entered into the main gate and turn left into the first street. (See in **Figure 4-2**)

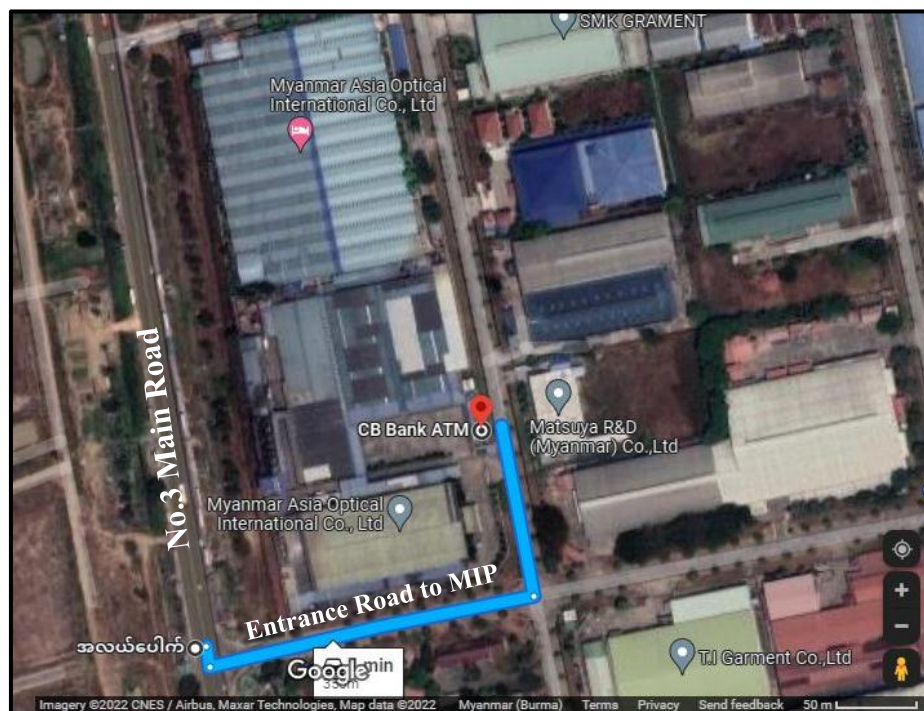


Figure 4-2 Access Road to the Proposed Project

### 4.3.2 Site Boundaries and Surrounding Environment

The factory is surrounded on the four sides as follows:

- East Side: Famoso Clothing Co., Ltd., Matsuya R & D (Myanmar) Co., Ltd., Kangaroo and SMK Mingaladon Garment Co., Ltd.
- West Side: No. 3 Main Road
- Left Side: MIP Centralized Wastewater Treatment Plant
- Right Side: MIP Office





Figure 4-3 Surrounding Environment of the Factory-1

## 4.4 Financial Information and Investment Plan

### 4.4.1 Financial Information

MAOI is wholly foreign-owned and the financial information is as follow.

Table 4-1 Financial Information

<b>Type of Investment</b>	100% Foreign Investment
<b>Type of Business</b>	Manufacturing
<b>Amount of Foreign Capital</b>	USD 12.880 Million
<b>Total Amount of Investment</b>	USD 23.558 Million
<b>Number of Shares</b>	45,123 Shares
<b>Type of Share</b>	Ordinary (USD 6,000 per one share)
<b>Validity of Investment Permit</b>	45 years

Table 4-2 Changed Amount in Total Amount of Foreign Capital

Sr. No.	Year/Date	Changed Amount of Foreign Capital (Million in USD)
1.	2003	12.88
2.	31.1.2015	12.929
3.	28.2.2017	13.580
4.	12.6.2017	14.113
5.	16.8. 2017	16.038
6.	26.1. 2018	16.838
7.	31 .8.2018	17.821
8.	25.4. 2019	20.732



Sr. No.	Year/Date	Changed Amount of Foreign Capital (Million in USD)
9.	6.6. 2019	22.411
10.	11.7. 2019	22.890
11.	5.12. 2019	23.236
12.	23.12.2019	23.558

#### 4.4.2 Investment Plan

The investment plan of MAOI is as follows:

Table 4-3 Investment Plan

Sr. No.	Particulars	Amount (USD)						Total (USD)
		2002	2003	2004	2005	2006	2007	
1.	Foreign Currency Working Capital	170,000	400,800	100,299	-	-	-	671,099
2.	Value of Machines	-	1,333,911	1,593,815	1,547,822	1,696,979	1,594,142	7,766,669
3.	Value of Factory Accessories	-	923,511	104,470	256,315	104,470	104,470	1,493,238
4.	Value of Tools	-	86,271	49,269	28,177	22,096	31,019	216,831
5.	Value of Office Equipment	-	94,097	-	-	-	-	94,097
6.	Factory Consumables	-	418,407	-	-	-	-	418,407
7.	Value of Land Use Premium	731,795	487,864	-	-	-	-	1,219,659
8.	Holding Value	-	-	-	-	-	-	-
<b>Total</b>		<b>901,795</b>	<b>4,744,861</b>	<b>1,847,853</b>	<b>1,832,314</b>	<b>1,823,545</b>	<b>1,729,631</b>	<b>12,880,000</b>

Source: MAOI

## 4.5 Working Hour and Manpower Requirement

### 4.5.1 Working Hour

There is one shift for management office and two shifts for factory operation and normal working hour is 8 hours per day from Monday to Saturday. The following table shows the detailed working hours.

Table 4-4 Working Hour of the Factory

Management Office		
No. of Shift	1 Shift	
Monday ~ Saturday	07:30 a.m. ~ 04: 30 p.m.	
Break	11:30 a.m. ~ 12:30 p.m.	
Factory Operation		
	Day Shift	Night Shift
Monday ~ Saturday	7:30 a.m. ~ 4: 00 p.m.	7:30 p.m. ~ 4:00 a.m.

Break	11:30 a.m. ~ 12:00 p.m.	11:30 p.m. ~ 12:00 a.m.
Overtime (OT)	4:00 p.m. ~ 7:30 p.m.	4:00 a.m. ~ 7:30 a.m.

#### 4.5.2 Manpower Requirement

Manpower is the main requirement for the operation of every project. To perform the operation and maintenance of the factory, the project proponent needs to control the employees in the best way. The manpower requirement of the project is as follows.

Table 4-5 Human Resources Requirement

Sr. No.	Position	No. of Persons (Factory-1)
<b>Foreigners</b>		
1.	Engineers	2
2.	Operational Experts	13
3.	Senior Managers	9
4.	Technicians	41
<b>Sub-total</b>		<b>65</b>
<b>Local</b>		
1.	Team Leaders	77
2.	Line Leaders	433
3.	Monitors	245
4.	Technicians	77
5.	Workers	2,622
<b>Sub-total</b>		<b>3,454</b>
<b>Total</b>		<b>3,519</b>

#### 4.6 Infrastructure of the Factory

The layout and photos of project sites showing existing buildings and infrastructures including production area, office area and internal roads etc. are shown in **Figure 4-4** and **Figure 4-5**.



Figure 4-4 Layout Plan



Figure 4-5 Photos of Office and Factory Buildings

## 4.7 Raw Materials and Subsidiaries

### 4.7.1 Raw Materials

The basic raw materials in the optical lens production are optical glasses. The raw materials are imported from China, Taiwan, Japan and Thailand.



Figure 4-6 Raw Materials Storage Area



Table 4-6 List of Raw Materials for Optical Lens Processing

Sr. No.	Commodity Name	Specifications	Yearly Consumption	Unit	Mode of Transport	Project
1.	Optical Glass (Main Raw)	-	60,000,000	Pcs	Air/Sea/Road	Optical Lens Process
2.	Dusper K3 Cleaning Paper	30 bag/box	18,000	bag	Air/Sea/Road	Lens Cleaning Process
3.	Dusper K4 Cleaning Paper	128 bag/box	3,600	bag	Air/Sea/Road	Lens Cleaning Process
4.	Finger Cots	S-15	4,000	bag	Air/Sea/Road	All Lens Process
5.	Computer Paper		300	bag	Air/Sea/Road	All Lens Process
6.	Vacuum Bag	460*460mm	20,000	Pcs	Air/Sea/Road	Packing Process
7.	Vacuum Bag	390*460*0.1mm	5,000	Pcs	Air/Sea/Road	Packing Process
8.	Vacuum Bag	320*400*0.2T	5,000	Pcs	Air/Sea/Road	Packing Process
9.	Filter Paper/Glassing paper	330*270MM	22,500	Pcs	Air/Sea/Road	Packing Process
10.	Fill	540*340mm	180,000	Pcs	Road	Packing Process
11.	Paper Tape/Masking Tape	24*15yard	3,000	Pcs	Road	All Lens Process
12.	Tape	2in	16,000	Pcs	Road	All Lens Process
13.	Tape	1in	2,500	Pcs	Road	All Lens Process
14.	Plastic Film	50-300(15-MIC)	600	Pcs	Road	Packing Process
15.	Paper Box (BCBX0001)	350*290*230	28,500	Pcs	Road	Packing Process
16.	Paper Box (BCBX0002)	320*210*300	30,700	Pcs	Road	Packing Process
17.	Paper Box (BCBX0003)	335*435*172	750	Pcs	Road	Packing Process
18.	Paper Box (BCBX0006)	340*230*300	850	Pcs	Road	Packing Process
19.	Paper Box (BCBX0007-7)	320*210*150	150	Pcs	Road	Packing Process
20.	Paper Pad (BCPX0004)	300*190	100,300	Pcs	Road	Packing Process
21.	Paper Pad (BCPX0005)	330*265	96,000	Pcs	Road	Packing Process
22.	Plastic Pad (BCPX0001)	300*190	249,100	Pcs	Road	Packing Process
23.	Plastic Pad (BCPX0002)	330*265	138,000	Pcs	Road	Packing Process
24.	Silica Gel/ Desiccant	2g	144,000	Pcs	Road	Packing Process



#### 4.7.2 Chemical Usage

In the manufacturing processes of optical lens, chemicals used in almost every stage are listed in **Table 4-7**.

Table 4-7 List of Chemicals for Optical Lens Production

Sr. No.	Commodity Name	ERP No	Specifications	Yearly Consumption		Used Process
				Quantity	Unit	
1.	Acetone	L060101		108,000	kg	QC-checking, centering reprocess, painting, coating process (wipes use) mold maintenance (Plastic injection section)
2.	Adhesive OP-1030M	L062850	HARDLOC	500	g	Cementing
3.	Adhesive OP-1030Z	L062849	HARDLOC	36,000	g	Cementing
4.	Adhesive OP-1903R	L062898	HARDLOC	500	g	Cementing
5.	Adhesive OP-1030K	L042366	HARDLOC	500	g	Cementing
6.	Adhesive RW99 No.2		RW99 No.2	50	kg	KCG
7.	Adhesive, UV Curable Acrylic Resin 5515	L042619	Work Rock No. 5515	3,500	g	Cementing
8.	Adhesive, UV Curable Acrylic Resin 5518	L042666	Work Rock No. 5518	3,000	g	Cementing
9.	Adhesive, UV Curable Acrylic Resin 8807L	L042639	8807L	500	g	Cementing
10.	Aluminium Oxide Al <sub>2</sub> O <sub>3</sub>	D172323	46 degree	1,500	kg	Coating process
11.	AMBERJET™ 1000 Na Resin	B252150	1000 Na Resin	750	kg	Pure water treatment
12.	AMBERJET™ 4200 CI Resin	B252173	4200 CI Resin	1,750	kg	Pure water treatment
13.	Anti-corrosion and Scaling Agents	L062892	HC-200	4,800	kg	Cooling tower
14.	Bees Wax	-	-	250	kg	Centering Process
15.	Cleaning Agent		FQG-118	14,400	kg	Cleaning process
16.	Cleaning Agent		FX15	55,200	kg	Cleaning process
17.	Cleaning Agent		QCJG-105	7,200	kg	Cleaning process

Sr. No.	Commodity Name	ERP No	Specifications	Yearly Consumption		Used Process
				Quantity	Unit	
18.	Cleanser (Methylene Chloride)		FX-315	145,800	kg	Cleaning process
19.	Calcium Carbonate		CaCO <sub>3</sub>	144	kg	Cleaning process
20.	Cutting fluid		CK-01	8,000	l	Grinding / SC grinding
21.	Cutting Liquid (Green cut), Water Soluble Grinding Fluid	L012202	18L	216	kg	Grinding / SC grinding
22.	Cutting Oil		CKR-07	26,000	kg	Grinding / SC grinding
23.	Cutting Oil		QXY-281	72,000	l	Centering reprocess
24.	Cenoflex 2621	L062869	Spray Pitch Cenoflex 2621	480	kg	KCG process /Centering cutting Reprocess
25.	Deinking Agent		FCT-18	3,000	kg	Centering reprocess
26.	Detergent SAT-686	L062890	SAT-686	3,000	kg	Cleaning process
27.	Chloroprene Rubber Solvent A-521	L042616	A-521	20	kg	Polishing process
28.	Diethyl Ether	L060115		5,260	kg	Centering reprocess, painting process, coating process, cleaning PVC Boxes, QC checking
29.	EPOLLA #2000 BLACK A Liquid	L112162	#2000 A	288	kg	Painting process
30.	EPOLLA #2000 SM B Liquid	L082012	#2000 B	144	kg	Painting process
31.	EPOLLA #2000 Thinner	L062149	#2000	288	l	Painting process
32.	Ethanol (Denatured Ethanol)	L062634		5,744	kg	Centering Reprocess, Painting process, coating process, Cleaning PVC Boxes, Checking Lens, SLA cleaning machine process use, mold maintain process
33.	Film-stripping Agent		FC-71	7,200	kg	Cleaning process
34.	Glycerin		Non sulfur, Chlorine compounds	840	kg	Cleaning process
35.	Glue Removing Agent	L022164M	TG-05	3,500	kg	Cementing process

Sr. No.	Commodity Name	ERP No	Specifications	Yearly Consumption		Used Process
				Quantity	Unit	
36.	Hardener GT-7 II B	L112553	Modified aromatic polyamine GT-7 II B	72	kg	Painting process
37.	Isopropyl Alcohol	L022137	Isopropanol, IPA	192,000	kg	Cleaning process
38.	Magnesium Fluoride	D172348	MgF <sub>2</sub>	2,000	kg	Coating process
39.	Norland Optical Adhesive 61	L052024	No.61	6,094	g	Cementing process
40.	Paint GT-7 II A	L112473	Bisphenol A liquid epoxy resin mixture	576	kg	Painting process
41.	Paint FASTITE No.140 (N) TL1 Black	L062896	-	20	kg	Painting process
42.	Paint (Lens coating Black B No.3)	L112163	Lens coating Black B No.3, For glass	16	kg	Painting process
43.	Photo Bond #150	L042511	Ultraviolet curing adhesive #150	3,600	g	Cementing process
44.	Photo Bond #300/300K	L042510	Ultraviolet curing adhesive #300/300K	1,200	g	Cementing process
45.	Polishing Liquid	D192157	ZOX-N	3,000	kg	Polishing process
46.	Polyacrylamide	L062419	PAM 90%	300	kg	Sewage treatment
47.	Poly-aluminum Chloride	L062096	Aluminum trichloride, PAC	3,750	kg	Sewage treatment
48.	Vacuum Pump Oil	C392016	MR-200	300	l	Coating process
49.	Vacuum Pump Oil (Lubricant)	-	R-7	400	l	Coating process
50.	Diffuse Pump Oil	L012517	OS-15, (C <sub>6</sub> H <sub>5</sub> ) <sub>5</sub> Si <sub>3</sub> (CH <sub>3</sub> ) <sub>3</sub> O <sub>2</sub>	200	l	Coating process
51.	NT Silane Coupling Agent	L182172	KBM #403	120	kg	Painting process
52.	Rare Earth Polishing Powder	D192119	Red	1,000	kg	Polishing process

Sr. No.	Commodity Name	ERP No	Specifications	Yearly Consumption		Used Process
				Quantity	Unit	
53.	Rare Earth Polishing Powder	D192120	White	800	kg	Polishing process
54.	Shin-Etsu Silicone	L042670	X-31-1598-2 (silicone mixture)	15,000	g	Cementing process
55.	Silica Scale Cleaning Agent	L060265	HC-300C	2,100	kg	Cooling tower
56.	SX-Lubricant for Glass Glazing	MAOJY20 03S0127	HY071	720,000	l	Centering reprocess
57.	Surfclear 100	D172267/ D170165	PAF-497B MS-EC100	2,000	Pcs	Coating process
58.	Silicon Dioxide	D172218	Cristobalite SiO <sub>2</sub>	600	kg	Coating process
59.	Thinner GT-7 II	L112475	GT-7 II	576	kg	Painting process
60.	Thinner (Lens YOU B Thinner)	L062151	(Lens YOU B Thinner) For glass	16	l	Painting process
61.	Thinner No.2350 (90-7309)	L062897	-	20	l	Painting process
62.	Zirconium Dioxide	D172265	ZrO <sub>2</sub> 99.9% 52°	2,000	kg	Coating process
63.	Zirconium Titanium Oxide	D172221	Metallic oxide ZrO <sub>2</sub> +TiO <sub>2</sub> 70°	5,000	kg	Coating process
64.	Paraffin Wax	L062908		360	kg	Centering reprocess
65.	Cutting Fluid	L012456M	SQXY-209	72,000	l	Centering reprocess
66.	Norland Optical Adhesive 63	L052103	No.63	509	g	Cementing
67.	Ink	L112172	SY5084	2,700	ml	Painting process
68.	Deinking Agent	L022089M	FCT-18	25,000	kg	Painting process

g = gram(s), kg = kilogram(s), l = litre(s), Pcs = pieces

## 4.8 Utilities

### 4.8.1 Electricity

Electricity is transmitted from existing national grid line to the Company's electrical system by connecting with 3 units of transformers at the factory-1. The necessary guidelines and precautionary measures relating to the use of electricity shall be adhered to. The internal infrastructure has to be designed. The necessary layouts and cable sizes needed are to be determined for the projected electrical demand.

Annual electricity requirement for the factory-1 is tabulated in **Table 4-8**.

For lighting, air-conditioning, air ventilation system and the production sectors, electricity is consumed continuously for the whole working time of the factory.

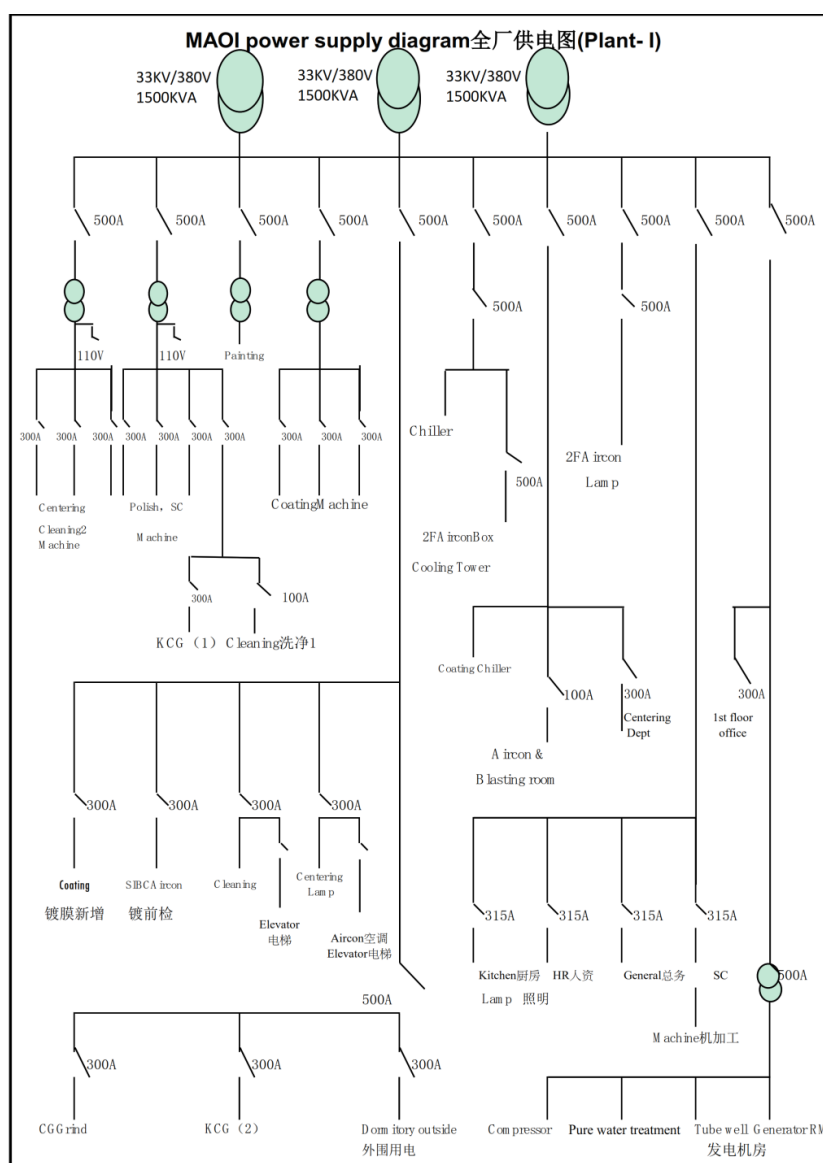


Figure 4-7 Power Supply Distribution Plan



Figure 4-8 Transformers

Table 4-8 Electricity Consumption

Sr. No.	Month	Electricity Consumption (kWh)			
		2019	2020	2021	2022
1.	January	1,361,310	887,930	1,156,000	735,500
2.	February	1,178,670	989,120	985,000	648,000
3.	March	1,453,710	1,318,260	1,281,000	474,000
4.	April	1,014,920	568,930	1,264,500	-
5.	May	1,062,200	1,335,880	1,333,900	-
6.	June	854,970	1,150,640	1,177,200	-
7.	July	135,9490	952,620	1,133,500	-
8.	August	1,207,000	1,204,720	1,384,900	-
9.	September	963,530	776,920	1,349,900	-
10.	October	828,080	-	1,138,400	-
11.	November	860,070	807,000	1,091,700	-
12.	December	885,970	948,190	1,027,500	-
<b>Total</b>		<b>13,029,920</b>	<b>10,940,210</b>	<b>14,323,500</b>	-

#### 4.8.2 Generators

There are eleven generators in the factory-1. They are one unit of 160 kVA, one unit of 550 kVA, one unit of 1,000 kVA, three units of 1,250 kVA and five units of 1,400 kVA.

The specification of the generators is as follows:

Table 4-9 Specification of the Generators

Sr. No.	kVA	Voltage	Type/Model	Serial No.
1.	160	230/440	GEH175 (OLYMPIAN)	OLY00000ARNS00707
2.	550	400	CUMMINS	C087855/05
3.	1,000	230/440	800 DFJC (CUMMINS)	C97A002424
4.	1,250	230/440	CUMMINS	73698-317
5.	1,250	230/440	N1120 DFLC (CUMMINS)	J98A005766



Sr. No.	kVA	Voltage	Type/Model	Serial No.
6.	1,250	230/440	CUMMINS	J98A005767
7.	1,400	230/440	CUMMINS	C9873036
8.	1,400	230/440	CUMMINS	C9873037
9.	1,400	230/440	1120 DFLC (CUMMINS)	J98A005768
10.	1,400	230/440	1120 DFCC (CUMMINS)	C9873038
11.	1,400	230/440	1120 DFJD (CUMMINS)	E80A00062



Figure 4-9 Generators and Generator Room

#### 4.8.3 Fuel Requirements

Diesel is used as fuel for generators and cars. It is bought from Aye Nyein Thar Co., Ltd. and Kyaw San Co., Ltd. and stored in separated area with three 15,000 gallons capacity diesel storage tanks for Factory-1.

Table 4-10 Diesel Consumption

Sr. No.	Month	Diesel Consumption (gallons)			
		2019	2020	2021	2022
1.	January	52,599	51,668	50732	53015
2.	February	49,828	44,278	42411	49049
3.	March	55,311	50,361	51563	113556
4.	April	56,504	24,591	49492	-
5.	May	90,199	56,672	62412	-
6.	June	83,105	51,777	70154	-
7.	July	62,168	45,999	51130	-
8.	August	59,225	47,841	63117	-
9.	September	62,564	38,315	59188	-
10.	October	72,716	3,267	59376	-
11.	November	75,360	19,677	52804	-
12.	December	56,141	49,221	54597	-
<b>Total</b>		<b>775,720</b>	<b>483,667</b>	<b>666,976</b>	<b>-</b>



Figure 4-10 Diesel Storage Tanks

#### 4.8.4 Water Requirement

Water is used in processes, domestic use and drinking. The raw water pumped from tube-wells is treated in water treatment system before using. The water sources are as follows:

Tube well (6" x 600') 4 units

MIP Water Supply Tap 3 units

The project proponent provided Reverse Osmosis (RO) system to purify water. The water quality is tested regularly at the national health laboratory and results are displayed in **Figure 4-11**. The process of pure water treatment system is mentioned in below. This Regeneration System is used to put Resin Chemical, which is used to reduce the lime.

THE REPUBLIC OF THE UNION OF MYANMAR  
MINISTRY OF HEALTH AND SPORTS  
DEPARTMENT OF MEDICAL SERVICES  
NATIONAL HEALTH LABORATORY  
#35, Hnaw Kun Talk Street, Dagon Township, Yangon  
BACTERIOLOGY SECTION

WATER EXAMINATION REPORT


Laboratory No : B-13198 Date of Report : 28.8.19  
Sender : Myanmar Asia Optical Co.Ltd  
Address : Mingalardon Twp.  
Voucher No : 034422  
Source (Description) : S.L.A မြေအောက်ရေ  
Date and Time of collection : 8:30 Am/ 27.8.19  
Date and Time of receipt : 12:00 Pm/27.8.19

Result of Analysis:

Total coliforms in CFU/ 100ml	<1
<i>Escherichia coli</i> in CFU/ 100ml	<1

(CFU = Colony Forming Unit)

Report: Water sample of B-13198 is bacteriologically satisfactory for drinking purpose.  
TECTA result form attached.

  
Microbiologist

Dr Thi Thi Htoon  
Head/Consultant Microbiologist  
Bacteriology Section  
National Health Laboratory

Reference: 1. Guidelines for Drinking-Water Quality, 4<sup>th</sup> ed. WHO, Geneva: 2011

THE REPUBLIC OF THE UNION OF MYANMAR  
MINISTRY OF HEALTH AND SPORTS  
DEPARTMENT OF MEDICAL SERVICES  
NATIONAL HEALTH LABORATORY  
#35, Hnaw Kun Talk Street, Dagon Township, Yangon  
BACTERIOLOGY SECTION

WATER EXAMINATION REPORT


Laboratory No : B-13197 Date of Report : 28.8.19  
Sender : Myanmar Asia Optical Co.Ltd  
Address : Mingalardon Twp.  
Voucher No : 034422  
Source (Description) : Roll မြေအောက်ရေ  
Date and Time of collection : 7:53 Am/ 27.8.19  
Date and Time of receipt : 12:00 Pm/27.8.19

Result of Analysis:

Total coliforms in CFU/ 100ml	1
<i>Escherichia coli</i> in CFU/ 100ml	1

(CFU = Colony Forming Unit)

Report: Water sample of B-13197 is bacteriologically satisfactory for drinking purpose.  
TECTA result form attached.

  
Microbiologist

Dr Thi Thi Htoon  
Head/Consultant Microbiologist  
Bacteriology Section  
National Health Laboratory

Reference: 1. Guidelines for Drinking-Water Quality, 4<sup>th</sup> ed. WHO, Geneva: 2011

THE REPUBLIC OF THE UNION OF MYANMAR  
MINISTRY OF HEALTH AND SPORTS  
DEPARTMENT OF MEDICAL SERVICES  
NATIONAL HEALTH LABORATORY  
#35, Hnaw Kun Talk Street, Dagon Township, Yangon  
BACTERIOLOGY SECTION

WATER EXAMINATION REPORT


Laboratory No : B-13196 Date of Report : 28.8.19  
Sender : Myanmar Asia Optical Co.Ltd  
Address : Mingalardon Twp.  
Voucher No : 034422  
Source (Description) : ရေအောက်ရေ  
Date and Time of collection : 7:50 Am/ 27.8.19  
Date and Time of receipt : 12:00 Pm/27.8.19

Result of Analysis:

Total coliforms in CFU/ 100ml	<1
<i>Escherichia coli</i> in CFU/ 100ml	<1

(CFU = Colony Forming Unit)

Report: Water sample of B-13196 is bacteriologically satisfactory for drinking purpose.  
TECTA result form attached.

  
Microbiologist

Dr Thi Thi Htoon  
Head/Consultant Microbiologist  
Bacteriology Section  
National Health Laboratory

Reference: 1. Guidelines for Drinking-Water Quality, 4<sup>th</sup> ed. WHO, Geneva: 2011

# Environmental Management Plan (EMP) Report for Factory-1(Part-I)

## Myanmar Asia Optical International Company Limited

**THE REPUBLIC OF THE UNION OF MYANMAR**  
**MINISTRY OF HEALTH AND SPORTS**  
**DEPARTMENT OF MEDICAL SERVICES**  
**NATIONAL HEALTH LABORATORY**  
 #35, Hnaw Kon Taik Street, Dagon Township, Yangon  
**BACTERIOLOGY SECTION**

**WATER EXAMINATION REPORT**

Laboratory No : B-13195      Date of Report : 28.8.19  
 Sender : Myanmar Asia Optical Co.Ltd  
 Address : Mingalardon Tsp.  
 Voucher No : 034422  
 Source (Description) : အိမ်ထောင်စုအတွက်  
 Date and Time of collection : 7:48 Am/ 27.8.19  
 Date and Time of receipt : 12:00 Pm/27.8.19

**Result of Analysis:**

Total coliforms in CFU/100ml	0
<i>Escherichia coli</i> in CFU/100ml	0

(CFU = Colony Forming Unit)

Report: Water sample of B-13195 is bacteriologically satisfactory for drinking purpose.  
**TECTA result form attached.**

Microbiologist  
 Dr Thi Thi Htoon  
 Head/Consultant Microbiologist  
 Bacteriology Section  
 National Health Laboratory

Reference: 1. Guidelines for Drinking-Water Quality, 4<sup>th</sup> ed. WHO, Geneva: 2011

**THE REPUBLIC OF THE UNION OF MYANMAR**  
**MINISTRY OF HEALTH AND SPORTS**  
**DEPARTMENT OF MEDICAL SERVICES**  
**NATIONAL HEALTH LABORATORY**  
 #35, Hnaw Kon Taik Street, Dagon Township, Yangon  
**BACTERIOLOGY SECTION**

**WATER EXAMINATION REPORT**

Laboratory No : B-13194      Date of Report : 28.8.19  
 Sender : Myanmar Asia Optical Co.Ltd  
 Address : Mingalardon Tsp.  
 Voucher No : 034422  
 Source (Description) : အိမ်ထောင်စုအတွက်  
 Date and Time of collection : 7:45 Am/ 27.8.19  
 Date and Time of receipt : 12:00 Pm/27.8.19

**Result of Analysis:**

Total coliforms in CFU/100ml	<1
<i>Escherichia coli</i> in CFU/100ml	<1

(CFU = Colony Forming Unit)

Report: Water sample of B-13194 is bacteriologically satisfactory for drinking purpose.  
**TECTA result form attached.**

Microbiologist  
 Dr Thi Thi Htoon  
 Head/Consultant Microbiologist  
 Bacteriology Section  
 National Health Laboratory

Reference: 1. Guidelines for Drinking-Water Quality, 4<sup>th</sup> ed. WHO, Geneva: 2011

Figure 4-11 Drinking Water Test Results







Figure 4-12 Pure Water Process Room at Factory-1



Figure 4-13 Chemicals used in Pure Water Process



Figure 4-14 Water Storage Tank

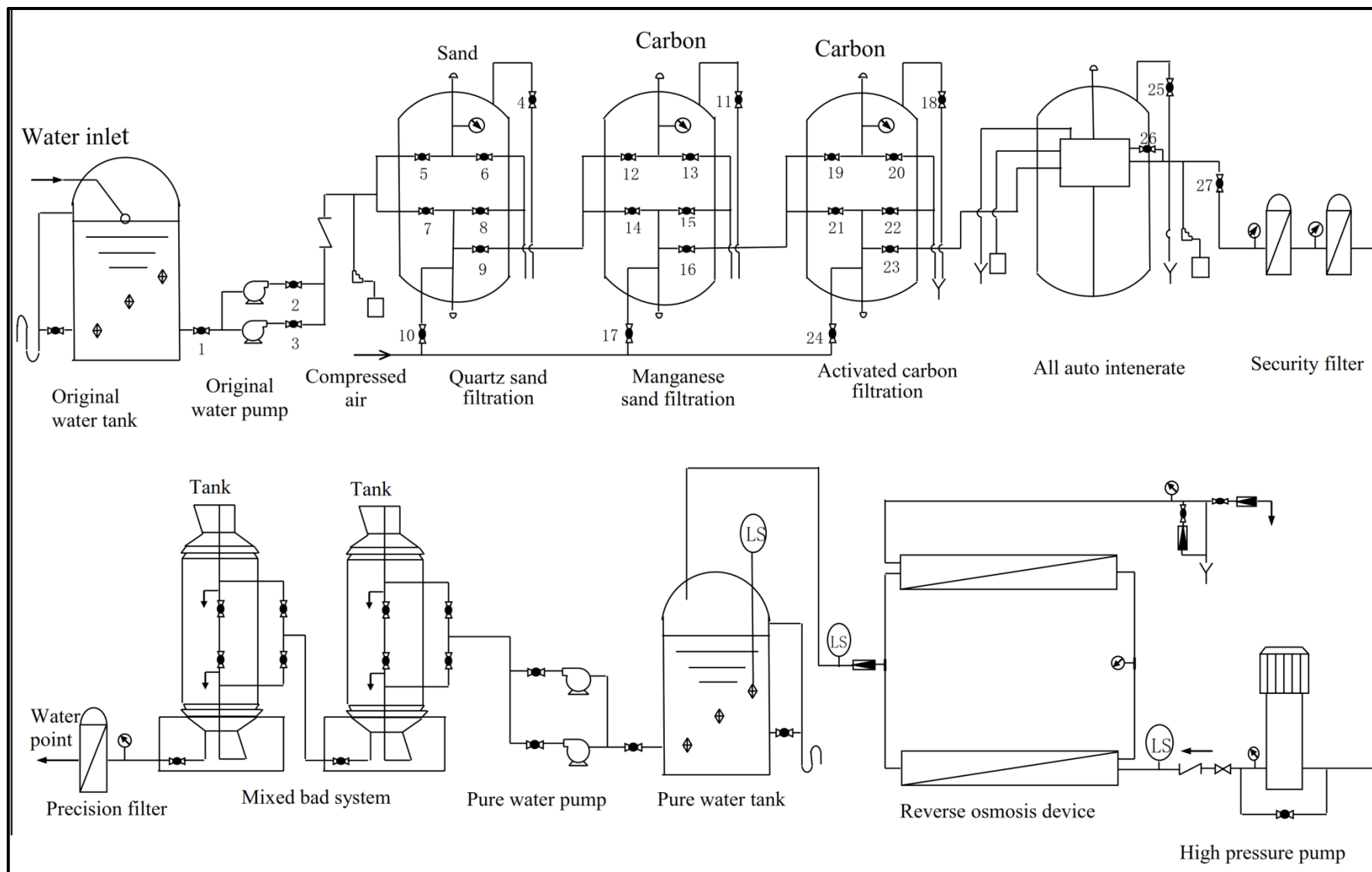


Figure 4-15 Water Treatment System Process Flow



Table 4-11 Annual Water Consumption (Tube-well)

Sr. No.	Month	Water Consumption (m <sup>3</sup> )			
		2019	2020	2021	2022
1.	January	28,556	22,589	23,612	21,333
2.	February	24,926	19,516	22,129	18,937
3.	March	19,071	20,954	28,630	19,916
4.	April	29,746	30,366	26,284	-
5.	May	31,785	28,634	30,239	-
6.	June	26,667	28,116	27,919	-
7.	July	27,307	25,458	22,497	-
8.	August	24,258	26,855	30,389	-
9.	September	20,856	21,893	23,062	-
10.	October	27,453	0	29,425	-
11.	November	23,131	14,933	26,904	-
12.	December	26,133	21,679	22,252	-
Total		309,889	260,993	313,342	-

Table 4-12 Annual Water Consumption (MIP Water Supply Tap)

Sr. No.	Month	Water Consumption (m <sup>3</sup> )			
		2019	2020	2021	2022
1.	January	11,279	8,122	6,696	7,866
2.	February	9,586	8,134	7,758	8,011
3.	March	8,061	7,565	7,391	9,704
4.	April	21,521	9,780	7,442	-
5.	May	18,335	10,351	10,363	-
6.	June	11,730	8,460	8,009	-
7.	July	13,913	8,760	8,288	-
8.	August	12,052	8,938	10,171	-
9.	September	8,123	6,647	6,642	-
10.	October	12,384	0	9,561	-
11.	November	11,389	9,071	11,187	-
12.	December	10,865	7,737	8,555	-
Total		149,238	93,565	102,603	-

Table 4-13 Pure Water Consumption for Cleaning Department

Sr. No.	Month	Pure Water Consumption (m <sup>3</sup> )			
		2019	2020	2021	2022
1.	January	4,792	4,126	4,993	5,034
2.	February	4,628	4,012	3,127	5,172
3.	March	3,580	3,488	5,053	6,967
4.	April	4,980	3,642	4,459	-
5.	May	4,952	4,166	3,719	-
6.	June	5,054	4,920	4,827	-
7.	July	4,822	4,141	3,712	-

Sr. No.	Month	Pure Water Consumption (m <sup>3</sup> )			
		2019	2020	2021	2022
8.	August	4,597	4,806	5,562	-
9.	September	3,053	3,377	4,473	-
10.	October	5,036	0	6,008	-
11.	November	4,592	4,420	5,927	-
12.	December	4,503	4,003	5,140	-
<b>Total</b>		<b>54,589</b>	45,101	57,000	-

Table 4-14 Pure Water Consumption for General Use

Sr. No.	Month	Pure Water Consumption (m <sup>3</sup> )			
		2019	2020	2021	2022
1.	January	2,090	1,811	2,286	1,987
2.	February	1,972	2,038	2,001	2,016
3.	March	1,555	1,780	2,189	1,618
4.	April	1,983	2,484	2,039	-
5.	May	2,097	2,069	1,652	-
6.	June	2,151	2,152	1,945	-
7.	July	2,065	2,129	1,863	-
8.	August	1,999	2,148	2,280	-
9.	September	1,764	2,626	1,689	-
10.	October	2,275	2,389	2,314	-
11.	November	2,157	2,060	2,405	-
12.	December	2,209	2,223	2,115	-
<b>Total</b>		<b>24,317</b>	25,909	24,778	-

## 4.9 Machinery and Equipment List

The machinery and equipment for each process are listed in the following tables.

Table 4-15 List of Machinery and Equipment for Optical Lens Production

Sr. No.	List of Items	Quantity	Unit	Used for
1	Curve Generation Machine	239	set	Curved Generation
2	Lathe	2	set	
3	Cutting Automatic Machine Complete Set	4	set	
4	Automatic Milling Machine	2	set	
5	Pressing Filter Machine	8	set	
6	Grinding Machine	37	set	Grinding
7	Polishing Machine	142	set	
8	Mill Automatic Feeder Machine Complete Set	1	set	
9	Automatic Grinding Machine	1	set	
10	Ultrasonic Cleaner	1	set	
11	Micro separator	35	set	
12	Grinding Machine	64	set	Polishing
13	Polishing Machine	209	set	
14	Laser Interferometer	26	set	

Sr. No.	List of Items	Quantity	Unit	Used for
15	Lens Appearance Tester	1	set	
16	Polishing Machine	101	set	KCG
17	Grinding Machine	3	set	
18	Curve Generator Machine	16	set	
19	Lens-dish Heating Equipment	1	set	
20	Laser Interferometer	8	set	
21	Adjusting Spherical Center Type High	1	set	
22	Grinding Machine	16	set	SC-Polishing
23	Polishing Machine	106	set	
24	Adjusting Spherical Center Type High	2	set	
25	Laser Interferometer	9	set	
26	Grinding Machine	9	set	SC-Grinding
27	Polishing Machine	121	set	
28	Micro separator	22	set	
29	Laser Interferometer	2	set	
30	Curve Generator Machine	1	set	Making Tools
31	Ultrasonic Cleaner	1	set	
32	Polishing Machine	6	set	
33	Coating Machine	28	set	
34	Ultrasonic Cleaner	23	set	Cleaning
35	Dehydrating Machine	9	set	
36	IPA Dryer	14	set	
37	Roaster	5	set	
38	Cutting Machine	11	set	
39	Centering Machine	427	set	Centering
40	Centering Machine	96	set	
41	Automatic Platoon Machine	1	set	
42	UV Machine	20	set	Cementing
43	Centering Microscope	17	set	
44	Automatic Dropper	2	set	
45	Automatic Inking Machine	16	set	Painting
46	Smearing Ink Machine	16	set	
47	Lathe Machine	5	set	-
48	Milling Machine	3	set	Mechanical Engineering
49	Grinding Machine	2	set	
50	CNC	5	set	
51	MC (Grinding Center)	2	set	
52	WE (Wire Cutting)	1	set	
53	Global Machine	3	set	
54	Vacuum Packaging Machine	2	set	Export Store
55	Microscope/mf-b3017d	1	set	QC Room
56	Micrometer Height Gauge	1	set	

SC = Special Case Polishing, KCG= Multiple Lens Processing








Table 4-16 List of Checking Instruments for Lens Production







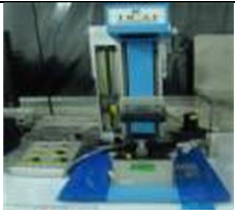
Sr. No.	Instrument Name	Model No.	Quantity	Unit	Used Department
1.	Centering microscope	CM-127	10	set	IQC in stock
					BQC
					Cent Di
					PA Di
		CM-126	2	set	Coat QA
					Cent Di
2.	Eccentricity Examine Machine	CS-A1000	1	set	QA Office
3.	Laser Interferometer	F601-FC	2	set	IQC
					IQC
		F601	2	set	PA Di
					PAE
		KIF-10A	1	set	BQC
		KIF-202L	2	set	BQC
		KIF-202	3	set	BQC
					PA Di
4.	Electrical Balance	GS623	1	set	FQC
5.	Thermostat	EL-02 AGP	2	set	Test
		ER-10 AGP	1	set	Test
6.	Projector	PJ-A3000	1	set	IQC
7.	Microscope	C-PF1039399	2	set	PA E
					BQC
8.	Timer	227A	1	set	IQC
9.	Micrometer Height Gauge	MS-4G	1	set	Cent Di
		MS-31G	2	set	BQC
					IQC
		MF-1001	1	set	IQC
10.	Height Gauge	574-111-1	1	set	IQC
11.	Static Tester	FMX-003	1	set	IQC
12.	Cleaning Bench	2150*1100*1440	2	set	Coat QA
		2150*1100*1440	2	set	PA
					SAC
		LAD-LCJT-1B	1	set	PA E
		LAD-LCJT-1C	3	set	Coat
					SAC
					PA E
		LAD-LCJT-2A	1	set	SAC
		LAD-LCJT-3A	6	set	Coating
					Plastic Packaging Checking
					PA E
13.	Abrasion Tester	-	1	set	Export Store
14.	Lens Appearance Tester	-	1	set	IQC

Sr. No.	Instrument Name	Model No.	Quantity	Unit	Used Department
15.	Eccentricity Measuring Device	LCT-R11	1	set	Cent Di







IQC= Income Quality Check, BQC = Both Quality Check, FQC = Final Quality Check, PAE = Painting Appearance Check, SAC = Second Appearance Check

Table 4-17 List of Various Inch Measuring Instruments used in each QC Department

Sr. No.	Equipment Name	Measurement Item	Photo
1.	Micrometer (0-25 mm) (Mitutoyo)	Diameter	
2.	Standard Template	Lens Newton Ring	
3.	PEACOCK (0.01mm)	Lens Thickness	
4.	OLYMPUS KIF-202	AS	
5.	Eccentric microscope (CM-127)	Decenter	
6.	Dial Indicator (LINKS)	Depth	
7.	Chamfer Microscope (MIRUC)	Chamfer	

Sr. No.	Equipment Name	Measurement Item	Photo
8.	Spectrum Tester (OLYMPUS)	Lens reflection spectrum	
9.	27 W Lamp	Appearance	
10.	Diameter Measuring Instrument	Diameter	
11.	Reflection Decenter Measuring Instrument	Decenter	
12.	Decenter Measuring Instrument	Decenter	
13.	Making Tools Measuring Microscope	Special Dimension	
14.	TR-A1 Decenter Measuring Instrument	Decenter	



Sr. No.	Equipment Name	Measurement Item	Photo
15.	Projector	Special Dimension	
16.	Electronic High Gauge	Height/Depth	
17.	Vernier Caliper	Diameter	
18.	Light Degree Measuring Instrument	Light	
19.	Particles Measuring Instruments	Particles	
20.	Constant Temperature Machine	Testing Lens Capabilities	

Source: MAOI

#### 4.10 Product Profile and Production Plan

The proposed investment business in factory-1 is the manufacturing of optical lens. The production capacities of various kinds of optical lens are 4,500,000 Pcs per month and all are exported to China, Taiwan, Japan and Thailand.

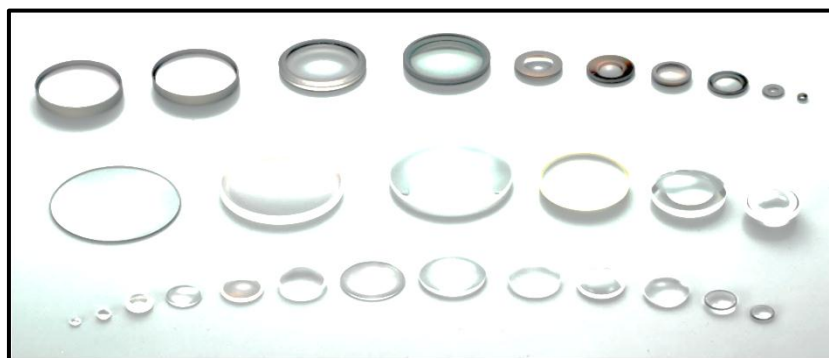


Figure 4-16 All Kinds of Optical Lens

#### 4.11 Transportation of Raw Materials and Products

Air, road and sea transportation are taken into account for the imported raw materials, machineries and equipment. The finished products are exported to abroad by air or ship. In the production area, trolley, forklift and various types of conveyor carry out transportation.



Figure 4-17 Forklifts used in MAOI

#### 4.12 Optical Lens Production Process in Factory-1

There are three kinds of products manufactured in MAOI for export, which are various kind of optical lens, plastic parts for electronic apparatuses and self-focus lens array (SLA). Among them, various kinds of optical lens are manufactured at factory 1.

Optical lens is a piece of glass or other transparent substance that is used to form an image of an object by focusing rays of light from the object. It is usually circular in shape, with two polished surfaces, either or both of which is curved and may be either convex (bulging) or concave (depressed). The curves are almost always spherical, i.e., the radius of curvature is constant. A lens has the valuable property of forming images of objects situated in front of it. Single lenses are used in eyeglasses, contact lenses, pocket magnifiers, projection condensers, signal lights, viewfinders, and on simple box cameras. More often a number of lenses made of different materials are combined together as a compound lens in a tube to permit the correction of aberrations. Compound lenses are used in such instruments as cameras, microscopes, and telescopes.

In MAOI, the basic material of an optical lens is the optical glass or optical glass blanks that can be ordered in many shapes and sizes (**Figure 4-18**) from the glass companies. Glass choices are made during the design process and involve a variety of factors including the refractive index, Abbe number, and availability/cost. Chemical and thermal properties are also important depending on the application and manufacturing process. A data sheet (or melt

sheet) must be included when purchasing glass blanks, so the actual properties of that particular batch are known as compared to catalog values.

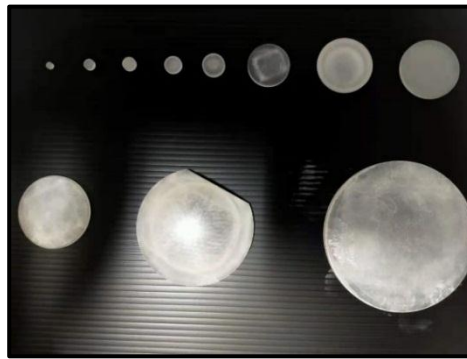


Figure 4-18 Optical Glass or Optical Glass Blanks

After choosing the proper glass blank, the lens goes through **curve generation** where the rough shape is ground into the blank. A lens is then blocked and undergoes further **grinding** to improve the surface and shape. **Polishing** is the final fine grinding stage where the surface and shape of the optics finished to specification. The optic is then **cleaned**, **centered** and bevels are put on the edges. Typically, the optic is then **coated**, and it is ready to be used in a system. Depend on the requirements of semi-finished product; **cementing** and **painting** will be followed accordingly.

MAOI produces various kind of optical lens using in cameras, projectors, cell phones, car cameras, microscopes, telescope lens, laser rangefinders, etc.

Process flow diagram of optical lens manufacturing process in MAOI and a brief description of each process steps in general are shown as below. (Figure 4-19)

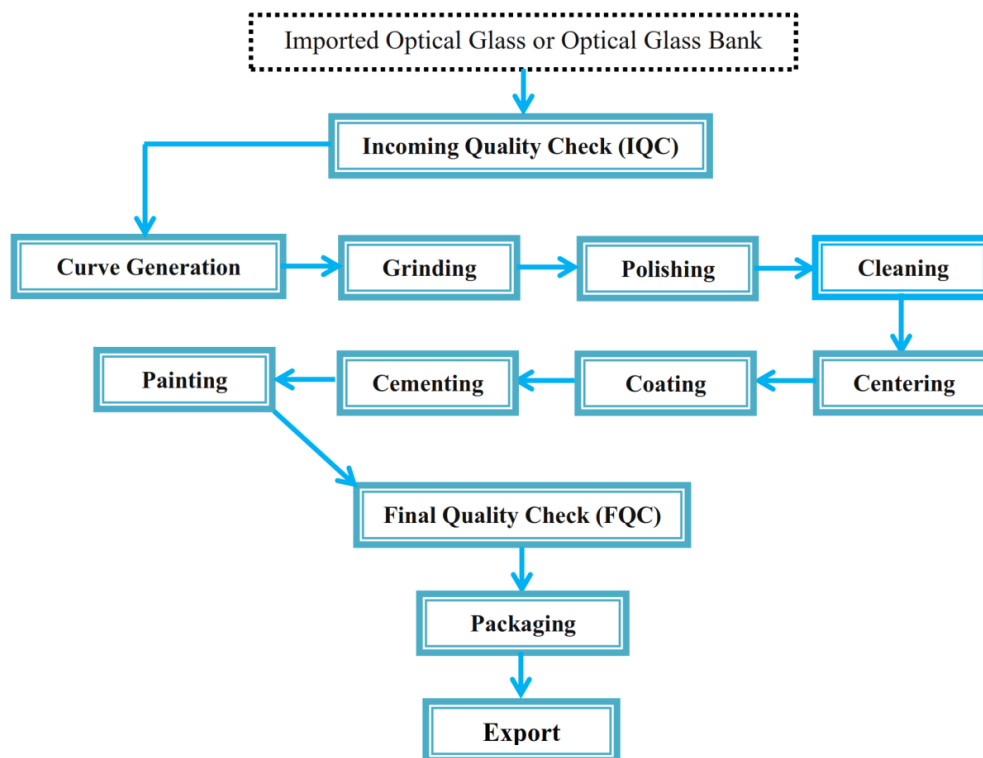


Figure 4-19 Process Flow Diagram of Optical Lens Manufacturing Process

4.12.1 Incoming Quality Check (IQC) for Raw Materials

Firstly, quality of a raw material is checked to produce required relevant product. The most important factors for checking are the outer diameter, tortuosity, thickness and height of the glass, meet the specification on the material drawing.

4.12.2 Curve Generation

Curve Generation is the first step in the lens manufacturing process, and it will ‘generate’ the shape of the lens into the glass blank, getting close to its final shape, size, and curvature by using a manual or automatic technique of loose abrasive grinding. The cutting fluid and cutting oil are used in this step to abrasive the lens.

Manual	Automatic
In manual operation, it involves using various grit sizes mixed with water which is called slurry to remove glass. The larger the grit size, the more glass is removed, resulting in a faster removal rate. However, a rougher surface will be produced. Therefore, generating begins with minimum 300 μm and up to maximum 500 μm.	In automatic operation, to program a removal function into a computer-controlled tool that has diamond cutting edges. This process has a much faster removal rate and once a template is programmed, it can be used for multiple runs. A limitation to this method is that the generating tool (See <b>Figure 4-20</b> ) must have a larger diameter than the radius of the optic being generated.



Figure 4-20 Generation Tool

Unfortunately, both methods result in surface damage to the optic. Further grinding and polishing is then needed to smooth the surface to its final form.

There are five lines such as two manual lines, two automatically controlled lines and one mixed line.



(a) Manual lines





(b) Automatically controlled lines



(c) Mixed line

Figure 4-21 Curved Generation Section, MAOI

#### 4.12.3 Grinding

Before the lens undergoes further grinding, the lens must be blocked, or mounted, to begin the process.

Blocking involves mounting lenses onto a convex or concave surface (inverse of the tool being used) with pitch or wax. A lens can be blocked individually (**Figure 4-22 (a)**), but more often, many lenses with the same radii are mounted on one surface for high production. (**Figure 4-22 (b)**).



(a) Individually



(b) Multiple optics on one tool

Figure 4-22 Grinding Process

Loose abrasive grinding uses inverse spheres of the same radii ground together so that the hills and valleys on the optics will wear away to produce a true sphere. The cutting fluid and cutting oil are also used in this step to abrasive the lens. Slurry flows in between the blocked parts and the spherical tool to keep the parts cool and wash away debris created during the grinding process.



Figure 4-23 Grinding Section, MAOI

#### 4.12.4 Polishing

After the lens is generated and fine ground, it undergoes polishing. Before going through polishing, random inspection will be done by QC to meet the specification on the drawing (thickness, aperture, appearance, eccentricity, etc.) at the checking place (See **Figure 4-24**). Depending on how precise the generation is, the lens may go through several stages of polishing. Whereas the grinding process mechanically removes material by breaking off small pieces of glass, the polishing process is both mechanical and chemical.



Figure 4-24 Checking Place

In MAOI, a Rare Earth Polishing Powder D192119 & D192120 (Sr. No. 52 & 53 of **Table 4-6**) is used for polishing process where it is adhered to a polishing tool which the inverse of the radius of optic is being polishing. The tool with the polishing powder will be placed on the optic and rubbed together, much like the grinding process. As the polishing process continues, it will slowly conform to the shape of the optic so that the surface of the optic is smoothed out, but its overall radius is not changed. To aid in removing debris, grooves are cut along the tool to allow slurry to flow more



readily between the tool and the optic. A hole is also cut at the center of the tool since it will flow toward the edges and center of the tool during polishing.

For higher production parts, high speed CNC (Computer Numerical Control) machines can also be used. In this stage, the final figure is put into the lens, including its radius of curvature and center thickness.



Figure 4-25 Polishing Section

***Middle Quality Control (MQC):*** After polishing, the lens are checked in MQC to meet the specification on the drawing (thickness, aperture and yass of the lens). If the polished lenses are not OK, they cannot be recycled and rejected as wastes. If the polished lenses are OK, they are checked again in the polishing section before sending to cleaning section.

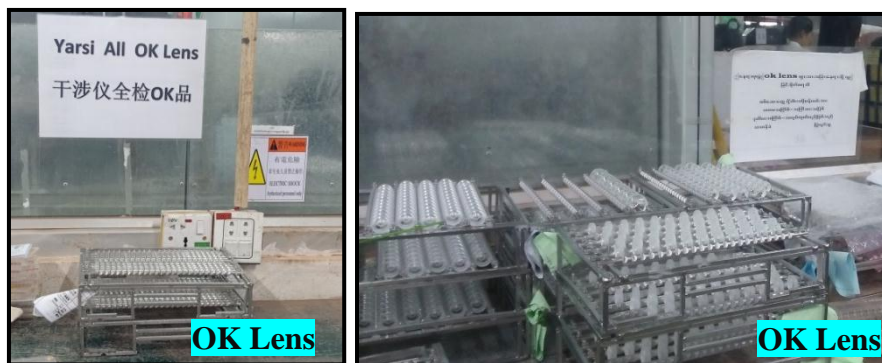




Figure 4-26 QC Room, Polishing Department

#### 4.12.5 Cleaning

The dirt or impurities on the surface of the lens are removed by physical or chemical action to achieve the surface cleanliness. Detergent SAT-686, Cleaning agent (FQG-118, FX15, QCJG-105), Calcium Carbonate, Film-stripping Agent, pure water, Methylene Chloride, Glycerin, and isopropyl alcohol are used in the cleaning process.

There are four steps to do in the cleaning process as follows:

- 1) Put the lens into the water tank to impurities on the surface of the lens.
- 2) Put it into the cleaning agent tank to clean the dirt on the surface of the lens.
- 3) Put lens into the water tank again to clean the agent on the surface of the lens.
- 4) The final step is using IPA or dryer to make the lens dry.



Figure 4-27 Cleaning Room, MAOI

#### 4.12.6 Centering

Before centering begins, the polished surfaces are first inspected. Surface accuracy is checked by using test plates or an interferometer and the optic is inspected for surface defects such as scratches, digs, and sleeves. If the optic does not meet its specifications on the drawing, it is returned to polishing.

A lens has a geometric axis, defined by the outer edges of the lens, and an optical axis, defined by the center of curvatures of each surface of the lens. The process of centering attempts to make the optical axis co-linear with the mechanical axis. Plane surfaces do not need to be entered is not correct. Small centering errors can

have large effects on an image since the optics will be assembled according to their mechanical axes and the errors will multiply.

Lenses can be centered both optically and mechanically by using both a manual and/or automated process.



Figure 4-28 Centering Department (MAOI)

#### 4.12.7 Coating

Once the optic is centered, it is cleaned and checked the appearance of the lens such dirt, cracked edge, scratches at a final time. Most often an optic will then be coated to enhance its performance at specified wavelengths.

The coating process involves the application of thin layers of chemicals and metallic compounds (derivatives) to the surface of the lens by vacuum deposition. Both reflective and anti-reflective coatings can be applied using evaporation in a vacuum chamber. First, the optics are cleaned thoroughly since the coating will not adhere to a dirty surface. The optics are placed into holders which are loaded into the top of a vacuum coating chamber. The most common holder is a rotating planetary style device seen below.



Figure 4-29 Coating Department, MAOI





Figure 4-30 Vacuum Coater and Planetary Optic Holder, MAOI

The coating materials, (Zirconium dioxide or zirconium titanium oxide, surf clear 100, aluminium oxide, magnesium fluoride, and silicon dioxide) are used in the process. According to different spectroscopic requirements, the medicinal materials used are different. They are then heated within the chamber and evaporates, coating the optics in the holder from below. The optics are held above the coating material, so they are coated evenly at normal incidence. The thickness of the coating applied depends on how long the optics are exposed to the evaporated material. Coating thicknesses and evaporation times are well documented and are typically computer controlled.

It may be coated from seven layers to twenty-four layers depend on the requirement of the product.

One batch time depends on the coating layers. The setting pressure is fixed at 1.6 ~ 3 Pa and O<sub>2</sub> and temperature is needed to adjust.

#### **4.12.8 Cementing**

Many lens systems also require the cementing of individual optical lenses together with other lenses. This procedure is extremely delicate and is carried out in a dust-free room. The lenses are cleaned right before application of the cement and joining.

Lenses that are joined typically bring together a concave and convex lens; the concave lens is heated to the melting point of UV glue - the cement to be used. UV glue (UV Curable Acrylic Resin 8807L) is used to cement the two or more lenses together. Under the action of ultraviolet rays, the glue is hardened to fix the lenses. Adhesive OP-1030M, OP-1030Z, OP-1903R, OP-1030K, Acrylic Resin 5515, Acrylic Resin 5518, Norland Optical Adhesive 63, Norland Optical Adhesive 61, PHOTO BOND #150, PHOTO BOND #300/300K, Shin-Etsu Silicone are used to glue the two or more lenses together into one piece of cementing lens.

The concave lens is then held-adhesive side down to prevent dust collection and the balsam is spread over the surface. This process is repeated for the convex conjugate lens to be cemented; meanwhile the concave lens sits in a glass jar to protect from dust.

The lenses are then brought together and compressed to squeeze out excess cement as well as air bubbles. The pressing is done in an oval-rotational pattern such

the bubbles migrate out from the center of the lens. Before the cement cools and hardens, the lenses must be aligned.

Alignment can be done mechanically, making the outer cylindrical edges concentric using a V-block or optically, through methods similar to optical centering. Optical alignment is superior in that it bypasses any errors associated with aligned mechanical/optical axes.



Figure 4-31 Cementing Section, MAOI

#### 4.12.9 Painting

Painting of the lens helps reduce scattered light and often improves contrast and signal to noise ratio. Permanent black ink that is water and alcohol resistant is easy to apply and does not cause mechanical build up on the surface.

Lacquers and epoxies are opaquer; however, they are more difficult to apply and add tens of microns to the diameter of the lens. Epoxy is the most durable option, and if factored in during the design of the lens, it will not negatively impact the finished diameter of the lens.

There are many kinds of paint such as Paint GT-7 II A, Paint FASTITE NO.140 (N) TL1 BLACK, NT Silane Coupling Agent, Paint (Lens coating Black B No.3, Ink , Paint GT-7 II A, Paint FASTITE NO.140 (N) TL1 BLACK, NT Silane Coupling Agent, Paint (Lens coating Black B No.3, Thinner GT-7 II, Thinner (Lens YOU B Thinner), THINNER NO.2350(90-7309), and Deinking Agent used in MAOI.



Figure 4-32 Painting Section, MAOI

#### 4.12.10 Final Quality Check (FQC)

Some of the products are finished in coating process and some are needed to cement and paint. Nevertheless, all of the finished semi-products are needed to check.

Outer diameter, thickness, eccentricity, depth, yass, spectrometry, film strength, ink strength, appearance and reliability are finally checked before packaging.

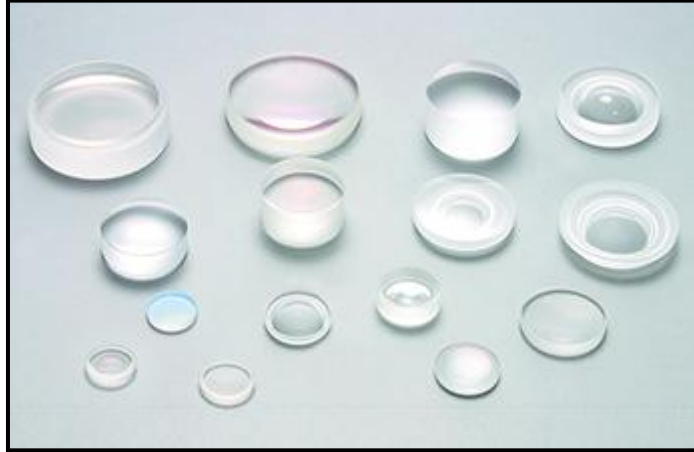


Figure 4-33 Finished Optical Lens

#### 4.12.11 Packaging

All finished lenses are transported to the packaging area. The important point here is to avoid defective or inadequate packaging and to ensure “traceability.”

Packaging is carried out efficiently and systematically. In packaging operation, DZ500 aeration packaging machine is used. As long as press the vacuum case’s lid, the machine will automatically complete the orderly assumed processes of vacuum extraction the inner gas, sealing, printing, cooling and aeration. The packed products can be prevented from oxidation, going mould and getting damp. Thus, packaging can be kept fresh in a prolonged storage period.

All the employees in packaging department have to follow the rules.

1. Do ‘5s’ in every morning.
2. Turn round three shifts day-to-day.
3. Over the packaging platform, not exceed two steps.
4. Over the packaging platform, clean the accessories orderly.
5. Over the lens box platform, order the boxes clearly.
6. Allocate the export boxes according to nation. Describe the country names over the boxes.
7. Assist the accessories in orderly.
8. Record in report diary every shift.



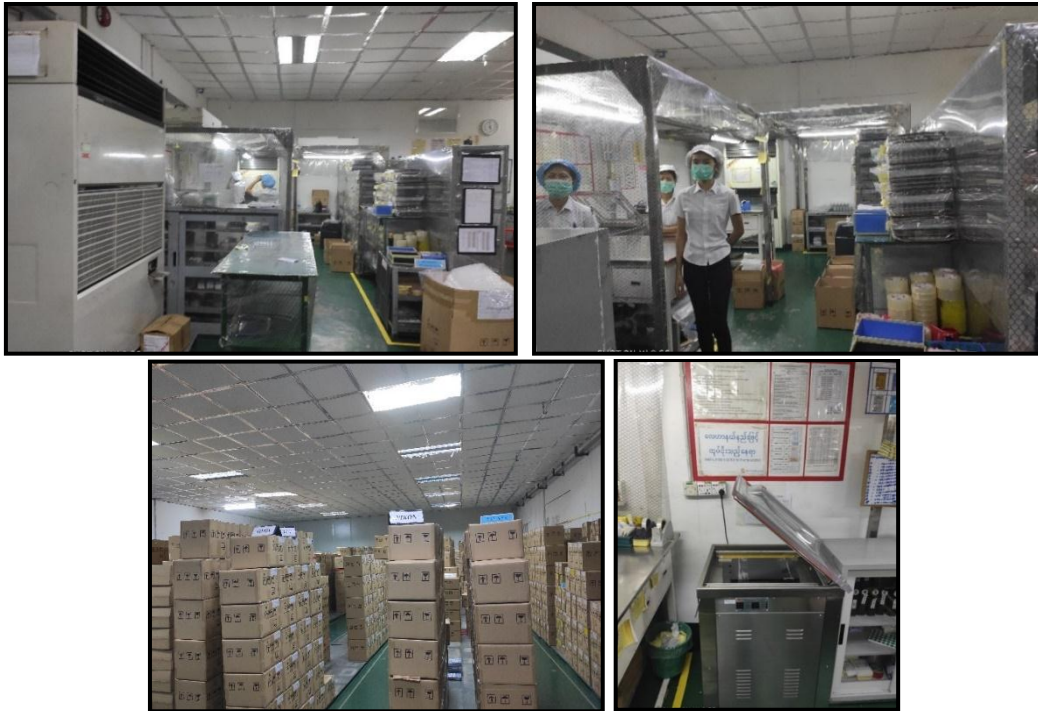


Figure 4-34 Packaging Area, MAOI

#### 4.13 Drainage and Sewage Disposal

There are drains running alongside the factory. Storm water is discharged into the drain. The industrial wastewater discharged from process is treated in the own wastewater treatment plant and discharged into the MIP centralized wastewater treatment plant. For convenience purpose, the project proponent provides 306 numbers of toilets (29 for males and 277 for females).





Figure 4-35 Basins and Drains in the Factory-1



Figure 4-36 Toilets in the Factory-1

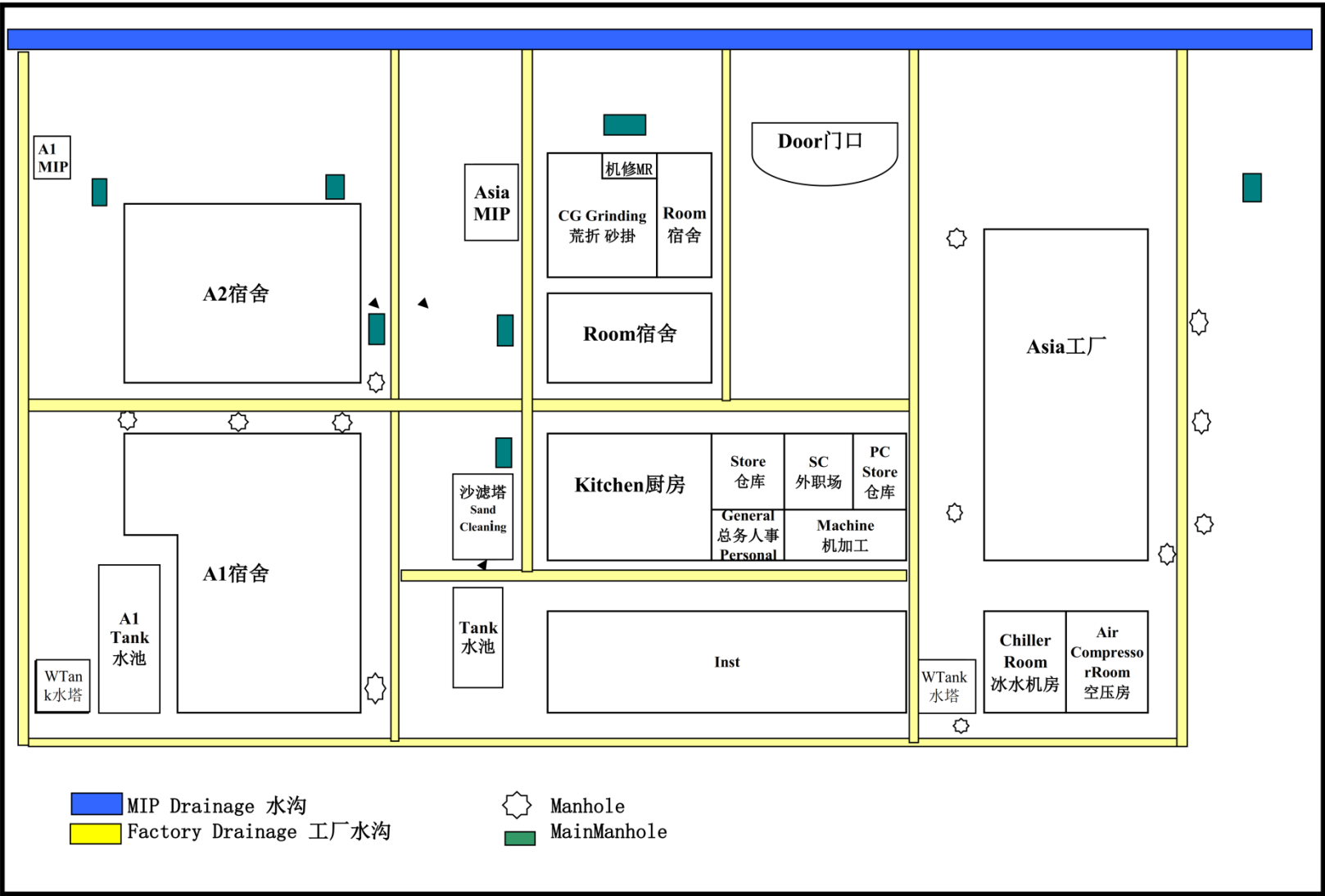


Figure 4-37 Drainage Layout of Factory-1



## 4.14 Waste Management System

### 4.14.1 Wastewater Management

#### (a) Filter Press System

The wastewater generated from the processes such as curve generation and grinding are pumped into the filter presses and the liquid and sludge are separated passing through it. The liquid is discharged to the wastewater treatment plant and the substances that are retained on a filter as filter cake that are stored in box.



Figure 4-38 Filter Press at MAOI-1



Figure 4-39 Storage Area of Sludge Tanks at Factory-1

#### (b) Wastewater Treatment System

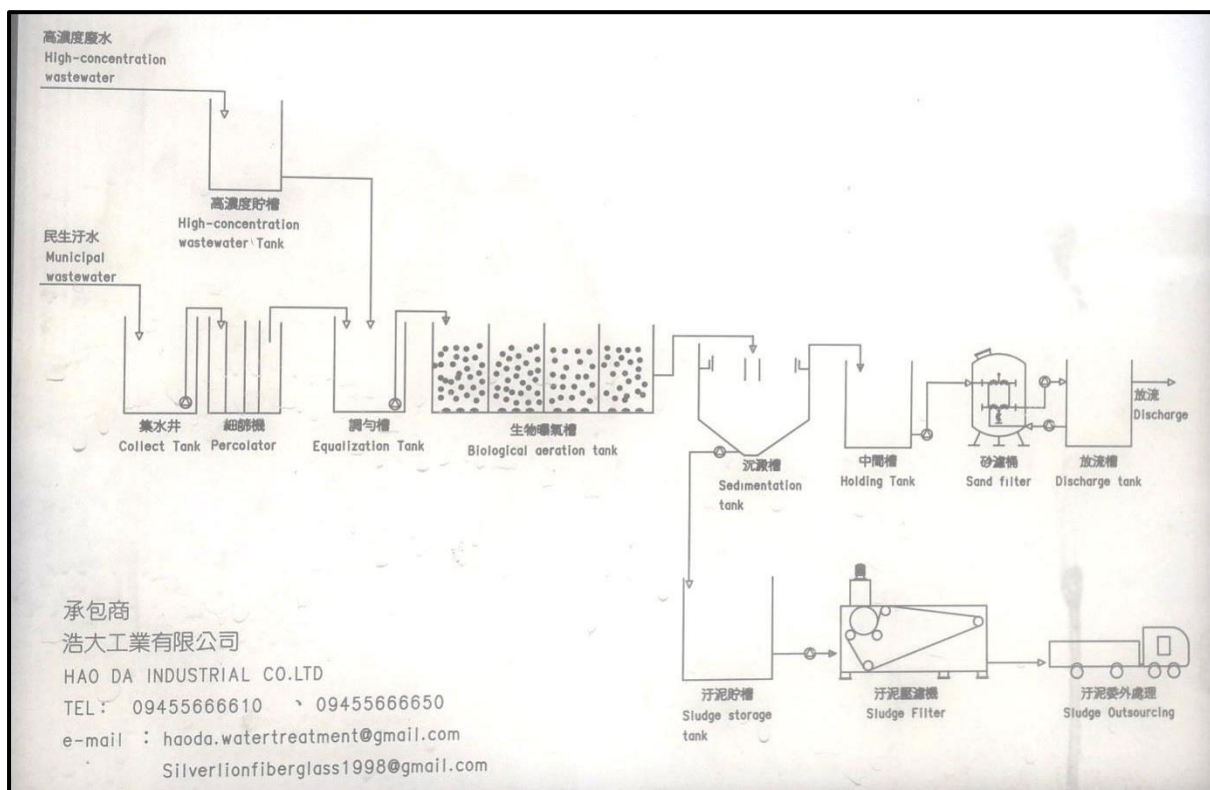
The wastewater treatment plant (WWTP) with biology treatment method is installed. It comprises of treatment units and equipment to treat wastewater collected from process of factory.

Since influent, composition and concentration of wastewater are fluctuated time by time, the plant is designed to have satisfactorily ability to treat those frequently concentration.

While the industrial wastewater is collected in high wastewater collection tank, the municipal wastewater is collected in tank and filtered with percolator. Both are passed into the equalization tank. In that, it acts as a buffer to collect the raw incoming sewage that comes fluctuating rates and pass it on to the rest of the sewage treatment plant at a steady flow rate to the biological aeration tank.

In municipal and industrial wastewater treatment, aeration is part of the stage known as the secondary treatment process. The activated sludge process is the most common option in secondary treatment. Aeration in an activated sludge process is based on pumping air into a tank, which promotes the microbial growth in the wastewater. The microbes feed on the organic material, forming flocks which can easily settle out. After settling in a separate settling tank, bacteria forming the "activated sludge" flocks are continually recirculated back to the aeration basin to increase the rate of decomposition.

From the aeration process, the sludge and treated water are come out. The primary sludge is filtered and send to the sludge outsourcing. The treated liquid are stored in holding tank and then passed the sand filter. The sand filter is used as a step in the water treatment process of water purification to reduce. The final treated water is discharged to the drain.



Source: MAOI

Figure 4-40 Wastewater Treatment System of Factory-1



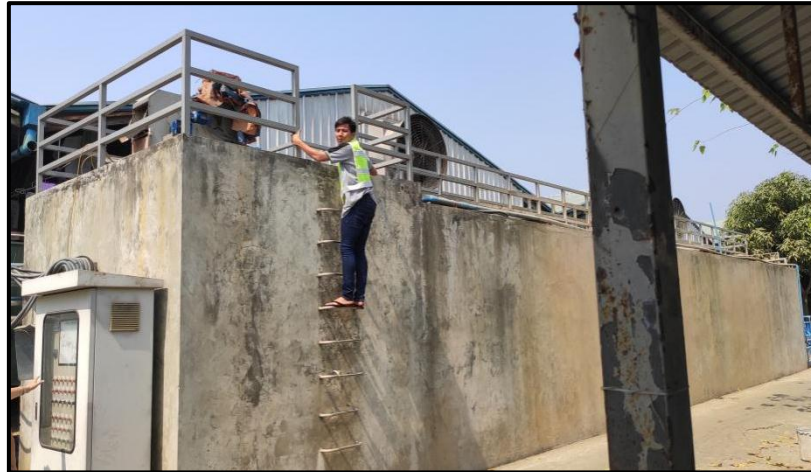


Figure 4-41 Wastewater Treatment Plant (Factory-1)

#### 4.14.2 Solid Waste Management

The largest component of solid waste generated from the optical lens factory is pieces of broken optical glasses. Other solid wastes and recyclables generated in much smaller amounts from optical lens factory include plastic waste, chemical packaging material, organic and domestic wastes from the living areas, canteen and restrooms.





Figure 4-42 Waste Bins

## 4.15 Other Facilities

### 4.15.1 Cooling System

Centralized cooling system is installed in chiller plants to provide cooling for an entire factory. This is because it is often more practical to centralize air conditioning equipment in one location rather than install many pieces of equipment in many different places. There are six chillers on the first floor of the factory-1. Chillers are used to generate cold water for air conditioning by removing the unwanted heat from the building.

Cooling water flows through a closed piping system that circulates water through various pieces of equipment. The cooling water is piped to a cooling tower where the heated water is aerated to reduce its heat gain. It is located up on the roof and is the final destination for the unwanted heat in the building. It contains a large fan which blows air through the unit. The cooling water is pumped up to the cooling towers and it is sprayed into the air stream. The cool ambient air will enter and come in direct contact with the spray of cooling water (in an open cooling tower) this will allow the heat to transfer into the air and this air is then blown out into the atmosphere.

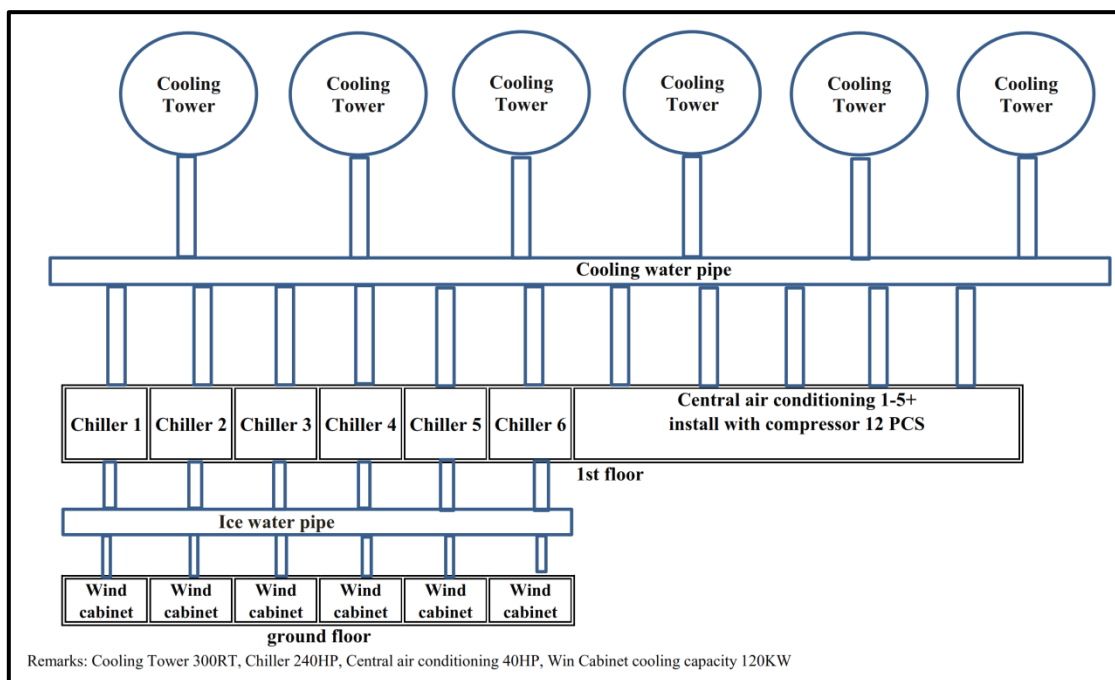


Figure 4-43 Air Conditioning System at Factory-1

#### 4.15.2 Ventilation System

Ventilation is an example of an engineering control method in which workplace hazard can be eliminated or reduced to acceptable levels. The use of personal protective equipment should not be the primary means to control exposure to paint and other material, unless substitution, engineering or administrative controls are not feasible.

A wide variety of volatile solvents is used in lens manufacture process. Exposure to solvent vapors can occur during thinning in solvent-based painting; during can filling in all solvent-based coatings; and during cleaning of process equipment with chemicals. Precautions include enclosure of process equipment, respiratory protection and confined-space procedures for cleaning processes.

Lens manufacturing and workplace areas require good lighting as well good ventilation to have optimum level of worker effectiveness. Good ventilation improves the air circulation. Inadequate ventilation can lead to lower productivity due to discomfort.





Figure 4-44 Chiller and Cooling System at MAOI-1



Figure 4-45 Ventilation Facilities at MAOI-1

## **5.0 DESCRIPTION OF THE CURRENT ENVIRONMENTAL AND SOCIAL CONDITIONS**

In this chapter, the environmental profile, the existing environment baseline situation (primary data), and secondary information such as natural environment/ physical components, biological components and socio-economic status for the proposed project are described. For the purpose of characterization and quantification of various pollutants, visits were made, and detailed field studies were conducted in each category. Based on the measured values, the averages values have been taken as basis to characterize the typical pollution streams.

### **5.1 Methodology for Data Collection and Analysis**

For preparation of this EMP report, there are two methodologies to collect the data to describe the current environmental and social conditions of the proposed project.

(i) Primary Data Collection and Analysis

(ii) Secondary Data Collection and Analysis

#### **5.1.1 Primary Data Collection and Analysis**

The objective of the EMP baseline data collection is to present the general description of the environment as primary data collection. The methodology is designed to assess the baseline data of the environmental quality factors for “Myanmar Asia Optical International Company Limited” Project. Baseline environmental parameters are defined according to the guidelines, which apply to projects dedicated to the proposed project.

Environmental baseline data (primary data) such as air quality, odor nuisance and noise levels are measured by using instruments. For water quality and soil quality, samples are collected and analyzed at the GMES laboratory and ALARM Ecological laboratory. The results are mentioned in this Chapter. All of the results are attached in Appendices.

All necessary criteria such as site selections for sampling and analysis of ambient air quality, workplace air quality, light intensity, noise level, water quality and soil quality were identified by GMES.

#### **5.1.2 Secondary Data Collection and Analysis**

Some data such as socioeconomic conditions, physical/biological environment and weather data are collected from the respective websites and reviewed by the EMP study team. The baseline data of the Mingaladon Township was collected from the Township Data published by General Administration Department (GAD) in 2020.

### **5.2 Environmental Baseline Situation (Primary Data)**

Green Myanmar Environmental Services Company Limited (GMES) had done measuring primary data or baseline environmental parameters such as ambient and indoor air



quality, water quality and soil quality on February 2020. The materials and methods of instruments used for surveying the environmental baseline data and the results are mentioned in the following section.

The water samples, tube well water, wastewaters and soil samples were collected and analyzed the results in the laboratory.

### **5.2.1 Air Quality**

The objective of the air-quality monitoring program is to describe the baseline air quality conditions in the project area.

Dispersion of different air pollutants released into the atmosphere has significant impacts on the neighborhood air environment of a project and forms an important part of impact assessment studies.

The air quality status with respect to the project site will form the baseline information over which the predicted impacts due to the proposed project can be superimposed to find out the net (Final) impacts on air environment. Based on the final impacts of the air environment, a viable Environmental Management Plan (EMP) can be prepared.

The baseline status of the air quality can be assessed through scientifically designed air quality measuring network.

#### **(i) Methods of Sampling and Analysis**

The rate of air quality was recorded automatically every one minute for gases causing air pollution (Sulfur dioxide, nitrogen dioxide, carbon dioxide, carbon monoxide, hydrogen sulfide and particulate matters) to describe ambient air quality.

Sampling pump was adjusted to 2 liter/min.

#### **(ii) Materials Used for Measuring**

The ambient air quality parameters such as nitrogen oxide (NO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>), particulate matters (PM<sub>2.5</sub> & PM<sub>10</sub>), ammonia (NH<sub>3</sub>), carbon dioxide (CO<sub>2</sub>), carbon monoxide (CO), hydrogen sulfide (H<sub>2</sub>S), methane (CH<sub>4</sub>), wind speed, wind direction, relative humidity and temperature were measured by using **Haz-Scanner** which is a true environmental air station providing ambient air quality measurement of critical EPA criteria pollutants and air parameters.



**Aeroqual** is used to measure the particulate matters (PM<sub>2.5</sub> and PM<sub>10</sub>) and **Mx-6** uses for oxygen, toxic and combustible gas, and volatile organic compounds (VOCs) of indoor air quality.



Mx-6



Aeroqual 500 Series

**KANE 900 Plus Combustion Analyzer** is used to measure the stack emission gas of boiler and generator. It can monitor the parameters such as Oxygen (O<sub>2</sub>), Carbon monoxide (CO), Carbon Dioxide (CO<sub>2</sub>), Sulfur Dioxide (SO<sub>2</sub>), Nitrogen Dioxide (NO<sub>2</sub>), differential pressure and temperature.



### (iii) Selection of Sampling Location

Air quality measurement was taken at each project site. The sampling points were selected based on their locations relative to key community receptors, as well as their current or potential for impairments.

- 4) Ambient air quality at the project site was measured at only one sampling point
- 5) Workplace air quality was measured at fifteen points and
- 6) Stack emission from diesel generators.

#### 5.2.1.1 Ambient Air Quality

Different analysis methods are used for different parameters of ambient air quality as shown in the following table.

Table 5-1 Parameters Measured for Ambient Air Quality

No.	Parameters	Analysis Methods
1.	Sulfur dioxide (SO <sub>2</sub> )	Electrochemical sensors
2.	Nitrogen dioxide (NO <sub>2</sub> )	Electrochemical sensors
3.	Carbon dioxide (CO <sub>2</sub> )	NDIR (optional sensor)
4.	Carbon monoxide (CO)	Electrochemical sensors
5.	Hydrogen Sulfide (H <sub>2</sub> S)	Electrochemical sensors
6.	Particulate matter 2.5 (PM <sub>2.5</sub> )	Infrared light scattering
7.	Particulate matter 10 (PM <sub>10</sub> )	Infrared light scattering

Ambient air quality at the project site was measured continuously at only one sampling point for 24 hours in each factory.

Table 5-2 Location of Ambient Air Quality Measuring Point

Sr. No.	Measuring Point	Geographic Information	Description	Remarks
1.	AMP	16° 56' 28.67" N 96° 09' 12.48" E	Near the entrance of the office at MAOI-1	See <b>Figure 5-1</b>

AMP= Ambient Air Quality Measuring Point

### Ambient Air Quality Measuring Results

At the initial stage of the project, baseline air quality should be measured on the vicinity of the site to assess background levels of key pollutants and to differentiate between existing ambient conditions and project-related impacts in future. Air quality is defined by the concentration of dust and pollutant gas of the ambient air.

The ambient air measuring for factory-1 was conducted on February 10, 2020. The air quality measuring result for ambient air for MAOI-1 is described in **Table 5-3**.



Figure 5-1 Location of Measuring Ambient Air Quality at MAOI-1



Figure 5-2 Photos of Measuring Ambient Air Quality at MAOI-1

Table 5-3 Measuring Results of Ambient Air Quality Baseline Data (AMP) for Factory-1

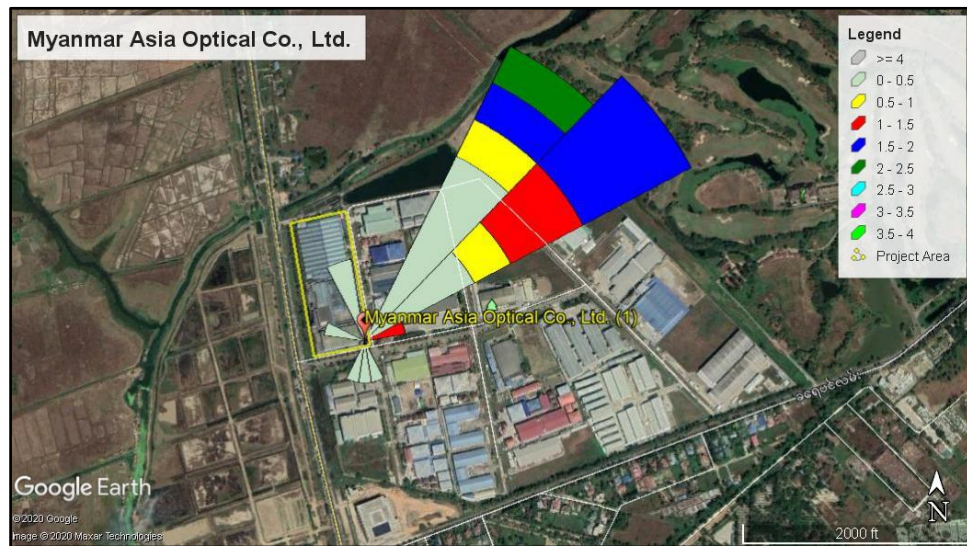
Sr. No.	Parameters	Unit	Analysis Values		National Environmental (Emission) Quality Guidelines		Remarks
			Result Value	Average Period	Guideline Value	Average Period	
1.	Nitrogen Dioxide	$\mu\text{g}/\text{m}^3$	42.35	24 hours	<b>200</b>	<b>1 hour</b>	10/2/2020 22:32-23:31 (Peak Hour)
2.	Sulfur Dioxide	$\mu\text{g}/\text{m}^3$	0	24 hours	<b>20</b>	<b>24 hours</b>	-
3.	Particulate Matter $\text{PM}_{10}$	$\mu\text{g}/\text{m}^3$	139	24 hours	<b>50</b>	<b>24 hours</b>	-
4.	Particulate Matter $\text{PM}_{2.5}$	$\mu\text{g}/\text{m}^3$	86	24 hours	<b>25</b>	<b>24 hours</b>	-
5.	Ammonia	ppm	0.86	24 hours	<b>NG</b>	-	-
6.	Carbon Dioxide	ppm	278.76	24 hours	<b>NG</b>	-	-
7.	Carbon Monoxide	ppm	0.78	24 hours	<b>NG</b>	-	-
8.	Hydrogen Sulfide	ppb	3.93	24 hours	<b>NG</b>	-	-
9.	Methane	ppm	0	24 hours	<b>NG</b>	-	-
10.	Relative Humidity	%	59.58	24 hours	<b>NG</b>	-	-
11.	Temperature	$^{\circ}\text{C}$	28.20	24 hours	<b>NG</b>	-	-

\*NG- No Guideline

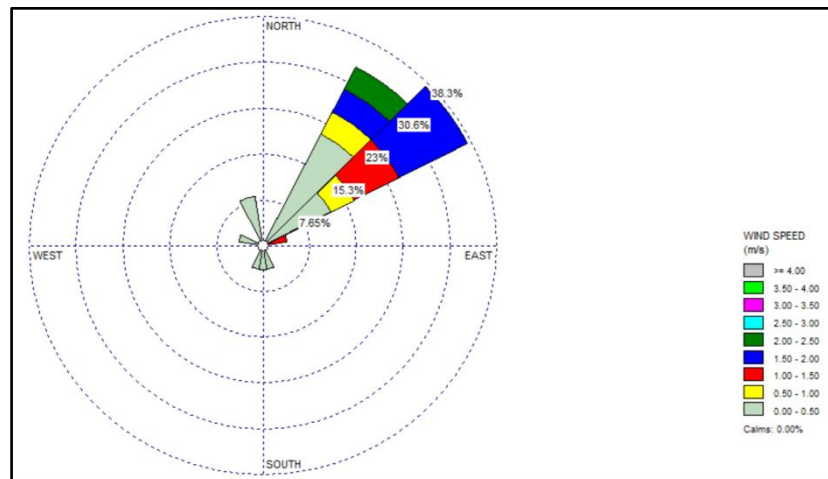
According to the **Table 5-3**, the particulate matters ( $\text{PM}_{10}$  and  $\text{PM}_{2.5}$ ) were much higher than the guideline values because vehicles and humans are moving around the air



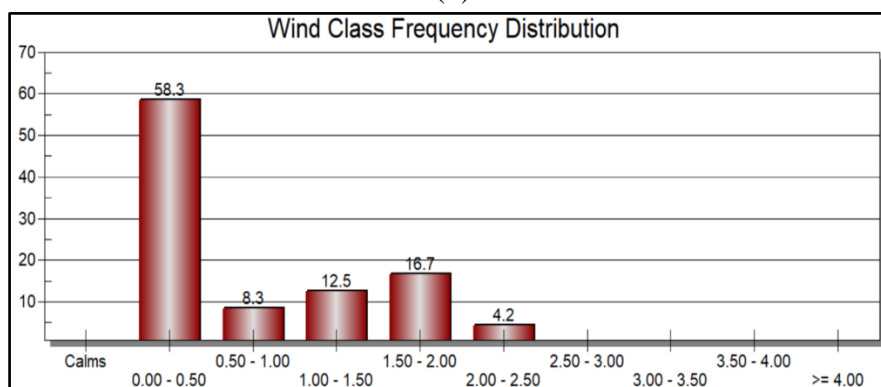
measuring station. The other parameters of the ambient air quality are within the National Environmental Quality (Emission) Guidelines.



(a)



(b)



(c)

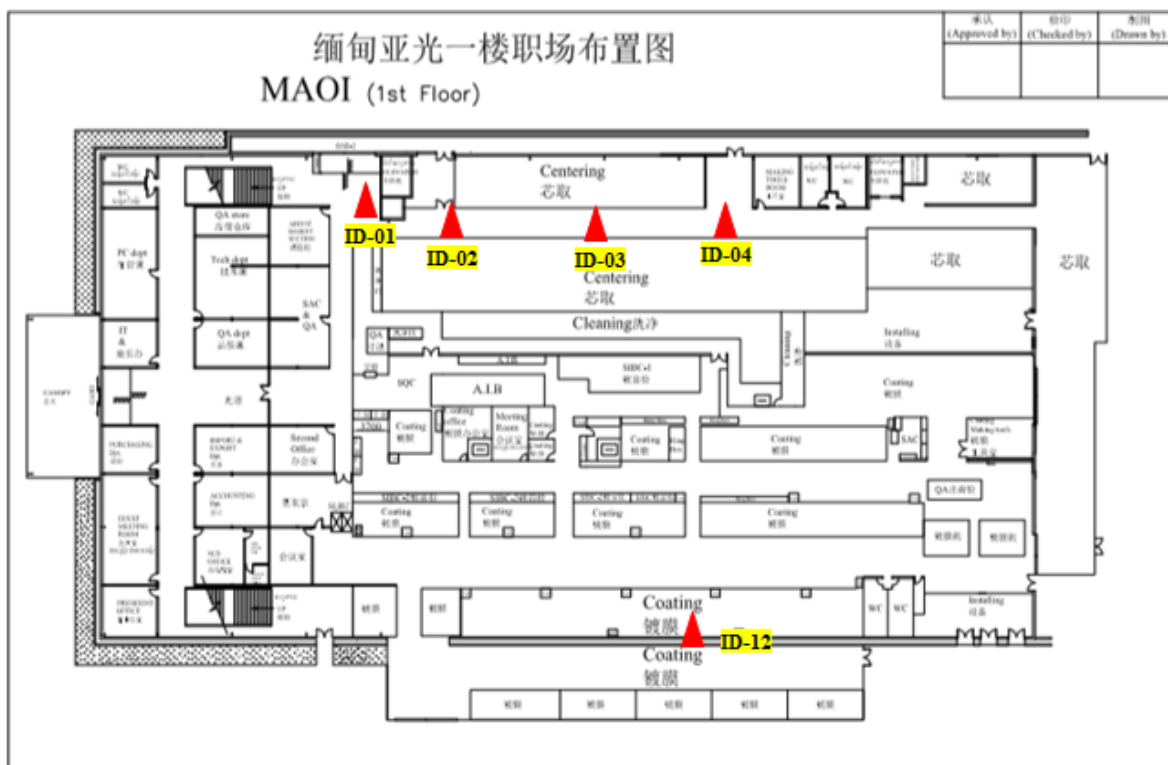
Figure 5-3 (a) Windrose Plot superimposed over the Project Site, (b) Windrose Plot, (c) Wind Class Frequency Distribution Chart for MAOI-1



### 5.2.1.2 Workplace (Indoor) Air Quality

Measurements to determine the environmental conditions of working environment of the factory were carried out for short-time interval samples (one hour for each sample measurement). The instrument was measured by two technicians.

Indoor air quality was measured at 15 locations on February 10, 2020 inside of the factor-1. The locations and results for MAOI are seen in **Figure 5-4, Figure 5-5 and Table 5-4.**



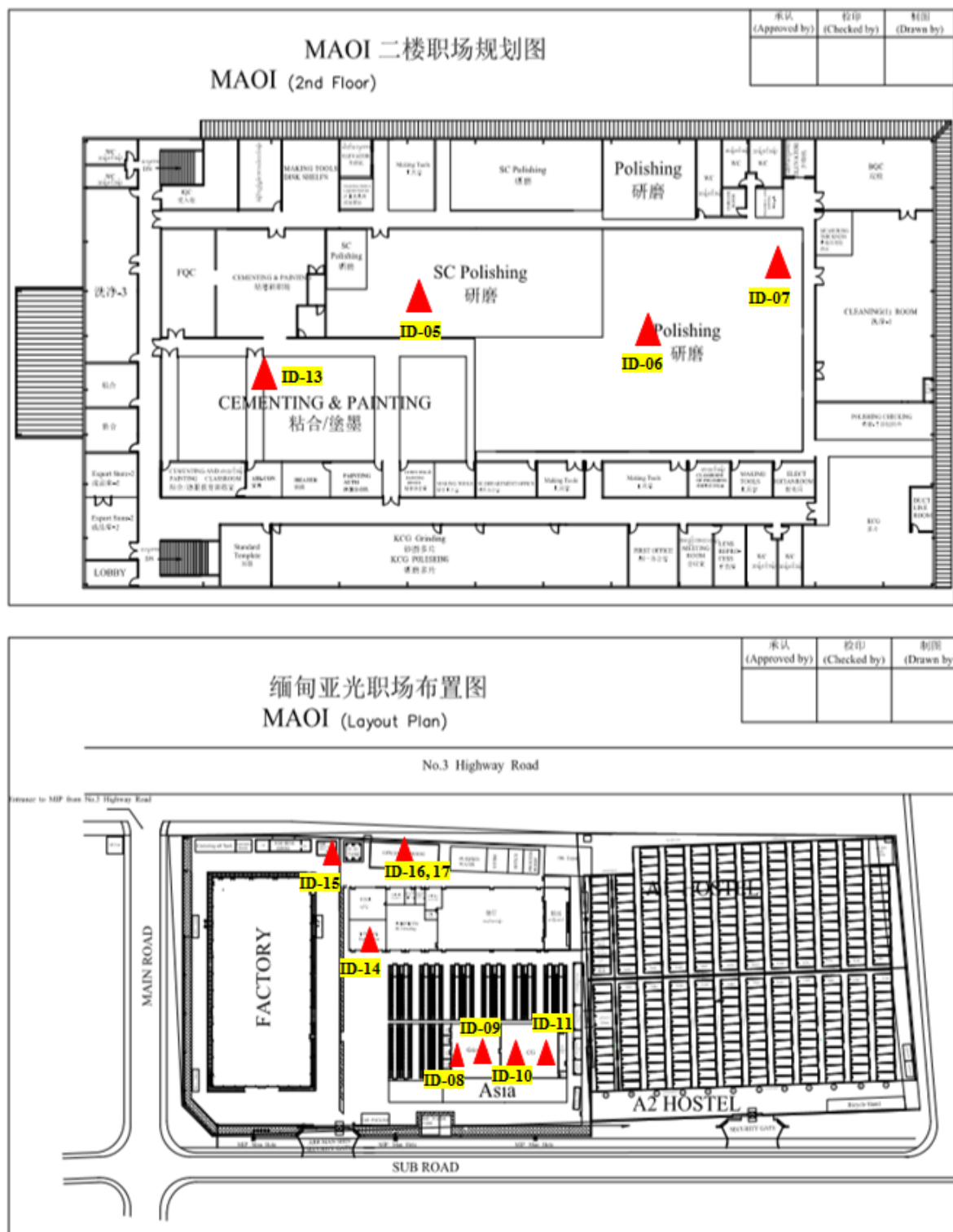


Figure 5-4 Location of Measuring Workplace (Indoor) Air Quality at MAOI-1



ID-01



ID-02



ID-03



ID-04



ID-05



ID-06



ID-07



ID-08



ID-09



ID-10



ID-11



ID-12



ID-13



ID-14



ID-15

Figure 5-5 Some Photos of Measuring Workplace (Indoor) Air Quality at MAOI-1



Table 5-4 Workplace (Indoor) Air Quality Measuring Results for MAOI-1

Sr. No.	Measuring Points	Description	Parameter		
			VOC (ppm)	PM <sub>10</sub> (μg/m <sup>3</sup> )	PM <sub>2.5</sub> (μg/m <sup>3</sup> )
1.	ID-01	Front of Centering Department	3.2	50	35
2.	ID-02	Centering Department Point-1	26.2	61	42
3.	ID-03	Centering Department Point-2	28.0	63	43
4.	ID-04	Centering Department Point-3	22.9	68	46
5.	ID-05	Polishing Point-1	48.3	85	43
6.	ID-06	Polishing Point-2	46.8	69	43
7.	ID-07	Polishing Point-3	57	91	47
8.	ID-08	Grinding Point-1	2.2	68	49
9.	ID-09	Grinding Point-2	13.8	62	41
10.	ID-10	Curved Generation Point-1	7.5	64	41
11.	ID-11	Curved Generation Point-2	7.8	54	21
12.	ID-12	Coating Room	18.2	17	14
13.	ID-13	Painting Room	18.2	14	11
14.	ID-14	Packaging Room	0.5	15	11
15.	ID-15	Chemical Store	1.3	68	57
16.	ID-16	Generator Room Point-1	2	70	56
17.	ID-17	Generator Room Point-2	2.4	73	53

The workplace (indoor) air quality does not have the specific guidelines.

#### 5.2.1.3 Generators' Stack Emission Measurement

There are ten generators in MAOI-1 and the measuring results of generators' stack emission in the factory-1 are described in **Table 5-5**.



Figure 5-6 Generators' Stack Emission Measurement

Table 5-5 Generator Stack Emission Measuring Results for MAOI-1

Sr. No.	Parameter	Unit	Measurement Results										Small Combustion Facilities Emission Guidelines
			Generator-1	Generator-2	Generator-3	Generator-4	Generator-5	Generator-6	Generator-7	Generator-8	Generator-9	Generator-10	
1.	O <sub>2</sub>	%	18.7	18.7	18.7	18.7	18.7	18.7	18.6	18.6	18.7	18.6	-
2.	CO	mg/Nm <sup>3</sup>	448	485	335	1050	580	783	782	757	1031	963	-
3.	CO <sub>2</sub>	%	1.64	1.67	1.67	1.65	1.68	1.67	1.68	1.75	1.76	1.78	-
4.	NO <sub>2</sub>	mg/Nm <sup>3</sup>	122	120	124	126	125	127	126	180	184	185	<b>460</b>
5.	SO <sub>2</sub>	mg/Nm <sup>3</sup>	10.1	9.8	9.5	10.5	10.2	9.8	10.2	10.9	11.4	11.5	<b>2000</b>

According to the measuring results, stack emission gases from generators are within the desirable limits.

### 5.2.2 Noise Level

Noise is one of the most undesirable and unwanted by-products of our modern lifestyle. It may not seem as harmful as air and water pollutants, but it affects human health and well-being and can contribute to deterioration of human well-being in general and can cause neurological disturbances and physiological damage to the hearing mechanism in particular. Therefore, it is necessary to measure both the quality as well as the quantity of noise in and around the site.

Parameter for noise level survey was determined according to Myanmar National Environmental Quality (Emission) Guidelines.

Noise surveys have been conducted at the project site in order to establish an acoustic baseline onto which potential impacts from the proposed project may be superimposed. Noise level measuring was also done at the same sampling points used for air quality monitoring.

Measurements to determine the environmental conditions of working environment of the factory were carried out for short-time interval samples (one hour for each sample measurement). Ambient noise level monitored continuously for 24 hours.

#### Material Used for Measuring

**Digital Sound Level Meter** measures the environmental conditions of working environment of the factory carried out for short-time interval samples (one hour for each sample measurement). Ambient noise level measured continuously for 24 hours.





### 5.2.2.1 Ambient Noise Levels

The ambient noise level was continuously measured for 24 hours. The ambient noise level measuring point are same with ambient air quality measuring points and the results are presented in **Table 5-6**.

Table 5-6 Ambient Noise Level Measuring Results

Sr. No.	Measuring Points	Measuring Results (dBA)	NEQG (dBA)	Remarks
1.	NMP	57.95	<b>70</b>	Day time (07:00 a.m. ~ 10:00 p.m.)
		58.47	<b>70</b>	Nighttime (10:00 p.m.~ 07:00 a.m.)

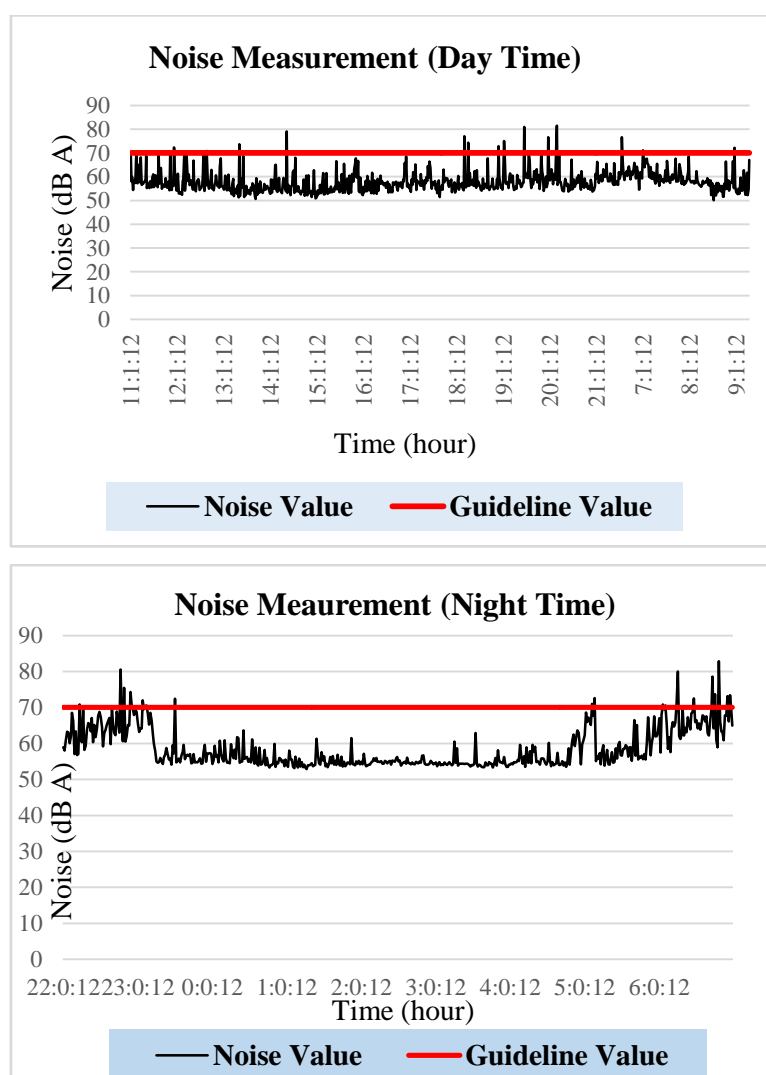


Figure 5-7 Ambient Noise Graph (24-hour) for Factory-1

As the project is located in industrial park, the observed values are compared with the guidelines for industrial area. The observed values of the ambient noise levels for daytime and nighttime are within the limit of Guidelines. Therefore, the human and the environment cannot be affected by the noise.

### 5.2.2.2 Workplace (Indoor) Noise Levels

Measurements to determine the environmental conditions of working environment of the factory were carried out for short-time interval samples (one hour for each sample measurement). The workplace (indoor) noise level measuring points are same with workplace (indoor) air quality measuring points and the results are presented in **Table 5-7**.

Table 5-7 Workplace (Indoor) Noise Level Measuring Results for Factory-1

Sr. No.	Measuring Points	Description	Noise Measuring Results (Duration = 1hr) (dB[A])	OHS Guidelines (8 hr) (dB[A])
1.	ID-01	Front of Centering Department	75.8	90
2.	ID-02	Centering Department Point-1	78.6	90
3.	ID-03	Centering Department Point-2	80.6	90
4.	ID-04	Centering Department Point-3	83.2	90
5.	ID-05	Polishing Point-1	81.5	90
6.	ID-06	Polishing Point-2	83.4	90
7.	ID-07	Polishing Point-3	86.3	90
8.	ID-08	Grinding Point-1	85.6	90
9.	ID-09	Grinding Point-2	85.7	90
10.	ID-10	Curved Generation Point-1	85.0	90
11.	ID-11	Curved Generation Point-2	87.6	90
12.	ID-12	Coating Room	80.1	90
13.	ID-13	Painting Room	66.8	90
14.	ID-14	Packaging Room	58.7	90
15.	ID-15	Chemical Store	77.6	90
16.	ID-16	Generator Room Point-1	94.8	90
17.	ID-17	Generator Room Point-2	100.1	90

According to the measuring results of average noise levels at workplace, the noise levels except generator rooms were within the acceptable conditions. The major noise pollution source inside the factory may be happened due to operation of generators and they are used in case of emergency only when the electricity goes out.

### 5.2.3 Light Intensity

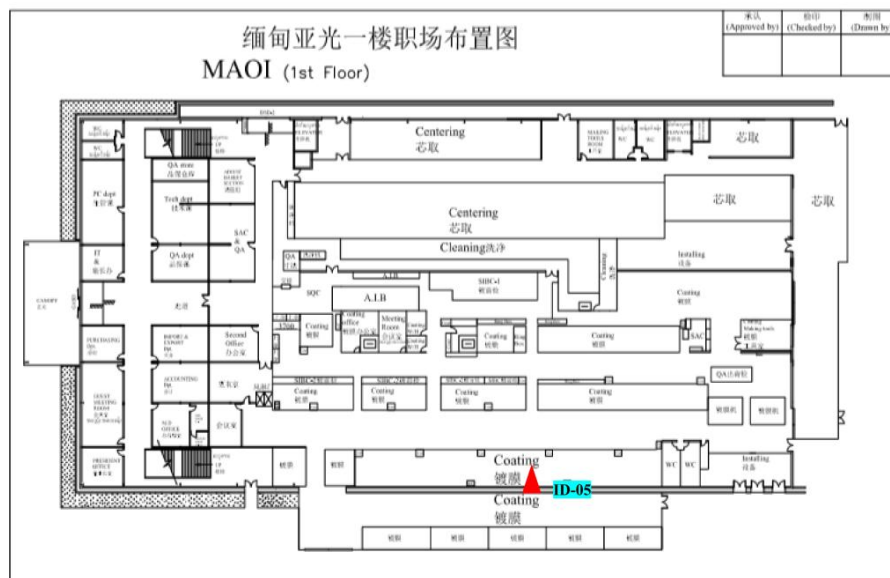
Light intensity is important for the workplace. Therefore, study team from Green Myanmar Environmental Services Co., Ltd. investigated light intensity at the six locations in the factory-I and one location in the factory-II by using Lux Meter in February 2020. Accurate and quantifiable measurement of light is essential in creating desired outcomes in practical day-to-day applications as well as unique applications. From measuring the amount of light in a workspace surface to ensuring emergency exits have proper illumination, light measurement and analysis is an important step in ensuring efficiency and safety. To perform these measurements, technicians often

From the workers' perspective, poor lighting at work can lead to eyestrain, fatigue, headaches, stress and accidents. On the other hand, too much light can also cause health and safety problems such as "glare" headaches and stress. Both can lead to mistakes at work, poor quality and low productivity. Various studies suggest that good lighting at the workplace pays dividends in terms of improved productivity, and a reduction. Improvements in lighting do not necessarily mean that you need more lights and therefore use more electricity – it is often a case of making better use of existing lights; making sure that all lights are clean and in good condition; and those lights are positioned correctly for each task. It is also a case of making the best use of natural light. However, little attention appears to be paid on the nature of the work - it is as though all work in the factory requires the same degree of lighting.

**Lux Meter** is used to measure the light intensity.



The following **Figure 5-8** shows the location points for measuring light intensity and the **Table 5-8** describes the light measurement results during the working hours.



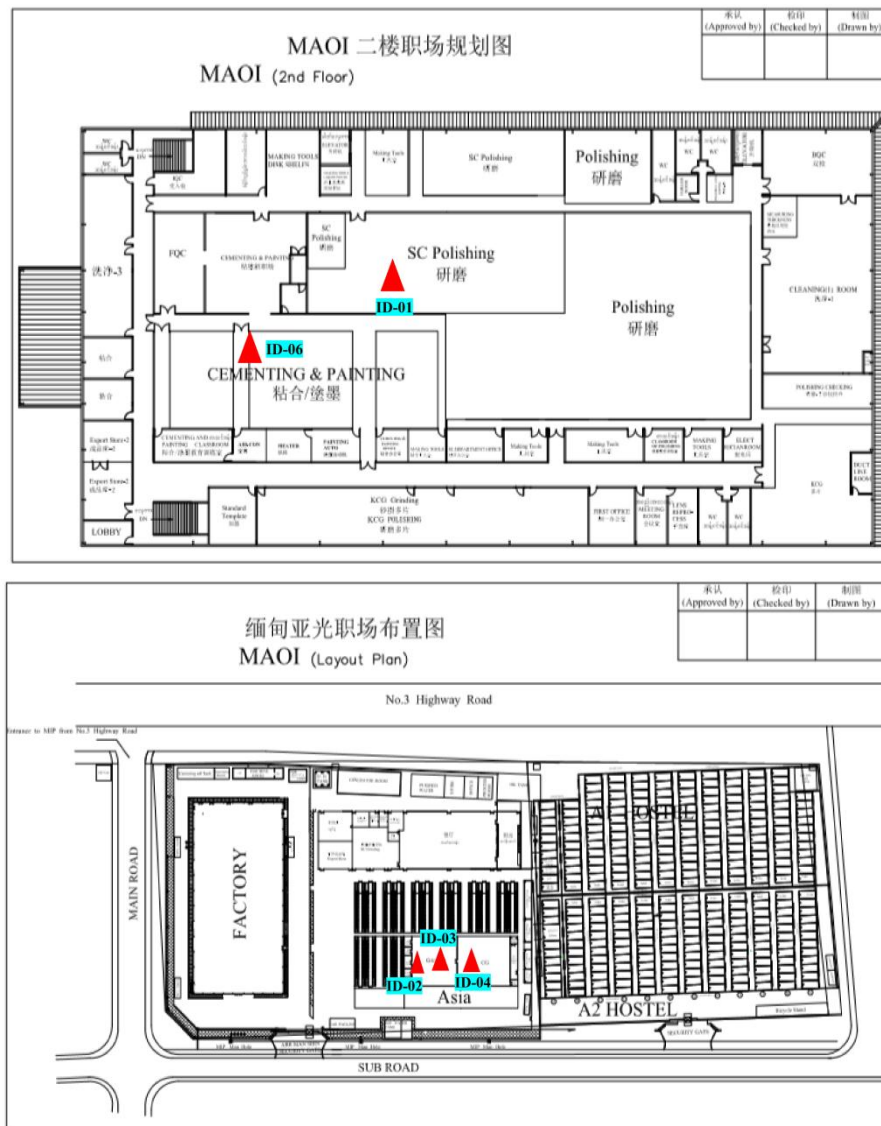


Figure 5-8 Location of Measuring Light Intensity at Factory-1







Figure 5-9 Light Measurement Activities

Table 5-8 Light Measurement Results

Sr. No.	Measuring Points	Location	Measure Values (Lux)	Guideline Values (Lux)
1.	ID-01	Polishing Point-1	355	300-750
2.	ID-02	Grinding Point-1	320	300-750
3.	ID-03	Grinding Point-2	520	300-750
4.	ID-04	Curve Generation	1813	1,500-3,000
5.	ID-05	Coating Room	165	300-750
6.	ID-06	Painting Room	565	300-750

According to the above table, the light levels at coating room was lower than the limits and the other were within the limits. Therefore, the project proponent should be arranged the suitable lightning system and monitored.

#### 5.2.4 Water and Wastewater Quality

Selected water quality parameters of tube water and surface water have been studied for assessing the water environment and evaluating the anticipated impact of the proposed project.

The purpose of this study is to:

- Assess the water quality characteristics for critical parameters,
- Predict impact on water quality by this project and related activities and
- Suggest appropriate mitigation measures.

#### Selection of Sampling Locations

Water quality was sampled from the water from water treatment plant and tube well water. Wastewater quality was sampled at the wastewater treatment plant and



drainage waters. Water and Wastewater samples were collected nine samples at the project site and its surroundings on February 13 and 14, 2020 and carried out laboratory analysis by GMES laboratory and the ALARM ecological laboratory. The locations of water sampling points are as shown in **Table 5-9**.

Table 5-9 Locations of Water Sampling Points

Sr. No.	Sampling Points	Description	Geographic Information	Remarks
1.	WSP-1	Treated Water Outlet	16° 56' 32.80" N 96° 09' 07.564" E	Water
2.	WSP-2	Treated Water Inlet	16° 56' 33.746" N 96° 09' 07.477" E	Water
3.	WSP-3	Raw Water	16° 56' 38.810" N 96° 09' 06.670" E	Water
4.	WSP-4	Wastewater Treatment Outlet	16° 56' 35.70" N 96° 09' 10.86" E	Wastewater
5.	WSP-5	Wastewater Treatment Inlet	16° 56' 34.579" N 96° 09' 11.694" E	Wastewater
6.	WSP-6	Drain 5 in front of the Factory	16° 56' 34.592" N 96° 09' 11.571" E	Wastewater
7.	WSP-7	Drain 3 in front of the Factory	16° 56' 30.880" N 96° 09' 12.293" E	Wastewater
8.	WSP-8	Tube Well Water	16° 56' 39.07" N 96° 09' 07.38" E	Water
9.	WSP-9	Drain 1 in front of the Factory	16° 56' 28.59" N 96° 09' 13.00" E	Wastewater

#### 5.2.4.1 Water Quality

The analysis results of the physico-chemical parameters are presented in **Table 5-10**. The analysis results were compared with Drinking Water Standards.



Figure 5-10 Location of Tube Well Water Sampling Points



Figure 5-11 Recorded Photos of Tube Well Water Samplings



Table 5-10 Result of Tube Well Water Quality (GMES Laboratory)

Sr. No.	Parameter	Unit	Analysis Value				Drinking Water Standard
			WSP-1	WSP-2	WSP-3	WSP-8	WHO (2011)
1.	Aluminum	mg/l	0.02	0.02	0.01	0.01	<b>0.2</b>
2.	Arsenic	µg/l	0	0	0	0	<b>10</b>
3.	Chloride	mg/l	22	14	305	320	<b>250</b>
4.	Copper	mg/l	ND	ND	0.06	0.07	<b>2</b>
5.	Cyanide	mg/l	ND	ND	ND	ND	<b>0.07</b>
6.	Manganese	mg/l	ND	ND	1.05	0.95	<b>0.4</b>
7.	pH	-	6.33	6.83	6.18	5.34	<b>6.5~8.5</b>
8.	Sulfate	mg/l	ND	2.9	11.2	13.4	<b>250</b>
9.	Total Alkalinity	mg/l	28	55	65	88	-
10.	Total Dissolved Solids	mg/l	50	60	940	990	<b>600</b>
11.	Total Hardness	mg/l	14	39	289	302	<b>500</b>
12.	Total Iron	mg/l	<0.1	0.1	4	30	<b>0.3</b>
13.	Turbidity	NTU	9.27	10.8	16.4	58.1	<b>5</b>

ND - Not Detected

According to the lab result, although the chloride and manganese, TDS, total iron and turbidity from WSP-3 (raw water) and WSP-8 (Tube well water) are higher than the WHO drinking water standards, it is found that these parameters are within the standards after treatment expect the turbidity values.

#### 5.2.4.2 Wastewater Quality

The analysis results of the physico-chemical parameters are presented in **Table 5-11**. The analysis results were compared with National Emission Quality (Emission) Guidelines (2015).



Figure 5-12 Location of Wastewater Sampling Points



Figure 5-13 Recorded Photos of Wastewater Samplings

Table 5-11 Result of Wastewater Quality (GMES Laboratory)

Sr. No.	Parameter	Unit	Analysis Value					National Environmental Quality (Emission) Guidelines (2015) General Application
			WSP-4	WSP-5	WSP-6	WSP-7	WSP-9	
1.	Arsenic	mg/l	0.0375	0.0375	0	0	0	0.1
2.	Chemical Oxygen Demand (COD)	mg/l	1255	2010	160	930	2530	250
3.	Oil and Grease	mg/l	14	50	ND	ND	ND	10
4.	pH	-	6.31	6.86	4.63	6.73	5.78	6~9
5.	Total Suspended Solids (TSS)	mg/l	54	820	26	38	20	50

ND - Not Detected



According to the lab result, ), pH values from WSP-6 (Drain 5 in front of the Factory) and WSP-9 (Drain 1 in front of the Factory) are a little lower than the guidelines and COD of all wastewater samplings, oil and grease from WSP-4 (Wastewater Treatment Outlet) and WSP-5 (Wastewater Treatment Inlet) and TSS values from WSP-4, WSP-5, WSP-7 (Drain 3 in front of the Factory) are higher than the guideline values. The other parameters are within the limits.

### 5.2.5 Soil Quality

To monitor the soil quality, the soil sample was collected in the project area.

#### Selection of Sampling Locations

The soil sample of the factory was collected at one location inside the factory compound on February 14, 2020.

Table 5-12 Locations of Soil Sampling Point (SSP)

Sr. No.	Sampling Points	Geographic Information	Description	Remarks
1.	SSP	16° 56' 36.40" N 96° 09' 10.77" E	Inside the factory-1	See <b>Figure 5-14</b>



Figure 5-14 Location of Soil Sampling Point in Factory-1





Figure 5-15 Photo of Taking Soil Sample inside the Factory Premise

### Analysis Results

The collected soil samples were tested at GMES laboratory. The analysis results of the physico-chemical parameters are presented in the **Table 5-13**.

Table 5-13 Results of Soil Quality for Factory-1

Sr. No.	Parameter	Unit	Analysis Value
1.	Aluminum	mg/kg soil	0.05
2.	Arsenic	mg/kg soil	0
3.	Chloride	g/kg soil	0.034
4.	Copper	mg/kg soil	0.35
5.	Cyanide	mg/kg soil	0.1
6.	Extractable Acidity	cmol/kg soil	4.88
7.	Manganese	mg/kg soil	3.1
8.	P-Alkalinity	mmol/l extract	0
9.	pH	-	6.35
10.	Total Alkalinity	mmol/l extract	3.32
11.	Total Iron	g/kg soil	0.5

ND: Not Detected

The above results are noted as baseline data, and it will compare with the future results. Comparison will show better or worse.

## 5.3 Natural Environment/ Physical Components (Secondary Data)

Physical environment essentially illustrates baseline conditions of climate, topography, geology, soils and hydrology of the project area, where necessary, of proposed project regardless of an assessment study. These data are extracted from the regional facts about Yangon Region, Mingaladon Township prepared by the Administrative Department of Township (2020) and study area is an area of that township.

### 5.3.1 Study Area (Mingaladon Township)

The proposed project (study area) which is located in Mingaladon Industrial Park (MIP), Mingaladon Township has mentioned in project description in detail. Mingaladon Township is located in the northern district of Yangon Region, Myanmar.

It occupies an area of 41.69 square miles. The location of the township is between north latitude 17° 3'2 and 17° 04' and between east longitude 96° 08' and 96°

The township shares border with

- Hlegu Township and North Okkalapa Township in the east,
- Shwepyitha Township and Insein Township in the west,
- Mayangone Township in the south, and
- Hmawbi Township and Hlegu Township in the north.

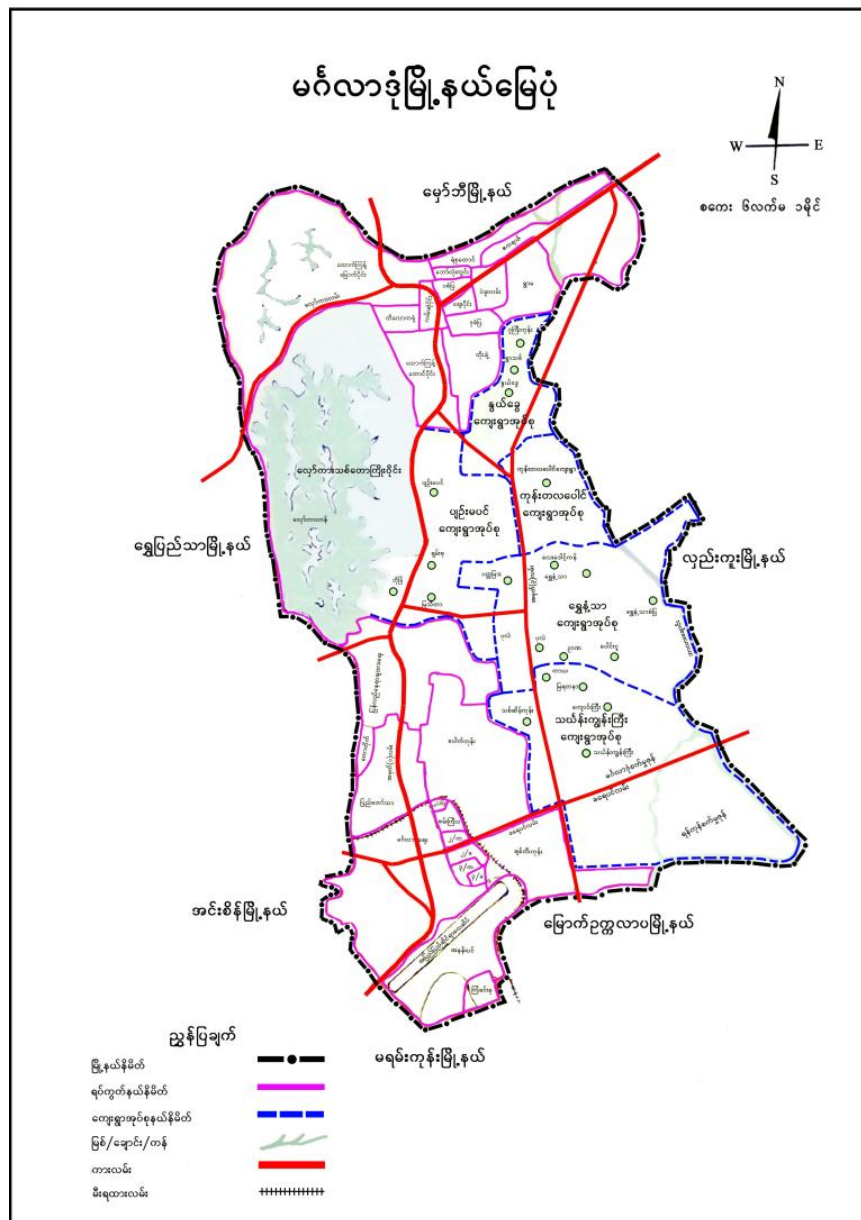


Figure 5-16 Map of Mingaladon Township

### 5.3.2 Climate

The climate of the Mingaladon Township is a tropical monsoon climate. The highest temperature is 39 °C and lowest temperature is 15.5°C. The following table shows the yearly rainfall data and temperature of Mingaladon Township.

Table 5-14 Annual Rainfall Data and Temperature at Mingaladon Township

No.	Year	Rainfall		Temperature	
		Rainy Days	Total Rainfall (inches)	Summer (°C)	Winter (°C)
				Highest	Lowest
1.	2016	126	104	38	15.7
2.	2017	117	101.93	39	15.5
3.	2018	81	79.07	39	15.5
4.	2019	135	132.85	38	15.8
5.	2020	128	112.5	38	15.7

Source: [www.gad.gov.mm](http://www.gad.gov.mm)

### 5.3.3 Topography

Ranged from south to north, Ngwe Yah Mountains is located in the western part of the Mingaladon Township. The Lawga Lake is situated at the western border near Shwepyitha Township and the rest areas are plains.

### 5.3.4 Geology

Yangon Region, excluding the Coco Islands in the Bay of Bengal, forms largely a flat terrain in the area of the Gulf of Mottama, except for low hills or ridges formed of upper Tertiary strata. Noticably high areas of the Region are the southern end of the Bago Yoma near Phaunggyi, and its farther southward extension of isolated low hills and ridges like those near Hlawga Lake, the Shwedagon pagoda Hill in Yangon City itself, and the ridge or rolling hills southeast of Thanlyin.

The mainland part of the Yangon Region is bordered on the west by the Ayeyawady Region, on the north and east by Bago Region and on the south by the Gulf of Mottama. The Coco islands, forming an outerarc ridge located in the Bay of Bengal, some 270 miles southwest of Yangon, is also part of the Yangon Region.

Being largely a flat alluvium-covered terrain with no notable economic mineral potential, Yangon Region has not attracted much of the attention of the geologists from the mineral prospect point of view. The geological succession of the Yangon Region is shown in **Table 5-15**.

Laterite for use as road material is now being quarried at Wanetchaung, between Hmawbi and Taikkyi, north of Yangon.

Table 5-15 Geological Succession of the Yangon Region

Age	Unit
Quaternary	Younger Alluvium Unconformity Older Alluvium Unconformity
Upper Miocene-Pliocene	Irrawaddy Formation Unconformity
Miocene	Pegu Group (upper part only) Unconformity
Cretaceous-Eocene	Indoburman Flysch (in Coco islands only)

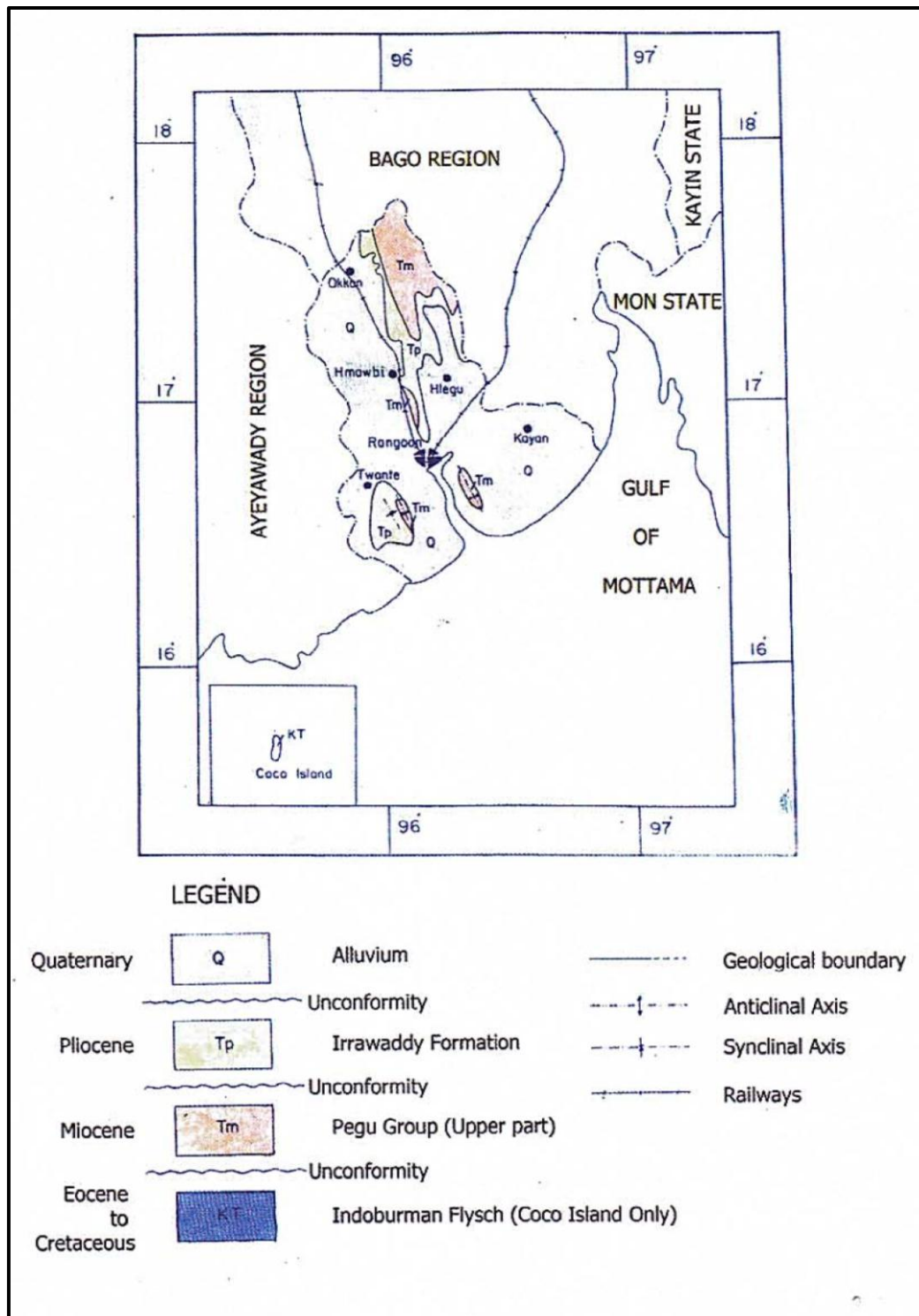


Figure 5-17 Geological Map of Yangon Region

### 5.3.5 Soil

There are several soil types in Yangon Region:

- (1) meadow soils and meadow alluvial soils,
- (2) clay and clay swampy soils,
- (3) swampy soils,
- (4) lateritic soils,

- (5) yellow brown forest soils,
- (6) dune forest and beach sand,
- (7) mangrove forest soils,
- (8) saline swampy meadow and gray soils.

Of them, mostly found soil types in the project area are (1) meadow soils and meadow alluvial soils, and (2) lateritic soils. Soil map of Yangon is shown in **Figure 5-18**.

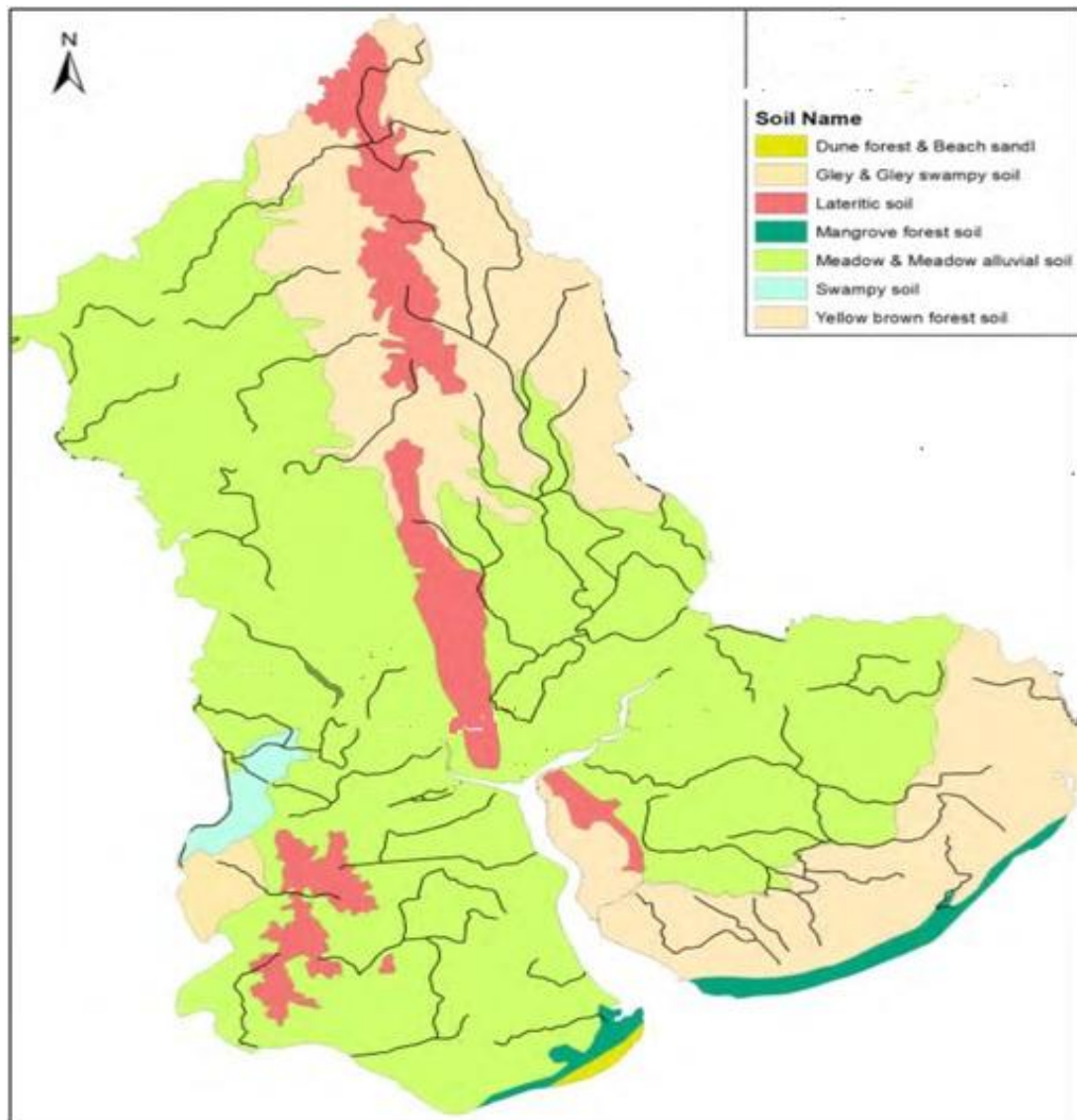


Figure 5-18 Soil Map of Yangon

### 5.3.6 Hydrology

Mingaladon Township has a few rivers and creeks flowing in that Barla Creek flows about 12 miles from north to south and about 8 miles from west to east. Its water depth is about 12 feet in rainy season and about 3 feet in summer and vessels/boats cannot travel in it.



## 5.4 Biological Components (Secondary Data)

The ecological information was received from the general administrative department of the Mingaladon Township.

### 5.4.1 Natural Vegetation (Flora)

The vegetation such as teak, pyinkadoe, thit-mar, nipa palm and mangroves are found in Mingaladon Township.

### 5.4.2 Wildlife (Fauna)

There is no wildlife in Mingaladon Township.

## 5.5 Socio-Economic Components (Secondary Data)

### 5.5.1 Population and Communities

Mingaladon Township is composed of 27 quarters and 5 village tracts that is composed of 20 villages. There are 57,380 households and 263,798 populations. The female population is slightly higher than male according to the general administration department in 2020. In the township, most of the people are 94% Burmese and population by national ethnic group that are lived in Mingaladon Township describes in **Table 5-16**.

Table 5-16 Population by National Ethnic Group

Sr. No.	Ethnicity	No. of Persons	Percentage (%)
1.	Kachin	519	0.19
2.	Kayah	221	0.08
3.	Kayin	3,839	1.45
4.	Chin	2,352	0.89
5.	Mon	1,642	0.62
6.	Burmese	247,899	94
7.	Rakhine	3,126	1.18
8.	Shan	504	0.19
<b>Total</b>		<b>260,102</b>	<b>98.6</b>

Table 5-17 Population by Foreigner

Sr. No.	Ethnic Race	No. of Persons	Percentage (%)
1.	Chinese	163	0.06
2.	Indian	3,515	0.33
3.	Pakistanis	1	0.01
4.	Bangladeshis	17	0.07
5.	Others	-	-
<b>Total</b>		<b>3,696</b>	<b>1.47</b>

Table 5-18 Population by Sex

Sr. No.	Living Area	Male	Female	Total
1.	Living on town	69,820	80,077	149,897
2.	Living in country	50,435	63,466	113,901
<b>Total</b>		<b>120,255</b>	<b>143,543</b>	<b>263,798</b>

### 5.5.2 Religion

In the township, most of the people are 90.99% Buddhist and the other religious groups are shown in following table.

Table 5-19 Religious Groups of Ethnic in Mingaladon Township

Sr. No.	Religious Group	No. of Persons
1.	Buddhist	252,156
2.	Christian	4,339
3.	Hindu	3,23,
4.	Islam	4,071
5.	Others	-
<b>Total</b>		<b>263,798</b>

### 5.5.3 Education Attainment

According to the secondary data from General Administration Department, there are 9 basic education high schools, 3 sub high schools, 7 middle schools, 6 sub middle schools, 2 post primary schools, 25 primary schools, 24 pre-primary school and 22 monastery education schools.

### 5.5.4 Connectivity

The selected project location has well connectivity and accessibility through road and air.

*Air:* Nearest airport is Yangon airport which is located around 5 km from.

*Road:* The project is easily approachable from No.3 Main Road.

### 5.5.5 Health Facility

Mingaladon Township has 5 hospitals, 11 clinics and 5 rural health care centers.

### 5.5.6 Economy

Mingaladon Township is one of the central economic township in Yangon. It is also an industrial town that composed of Yangon Industrial Zone, Mingaladon Industrial Zone and Pyinmapin Industrial Zone. It has the best communication due to existing of Yangon-Pyi Road and No.3 Main Road.

### 5.5.7 Land Use

The following **Table 5-20** describes the land use classification of Mingaladon Township.

Table 5-20 Land Use of Mingaladon Township

No.	Types of Land	Area (acres)
<b>1.</b>	<b>Net Cultivation Area</b>	<b>4,285</b>
	(i) Paddy land	2,839
	(ii) Farmland for crop	-
	(iii) Cultivated Island	-
	(iv) Orchard	1,446
	(v) Hillside	-
<b>2.</b>	<b>Vacant Land Area</b>	<b>53</b>
	➤ Paddy land	2,596
	➤ Farmland for crop	-
	➤ Cultivated land	-
	➤ Orchard	88
	➤ Hillside	-
<b>3.</b>	<b>Grazing Ground</b>	<b>-</b>
<b>4.</b>	<b>Industrial Land</b>	<b>54</b>
<b>5.</b>	<b>Urban Land</b>	<b>3,983.189</b>
<b>6.</b>	<b>Rural Land</b>	<b>3,431.11</b>
<b>7.</b>	<b>Others</b>	<b>7,526.301</b>
<b>8.</b>	<b>Reserved Forest and Protected Forest Area</b>	<b>7,175</b>
<b>9.</b>	<b>Wild forest</b>	<b>-</b>
<b>10.</b>	<b>Virgin Soil area</b>	<b>174</b>
<b>11.</b>	<b>Non-cultivated area</b>	<b>-</b>
<b>Total</b>		<b>26,681.60</b>

### 5.5.8 Workforce

There are 129,141 persons, who can be worked. Among them, 103,409 persons are employees and 25,232 persons are jobless. So, the percentage of jobless in Mingaladon Township is 19.53 %.

Table 5-21 Workforce of Mingaladon Township

Sr. No.	Types of Job	No. of Persons
1.	Government Employee	40,732
2.	Services	6,100
3.	Agriculture	2,841
4.	Breed	153
5.	Trading	25,000
6.	Factory / Workshop Employee	7,300
7.	Fishing	15
7.	Random Worker	22,000
8.	Others	25,000
<b>Total</b>		<b>129,141</b>

## 6.0 SUMMARY OF IMPACTS

The MAOI Factory-1 has been already constructed factory buildings so that there is no need to consider the construction phase impacts.

The MAOI products are produced from recyclable materials (such as glass). However, as other products, these products may create various kinds of environmental impacts at different stages of the manufacturing processes. There may be some positive and negative impacts in the surrounding environment of the project site due to the implementation of the project. A major source of the environmental impacts is the consumption of energy required to produce these products and water during the manufacturing process from raw materials to the final products.

### Anticipated Negative Impacts for Operation Phase

All environmental effects are checked during an inspection of the site and found the following:

#### *Environmental Effects*

Energy consumption	electrical supply for process and auxiliary machinery electrical supply for lighting
Consumption of raw materials	use of glass blanks, plastic materials
Chemicals	purchase, storage, use, disposal
Emissions to atmosphere	dust, fumes, VOC, NO <sub>x</sub> , SO <sub>x</sub> , CO, CO <sub>2</sub> from heating installation
Water consumption	process water for cleaning domestic water
Discharges to water	effluents from washing effluents from cooling
Solid waste	process waste (plastic pieces, glass pieces, etc.) hazardous waste (e.g., machine oil, chemicals, solvent, etc.) packaging waste (plastics, cardboard, paper, etc.)
Noise	noise from machinery
Vibration	vibrations from machinery

### 6.1 Impact on Ambient Air Quality

Process-related emissions, such as the glass particles, dust and chemical fumes, the use of organic solvents or noise from process and mechanical equipment, can affect a factory in two ways:

- when they occur in the workplace, they present occupational health and safety concerns,
- when they are released outside, they become an environmental issue.

Air pollution is the most difficult type of pollution to sample, test, and quantify in an audit. Air emissions can be classified according to the nature of their sources:

#### ***Point Sources***

Specific discharge points, such as stacks or vents that are intended to be the point of atmospheric release for emissions.

#### ***Fugitive Sources***

Sources for more general atmospheric emissions occurred by evaporation, leaks, and spills.

The major sources for air quality deterioration for MAOI factory are gases from generators, and emissions from different mechanical and electric appliances; and operation activities such as grinding, cleaning, polishing, coating, etc. Fugitive or area sources of air pollutants include warehouses and spills. Common air pollutant emissions include VOCs from hazardous as well as non-hazardous chemicals. There are also several particulates or fumes emitted during optical lens production e.g., grinding, polishing, coating, etc.

#### ***Raw Materials Store***

Chemicals stored in storage room can emit volatile emissions, especially chemicals used for lens.

#### ***Spill***

Spills can emit volatile pollutants for years and, therefore, should be cleaned up promptly. Spill residues should be disposed of according to proper protocol, which in some cases requires handling residues as hazardous waste.

#### ***Particulate and Fume***

During lens production, there are several particulates or fumes that could be inhaled by operators causing health effects. Polycarbonate or plastic dust disperses into the air and collects within the grinding machine during manufacturing processes. Even in an enclosed machine, the operator may be exposed to plastic dust when cleaning the machine or switching to a different lens.

During the polishing step of lens production, polishing compounds and water combines with plastic dust forming a mist which could pose health effects. Both plastic dust and mist inhalation could be dangerous to the operator's health. Plastic dust contains microparticles of plastic which could become embedded deep in the lungs. The plastic microparticles could expose the lungs to the chemicals in the plastic or cause infections, coughing, lung disease, or lung function limitations. Sometimes the particles simply pass through the body without causing any effects. Both indoor and outdoor air contains plastic dust but the full effects of breathing plastic microparticles are not clear. Particularly industrial or commercial areas contain



more plastic microparticles concentrations in the air. Plastic dust exposure may also cause eye or skin irritation.

The metals or chemicals used for the coating step of lens production can cause respiratory irritation after inhalation and could be harmful to the lungs. Titanium oxide exposure has been shown to cause nausea, dyspnea, and irritation to the respiratory system.

## 6.2 Impact on Noise

The long-term effects of excessive noise exposure are physical as well as psychological.

Physical effects may include headaches, nausea, irritability, constriction of blood vessels, changes in the heart and respiratory rate, and increased muscle tension. Prolonged exposure to high noise levels may result in hearing damage.

Psychological effects may result from the stress and irritability associated with a change in sleeping patterns due to excessive noise.

Noise pollution is from generation of noise from vehicle movement and especially from the operation of heavy equipment such as compressor, generator, and other vibrating machines.

During the *operation phase*, machines' noise, transportation of raw materials and products and other production process activities, such as curve generation, grinding, polishing, etc. (See Flow diagram for each operation) of the factory, operation of heavy equipment such as compressors, diesel generators, pumps, motors and the maintenance workshop could be the major sources of noise pollution. But these are not much impact to the workers and surrounding environment because of using the engineering control of factory building design and using modernized machines. Estimated noise level outputs were obtained from equipment manufacturers and the impacts were assessed.

In the *decommissioning phase*, there will be some noises generated from heavy machineries running for dismantling activities. Activities likely to generate noise during this phase include cutting and demolition of structures, transportation of demolished materials could affect the noise level of the area. Though demolition works could lead to significant nuisance to the surrounding area, it is a short-term activity. Hence, it can be assumed that the impact of this phase is likely to be medium.

## 6.3 Light Pollution

During operation phase, the potential use of excess light could represent a minor environmental impact. The management and control measures identified in Chapter 6 of the report should minimize any impact

Process	Steps
Optical Lens Manufacturing Process	<ul style="list-style-type: none"> <li>• Cementing</li> <li>• Painting</li> </ul>

## 6.4 Water Use

Access to high quality water for production operations is an essential factor in ensuring the quality of the finished and semi-finished lenses that the Company distributes. The MAOI factory-1 is located in industrial areas where access to water is provided by local authorities. They are dependent on these local authority managed utilities.

The MAOI factory-1 use considerable quantities of water for lens machining, surfacing and rinsing operations. The net water consumption is the water used in the production processes, everyday site consumption and in sanitary networks.

### Daily Water Use

Employee Housings      Bathrooms (including toilets, faucets, showers) and other personal uses

Food Preparation      Cooking, food preparation, dishwashing, and cleaning

These support operations exist in many other industry sectors, there are several proven Best Management Practices. Therefore, many of the water efficiency techniques and equipment from residential and business settings can be applied to minimize the water use.

## 6.5 Soil Contamination

During the *operation phase*, impact on soil may be caused by accidental spills of chemicals used in lens processing, liquid wastes and diesel at storage area and emergency generators. Moreover, oil can be spilled at machines maintenance room while repairing the machines. But these are insignificant impact because the project proponent paved the ground of diesel storage area, generators room and entire compound. However, the occurrence will be low because of all activities in line with lens processing are mostly in-door. Hence, there is no significant impact to soil quality by operation activities.

During the *decommissioning phase*, soil can also be contaminated by activities related with decommissioning works and accidental spillage of oil used in decommissioning activities. The decommissioning phase could cause negative effect on the on-site soil quality as there is a potential for accidental spillage of fuel and lubricant from construction activities.

## 6.6 Solid Waste Discharge

MAOI's operations do not present any risks of discharges into the air, water and ground which could seriously affect the environment. However, MAOI-1 mainly uses optical glasses and chemical products in the manufacture of lenses. It also buys packaging products (cardboard, plastic casing, plastic film, etc.). These activities generate special waste, which must be handled and processed in a particular way.

The following “3Rs” must be practiced.

- Reducing the volume of materials used in the various processes (manufacture, distribution),
- Reuse, and
- Recycle raw materials and packaging.

**Solid Waste Generation**

During the operation phase of the factory, the solid wastes will increase quantitatively.

- Ordinary (non-hazardous) waste
- Special (hazardous) waste

Manufacturing lenses produces some toxic byproducts such as styrene and butadiene which are released to the environment during production. Many other materials such as leftover glass and fluorite can be easily recycled for other uses with little waste.

***Packaging Materials***

Another major source of solid waste is packaging materials. These materials include cardboard boxes, wire, paper sacks, paperboard, plastic, or metal.

Reducing these wastes is largely a matter of establishing and enforcing improved purchasing specifications.

***Drums***

When purchasing fuel in drums, returnable containers should be specified, and the vendor should be required to accept unwashed drums for return. Eliminating the need to wash each drum before pickup can prevent a significant amount of wastewater.

***Bags***

Bags often break, resulting in spillage of contents, and disposing of them is a nuisance. They cannot be stored near high traffic areas or wet locations. They also must be moved on skids, which frequently break, and handling bags requires a considerable amount of labor.

***Processing Wastes***

Lens pieces and rejects from processing accounts for the solid waste generated.

Proper training can significantly reduce these wastes and could easily recover waste.

***Miscellaneous***

Other solid wastes include metal, trash, paper, and semisolid waste oils.

**6.7 Energy Use**

Energy and resource consumption are of major focus for this industry. To produce goods of the right quality and quantity, manufacturing processes are responsible for the major share of energy and water consumption.

During manufacture, machinery uses electricity to grind, cut, anneal, polish, align, and coat the crystal glass into the lens. These processes will contribute to the high energy consumption for the factory. Assembly, on the other hand, is mostly done by hand or human mechanical energy resulting no energy use. Trimmed plastics parts are usually recycled. However, electricity is required to melt these parts into reusable material.

**6.7.1 Electricity Consumption**

Although electrical consumption is not directly concerned with impact on nature environmental and local communities, the resource utilization is an issue which should be seen from a sustainable development perspective, scarcity of water resources, combustion of fossil fuels, utilization of raw materials, emission of ozone depletion gases, CO<sub>2</sub>, etc.

Moreover, high electricity demand can also consider negative impact on local uses because local electricity demand is higher and higher due to the normally increased in population and infrastructures.

The annual power requirement will be around 13,029,920 kWh for factory-1.

**6.7.2 Diesel Consumption**

The factory-1 use diesel generator for thermal energy utilization in the manufacturing process and for standby power requirement, and thus high diesel fuel consumption will take place. The annual diesel fuel requirement for generators in factory-1 is 775,720 gallons.

## **7.0 DESCRIPTION OF PROPOSED MITIGATION MEASURES**

This environmental management plan is conducted, because not only it is required by law, but also to measure the exact impacts of the activity on the environment and to propose what suitable mitigation measures that can be undertaken to decrease these impacts to the least.

The company recognizes that increased industrial activity and urbanization often generate increased levels of pollution to air, water, and land that may threaten people and environment at the local, regional, and global level; therefore, it intends to integrate the suitable technologies and practices to decrease such levels to the minimum. The company, through its all-work phases, will do its best to comply with the Myanmar Standards that deals with the Pollution Prevention and Abatement.

### **7.1 Mitigation Measures for Air Emissions and Ambient Air Quality**

A wide variety of particulate and fume control solutions would prevent operators from exposure to dust and chemical fumes from the coating step. The best suited solution would depend on the setup and size of the lens production facility.

Fume extractors and air purification systems use a fan to pull the hazard away from the operator and filter out the particulate and/or fume releasing the air back into the surrounding room. These systems do not require expensive external ductwork or makeup air.

- The cleanroom requirements of the coating room would require dust and other particles to be minimized to ensure high quality production.
- Mist collector mounts directly on the machinery to filter out particulates and mist produced from the grinding and polishing process.
- Portable fume extractor can be used to capture particulate at the source for open grinder units used for lens production.
- The hanging ambient air cleaners provide extra protection to clean the workspace air for worker safety during lens production.
- For small polishing, grinding and most edging machines, the entire system can be contained within a ductless fume hood for particulate control.

### **7.2 Mitigation Measures for Noise**

Despite the level of noise in working with most of the machinery in the factory are within the human accepted level (max. 60 dB, Decibel), some mitigation measures will be carried out in case of exceptional noise levels arise during any phase of work; for example: running of diesel generators and machineries.

- Take steps to reduce noise directly at source
- Encase or encapsulate noisy machines and equipment
- Screen noisy areas with walls or ramparts
- Use sound-proofing materials for the coating of ceilings or walls
- Try to influence noise by modifying physical data (e.g., speed)



- Locate noise-intensive machines together if possible
- “Flag” noisy areas with signs and ensure that the workers wear ear plugs in these areas
- Wearing ears' anti-noise devices,
- Keeping continuous checking, and
- Sustainable maintenance for all machinery

### **7.3 Mitigation Measures for Light Pollution**

- Work surfaces - Ensure work surfaces are dull instead of shiny as reflected light reflects more off shiny surfaces which results in indirect glare.
- Adjust light level to necessary.
- Install adjustable light so workers can adjust the light level.

### **7.4 Water Use Reduction**

Water is a key natural resource for the factories’ activities, and it is a primary element for the lens manufacturing processes. The water management is not only important to ensure the quality, continuity, and efficiency of the production operations, but it is also essential for the well-being of the employees and local communities where the factories are present.

Water use reduction is a high priority at MAOI-1 as the factory uses considerable quantities of water for lens machining, surfacing, and rinsing operations. To actively reduce its water use, the following actions should be taken:

- water mapping: drafting of network maps for water and equipment using water for the main factory and mass production lines
- installation of several meters, including “smart” meters to allow more accurate, continuous measurement of water use by the various production lines, support equipment or sanitary water networks
- drafting of a medium-term plan to reduce water use of each area

#### **Water Use Best Management Practices**

Best Management Practices are to-

- Develop and implement a preventive maintenance schedule for water leak identification and repair.
- Install water-efficient shower heads in dormitory.
- Retrofit old toilets in dormitories and factory bathrooms to improve water efficiency.
- Install low-flush toilets in dormitories and factory bathrooms to improve water efficiency.
- Close the water tabs when not in use.

### **7.5 Soil Quality**

The project proponent paved the whole ground of the factory. Since all the diesel storage area, generators room and chemical storage area are paved, soil contamination in these areas is impossible. Contamination of soil is reduced by suitable management of oil and

fuel storage and handling. In order to reduce the soil pollution, the project proponent must make sure of,

- Regular inspection of raw materials storage area for leakage
- Regular inspection of vehicles and emergency generators to prevent leakage of fuel and engine oils, and
- Refilling fuel with great care to prevent spillage

## 7.6 Solid Waste Control

Waste produced by the optical industry includes glass, plastics and metals as well as water used during the manufacturing process. Solid waste management system should comply with the waste management regulations and laws in Myanmar. It is therefore important to build appropriate infrastructures, to dispose various wastes. Poor management of the collection and disposal of solid waste may lead to pollute surface water or groundwater by leaching. This may cause significant problems if the waste contains toxic substances or if nearby water sources are used for water supplies. Where large quantities of dry waste are stored in hot climates, this may create a fire hazard. Related hazards include smoke pollution and fire threat to nearby buildings and people.

The company will establish proper management guidelines and ensure that all local requirements for on-site waste management are met and train all employees on the waste management procedures.

Recyclable solid wastes are sold to the suppliers, who have business license. The solid wastes, which cannot be disposed are stored in temporary places separately and manages them by cooperating with Yangon City Development Committee (YCDC).

Common types of solid waste and pollution prevention strategies for the wastes are described below. Usually, the sources of each waste type are obvious upon inspection. A solid waste audit can identify waste sources that might be overlooked in everyday operations. After identifying the sources, factory can reduce or eliminate the associated wastes if they remain committed to achieving their pollution prevention goals.

Table 7-1 Procedure and Description of Waste Management in MAOI

Sr. No.	Procedure	Cautions	Responsibilities
1.	Waste Classification	<ul style="list-style-type: none"> <li>▪ Paper scraps and tissues from office, workplace and public environment</li> <li>▪ Plastic waste, stationery waste and rubber waste from office, and public environment</li> <li>▪ Disposal of glass and plastics waste from manufacturing processes</li> <li>▪ Toxic and harmful substances from various activities such as packaging of toxic and hazardous materials and materials left from these packages</li> </ul>	Each Department
2.	Waste Handling	<ul style="list-style-type: none"> <li>▪ Each department must segregate waste according to the standard criteria</li> </ul>	Each Department

Sr. No.	Procedure	Cautions	Responsibilities
		<ul style="list-style-type: none"> <li>In every department, clear landfills must be marked</li> <li>Depending on the volume of waste in each department, the waste must be transported to the appropriate storage unit. In the living environment, waste must be categorized and marked</li> </ul>	
3.	Temporary Storing	<ul style="list-style-type: none"> <li>There must be adequate fire extinguishers and clear markers for storing waste</li> <li>Incompatible waste must not be stored together</li> <li>Inspection must be taken to prevent contamination and leaks</li> </ul>	Each Department
4.	Waste Management and Disposal	<ul style="list-style-type: none"> <li>To dispose the waste of each department legally at the official antiques store through the General Affairs Department</li> <li>Wastes and hazardous wastes that have a significant impact on the environment, must be handled by a business license holder.</li> <li>If the license is not found, it should be stored temporarily.</li> </ul>	General Affairs Department
5.	Solving Abnormal Situation	If any abnormal situation occurs during the waste management process, it shall be solved with the regulations on environmental remediation and prevention.	Relevant Department

## 7.7 Mitigation Measures for Energy Consumption

### 7.7.1 Conservation of Electricity

There are several methods that can be employed to help conserve electricity and these include:

- Install energy and water meters to measure and control consumption throughout the facility.
- Implementing good housekeeping measures such as turning off equipment and lights when not in use.
- Use LED lights and/ or lower wattage lamps.
- Using more efficient equipment when replacing old equipment (such as motors and heating units).
- Installation of computerized controllers to better regulate motor output.
- Installation of timers and thermostats to control heating and cooling.
- Preventative maintenance of operational processes and pipes so as to improve efficiency and minimize losses.

- Raising awareness among technicians and maintenance teams and providing them with training; and
- Stoppage or standby conditions for equipment with the highest consumption.

#### **7.7.2 Minimizing Diesel Fuel Consumption**

Minimizing of diesel fuel consumption can also reduce the emission of gases, solid waste and as well as operation cost. Diesel fuel consumption can be reduced using high efficiency diesel generator sets.

#### **Energy Use Best Management Practices**

Best Management Practices are to improve the energy efficiency of the manufacturing processes, different actions such as energy mapping for the main mass production sites and laboratories, installation of smart meters, benchmarking of energy models and medium-term energy reduction plans should be taken.

## 8.0 MONITORING PROGRAM

### 8.1 Environmental Monitoring Plan

Monitoring is an essential and an integral part of the implementation of the proposed environmental mitigation measures. Environmental monitoring generates useful information and improves the quality of implementation of mitigation measures.

Monitoring involves the observation, review and assessment of onsite activities to ensure adherence to regulatory standards and the recommendations made to reduce negative impacts. The plan must be comprehensive and address relevant issues, with a reporting component that will be made available to the regulatory agencies based on a mutually agreed frequency. It is recommended that a minimum yearly monitoring report be submitted to the authorities. The monitoring report will include at a minimum:

- Raw data collected
- Tables/graphs (where appropriate)
- Discussion of results with respect to the development in progress, highlighting parameters which exceed standards
- Recommendations

According to the section 108 of EIA Procedure, the project proponent will submit the Monitoring Report prescribed in the schedule of the Environmental Management Plan to the Ministry every (6) month or as may be prescribed by the Ministry.

**Table 8-1** shows the environmental monitoring plan for operation phase and decommissioning phase. Whereas the project proponent, MAOI is responsible during the operation phase and the demolition contractor is responsible during the closure phase for the implementation of environmental monitoring, summarization of the results and submission of the monitoring report to Environmental Conservation Department (ECD), Yangon Region under Ministry of Natural Resources and Environmental Consideration (MONREC) periodically.



Table 8-1 Environmental Monitoring Plan for the Operation and Decommissioning Phases

Sr. No.	Category	Monitoring Items	Monitoring Frequency	Monitoring Method	Location	Responsibilities
<b>Operation Phase</b>						
1.	Air Quality	Ambient air quality	Once a Year	Measurement by equipment	Within the factory premise	EMT
		Indoor air quality	Twice a Year	Measurement by equipment	Workplace (Front of centering dept., 3 points in centering dept., 3 points in polishing dept., 2 points in grinding dept., 2 points in curve generation dept., coating room, painting room, packaging room, chemical store and 2 points in generator room)	EMT
		Generators' stack emission	Twice a Year	Measurement by equipment	All the generators' stack	EMT
		<ul style="list-style-type: none"> <li>Inspection of the machinery, equipment, and vehicles</li> <li>Inspection of the ventilation system</li> <li>Inspection of the toilets and sewage system</li> <li>Inspection of the waste disposal yards and waste bin</li> <li>Preparation of inspection record / report</li> </ul>	Monthly	Inspection and checking	Workplace	EMT and Supervisors
2.	Noise Levels	Ambient noise level	Once a Year	Measurement of noise levels by	Within the factory premise	EMT

Sr. No.	Category	Monitoring Items	Monitoring Frequency	Monitoring Method	Location	Responsibilities
				equipment		
		Indoor noise level	Twice a Year	Measurement of noise levels by equipment	Workplace (Front of centering dept., 3 points in centering dept., 3 points in polishing dept., 2 points in grinding dept., 2 points in curve generation dept., coating room, painting room, packaging room, chemical store and 2 points in generator room)	EMT
		<ul style="list-style-type: none"> <li>Record the noise and vibration activities</li> <li>Inspection of the installation of sound barriers</li> <li>Regular supply of sufficient quantity of PPE</li> </ul>	Twice a year or according to instruction and compliance	Inspection and checking	Workplace	EMT and Supervisors
3.	Light Intensity	Light intensity	Twice a Year	Measurement by equipment	Workplace (Polishing point-1, grinding point-1, grinding point-2, curve generation, coating room and painting room)	EMT
4.	Water and Wastewater Quality	Tube well water quality	Once a Year	Laboratory Analysis	Treated water outlet, treated water inlet, raw water and tube well water	EMT
		Effluent water quality	Once a Year	Laboratory Analysis	Wastewater treatment outlet, wastewater treatment inlet, drain-5, drain-3 and drain-1 in front of the factory	EMT
		<ul style="list-style-type: none"> <li>Inspection of the</li> </ul>	Monthly	Inspection and	Workplace and factory premises	EMT and

Sr. No.	Category	Monitoring Items	Monitoring Frequency	Monitoring Method	Location	Responsibilities
		stormwater flowing ■ Inspection and maintenance of the screen to collect the solid waste ■ Inspection of the condition of concrete floor ■ Inspection of the leakage and spillage of oil, lubricant and fuel ■ Preparation of inspection record / report		checking		Supervisors
5.	Soil Quality	Soil	Once a Year	Laboratory Analysis	Within the factory premise	EMT
6.	Waste Disposal	■ Separate bins for different kinds of wastes ■ Record the solid waste amount ■ Inspect the waste disposal system ■ Inspect storage system of waste	Monthly	Inspection and checking	Factory compounds and surrounding environment	EMT
7.	Hazardous Chemical and Materials	■ Record the storage amount of hazardous waste ■ Inspect the disposal system	Monthly	Inspection and checking	Hazardous waste storage area	EMT

Sr. No.	Category	Monitoring Items	Monitoring Frequency	Monitoring Method	Location	Responsibilities
		<ul style="list-style-type: none"> <li>Inspect the hazardous wastes storage area</li> </ul>				
8.	Water Consumption	<ul style="list-style-type: none"> <li>Record the amount of water usage</li> </ul>	Daily/ Monthly	Records by water meter	Drinking water, process water and domestic water use	EMT
9.	Electricity Consumption	<ul style="list-style-type: none"> <li>Record electricity usage</li> </ul>	Daily/ Monthly	Recording	electric meter	EMT
10.	Fuel Consumption	<ul style="list-style-type: none"> <li>Record diesel consumption</li> </ul>	Daily/ Monthly	Recording	Generator	EMT
11.	Occupational Health and Safety	<ul style="list-style-type: none"> <li>Record the OHS</li> <li>Record the worker complains and conflict</li> <li>Inspect the PPE and record the details of PPE delivery</li> <li>Supply the first aid kits</li> <li>Inspect the worker rest camps and drinking water supplying situation</li> <li>Inspect the toilets and sewage system</li> </ul>	Monthly	Inspection and checking	Factory compounds	HSE Officer and EMT
		<ul style="list-style-type: none"> <li>Regular medical checkup for employee at sensitive area</li> <li>Medical check-up record of each employee</li> <li>Give training for OHS and first aid</li> </ul>	Once a year	Inspection and checking	Factory compounds	HSE Officer and EMT
12.	Social	<ul style="list-style-type: none"> <li>CSR activities</li> </ul>	Yearly	Records	Nearest local area and factory area	HR Manager and

Sr. No.	Category	Monitoring Items	Monitoring Frequency	Monitoring Method	Location	Responsibilities
	Consideration	<ul style="list-style-type: none"> <li>Worker ware-fare activities</li> </ul>				EMT
13.	Emergency Risks	<ul style="list-style-type: none"> <li>Inspect the firefighting equipment</li> <li>Record the training situation and trained person</li> <li>Record the hazardous materials handling and management</li> <li>Inspect and record the emergency response activities</li> <li>Inspect and record the situation of drain inside the project area</li> <li>Record the emergency response plan</li> <li>Record the inspection information</li> </ul>	Twice a year or if necessary	Inspection and checking	Factory compounds	Emergency Response Team and EMT
<b>Decommissioning Phase</b>						
1.	Air Quality	Ambient air quality	Once	Measurement by equipment	A suitable point on demolition site	Demolition Contractor
		Dust emission	Daily	Visual inspection	Demolition site	Demolition Contractor
		Exhaust Gases	Weekly	Visual inspection	Demolition site	Demolition Contractor
		Repair and maintenance of	As necessary	Record of repair and	Demolition site	Demolition



Sr. No.	Category	Monitoring Items	Monitoring Frequency	Monitoring Method	Location	Responsibilities
		vehicles, machineries and equipment		maintenance		Contractor
2.	Noise Levels	Ambient noise level	Once	Measurement of noise levels by equipment	Demolition site	Demolition Contractor
		Repair and maintenance of vehicles, machineries, and equipment	As necessary	Record of repair and maintenance	Demolition site	Demolition Contractor
3.	Water and Wastewater Quality	Water quality for drinking and domestic use	Once	Laboratory Analysis	Demolition site	Demolition Contractor
		Effluent water quality	Once	Laboratory Analysis	Effluent pit before discharge	Demolition Contractor
		Operation of temporary water ponds	Weekly	Visual inspection	Demolition site	Demolition Contractor
		Domestic wastewater collection	Monthly	Record of wastewater collection receipts	Installation areas of temporary septic tank	Demolition Contractor
4.	Soil Quality	Soil	Once	Laboratory Analysis	Demolition site	Demolition Contractor

## 8.2 Estimated Cost for Environmental Monitoring

The budget plans for environmental management and monitoring that will be implemented by the project proponent are estimated and proposed in the following sections.

MAOI will be responsible to implement necessary environmental mitigation measures and the expenses for environmental management not only the operation phase but also the decommissioning phase in accordance with EMP study.

The following tables are not definitive and should be treated as preliminary and representative.

Table 8-2 Estimated Cost for the Basic Environmental Monitoring during the Operation and Decommissioning Phases

Sr. No.	Environmental Issues	Monitoring Items	Number of Location (a)	Recommended Monitoring Frequency (Time/year) (b)	Rate (MMK/ Measurement) (c)	Total Annual Amount (MMK) (a x b x c)
<b>Operation Phase</b>						
1.	Air Quality	Ambient air quality	1	1	800,000	800,000
		Workplace (Indoor) air quality	17	2	200,000	6,800,000
		Stack emission of generator	10	2	200,000	4,000,000
2.	Noise and Vibration	Ambient noise levels	1	1	250,000	250,000
		Workplace noise levels	17	2	50,000	1,700,000
3.	Light	Light at workplace	3	2	30,000	180,000
4.	Water Quality	Tube well water	4	1	250,000	1,000,000
		Effluent water quality	5	1	350,000	1,750,000
5.	Soil Quality	Soil	1	1	600,000	600,000
6.	Waste Management				Lump sum	150,000
7.	Hazardous Waste Management				Lump sum	100,000
8.	Energy and Resource Consumption (Water, diesel and electricity)				Lump sum	2,500,000
9.	Emergency Response Equipment (Signboard on safety, emergency safety measures, fire safety measures and so on)				Lump sum	1,500,000
10.	Public Health and Occupational Safety				Lump sum	1,500,000

Sr. No.	Environmental Issues	Monitoring Items	Number of Location (a)	Recommended Monitoring Frequency (Time/year) (b)	Rate (MMK/ Measurement) (c)	Total Annual Amount (MMK) (a x b x c)
<b>Total Costs for Operation Phase</b>						<b>22,830,000</b>
<b>Decommissioning Phase</b>						
1.	Air Quality	Ambient air quality	1	1	800,000	800,000
2.	Noise and Vibration	Noise	4	1	250,000	1,000,000
		Vibration	1	1	500,000	500,000
3.	Water Quality	Drinking water and domestic-use water	2	1	250,000	500,000
		Effluent water quality	1	1	350,000	350,000
4.	Soil Quality	-	1	1	300,000	300,000
<b>Total Costs for Decommissioning Phase</b>						<b>3,450,000</b>

### 8.3 Environmental Management Team (EMT)

The project proponent pleased to offer all membership in Myanmar Asia Optical International (MAOI) Company Limited as Environmental Management Committee and appointment was commenced on 2021-01-10.

This team undertakes the activities of monitoring the stack emissions, ambient air quality, indoor air quality, noise levels, water quality, etc. either departmentally or by appointing external agencies wherever necessary. Regular monitoring of environmental parameters are being carried out to find any deterioration in environmental quality and also to take corrective steps, if required, through respective internal departments. The Environmental Management Team also collects data about health of workers, Green Belt Development etc.

The EMT shall also be responsible for monitoring of the plant safety and safety related systems which include:

- Checking of safety related operating conditions
- Visual inspection of safety equipment.
- Preparation of a maintenance plan and documentation of maintenance work specifying different maintenance intervals and the type of work to be performed.

The organization of the EMT are as the following figure and the main duty of the affairs staff is

- Implementation of the plan
- Implementation of the plan's schedule assurance
- Regular report promotion status and
- Communication of contact matters

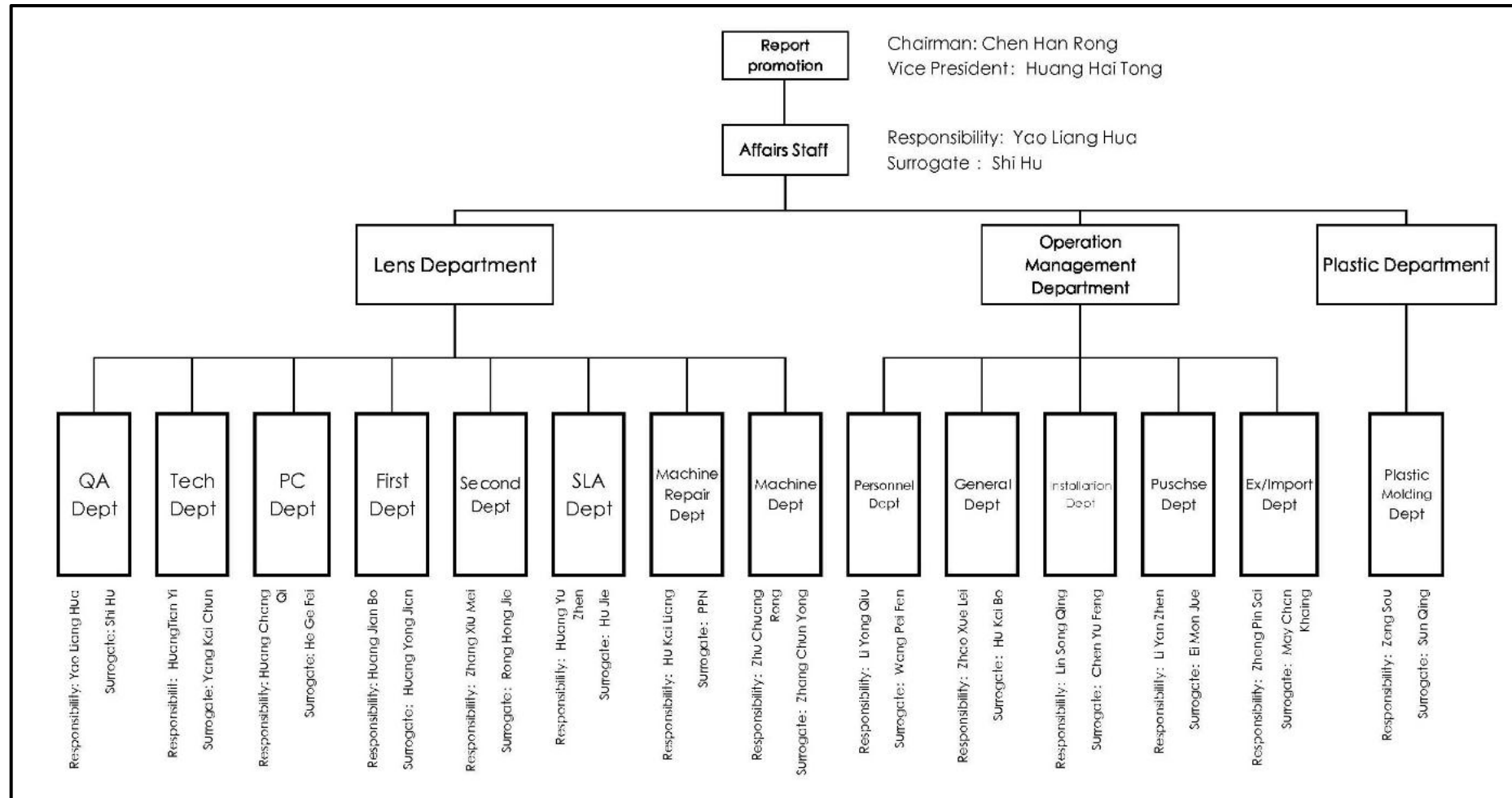


Figure 8-1 Organization Chart of the Environmental Management Team

## 8.4 Chemical Management Plan

### 8.4.1 Registration, Registry of Chemical / Hazardous Substances and SDS

All hazardous chemicals, which are produced, stored, used or handled, need registration with local agencies. MAOI will ensure permit or license to obtain the permit of procurement, storage and use. MAOI will maintain a daily registry of inventory of the chemical / hazardous substances for production.

All hazardous substances must have safety data sheet (SDS). A master-list of SDS for all hazardous substances that are produced, stored, used or handled are registered by individual department and submitted to Administrative Officer for compilation.

Respective work area will maintain a file containing all SDS of the hazardous substances used in the area. SDS can point identification of substance and the company, hazard identification, composition of ingredients, first aid measures, fire-fighting measures, accidental release measures, handling and storage, exposure controls and personal protection, physical and chemical properties, stability and reactivity, toxicological information, ecological information, disposal considerations, transportation information, regulatory information and other information

There are 68 chemicals registered for operation and SDSs are attached in **Appendix 10**. The chemicals used in MAOI factory are listed in **Table 4-7** of **section 4.7.2**.

### 8.4.2 Labeling and Warning Signs

#### Labeling

- ❖ All packed containers containing hazardous chemicals shall be labeled in accordance with GHS (Globally Harmonized System).
- ❖ The label will indicate the identity of the chemical, its hazards and the precautions to take.
- ❖ Original labels may only be removed or modified in that container which is no longer to be used for holding that hazardous substance and has been emptied and cleaned to remove any residual substance

#### Warning Signs

According to WSH (Workplace Safety and Health) Law all employees who are required to handle the hazardous substances must be aware of the hazards and the precautionary measures.

- ❖ Warning signs or notices specifying the nature of the danger of the hazardous substances will be prominently displayed in areas where such substances are used or handled.

### 8.4.3 Handling

- ❖ Avoid aerosol formation
- ❖ Wear suitable protective clothing and eye/face protection.



- ❖ Avoid contact with the skin, eyes and clothing.
- ❖ Keep container tightly sealed.
- ❖ Ensure that there is no crystallized product in the container before use.
- ❖ Processing machines must be fitted with local exhaust ventilation.

Protection against fire and explosion:

- ❖ Risk of self-ignition when a large surface area is produced due to fine dispersion.
- ❖ Soiled textiles / cleaning rags / adsorbents and Silica are capable of self-ignition and should be wetted with water and must be disposed of in a safe manner.
- ❖ Take precautionary measures against static discharges.

Avoid all sources of ignition:

- ❖ Heat, sparks, open flame. If exposed to fire, keep containers cool by spraying with water.

#### **8.4.4 Transportation**

Whenever hazardous substances are transported within or outside MAOI, precautionary measures should be taken to ensure that the potential risks are communicated to persons who will come into contact with the hazardous substances during transportation. This can be accomplished through

- ❖ Marking and labeling of packages or containers to indicate the hazards of the consignment.
- ❖ The relevant information can be included in the transport documents, and by placing or sticking placards on the transport units i.e., vehicles and containers. These labels should conform to the Prevention of Hazard from Chemical and Related Substances Rules.
- ❖ The vehicles should be equipped with appropriate firefighting appliances and
- ❖ Drivers should be trained in the safe transport of Hazardous Substance as well as in dealing with emergency situations.

Loading, unloading and transfer operations are prone to accidents, and should be managed properly.

- ❖ Safe work procedures (SWP) should also be established and carried out in order to avoid unnecessary risks.
- ❖ Control measures such as understanding of SWP and conducting RA (Risk Assessment) should be implemented to reduce the risks.

#### **8.4.5 Storage**

- ❖ All hazardous substances will be stored separately.
- ❖ Installed fire extinguisher.
- ❖ Flammable substances must be stored in cool condition and away from the direct sunlight.
- ❖ All hazardous substances inventory must be maintained to-date. (e.g., Daily Production Report and Chemical inventory list).

- ❖ Design of storage facilities are based on statutory requirements, safety data or other technical information (International standards should be followed where applicable).



Figure 8-2 Chemical Storage Area in Factory-1

#### 8.4.6 Identification of Hazardous Chemicals

Most of the chemicals used in this factory are solvents and pigments. Some of the pigments and solvents used in the solvent-based paints are hazardous.

Table 8-3 Identification of Hazardous Chemicals

Sr. No.	Commodity Name	Physical Appearance	Hazardous Identification		Type of Work Used
			Non-Hazardous	Hazardous	
1.	Acetone	Transparent liquid	-	✓	Centering reprocess, painting process, mold maintenance
2.	Adhesive OP-1030M	Viscous liquid	✓	-	Cementing
3.	Adhesive OP-1030Z	Viscous liquid	✓	-	Cementing
4.	Adhesive OP-1903R	Transparent viscous liquid	-	✓	Cementing
5.	Adhesive OP-1030K	Viscous liquid	✓	-	Cementing
6.	Adhesive RW99 No.2	Combustible blackish brown solid	-	✓	KCG process
7.	Adhesive, Acrylic Resin 5515	Clear liquid	-	✓	Cementing

Sr. No.	Commodity Name	Physical Appearance	Hazardous Identification		Type of Work Used
			Non-Hazardous	Hazardous	
8.	Adhesive, Acrylic Resin 5518	Clear liquid	✓	-	Cementing
9.	Adhesive, UV Curable Acrylic Resin 8807L	Clear liquid	✓	-	Cementing
10.	Aluminium oxide $Al_2O_3$	White solid	✓	-	Coating process
11.	AMBERJET™ 1000 Na Resin	Beads	✓	-	Pure water treatment
12.	AMBERJET™ 4200 Cl Resin	Beads	✓	-	Pure water treatment
13.	Anti-corrosion and Scaling Agents	Liquid	-	✓	Cooling tower
14.	Bees Wax	Solid	✓	-	Centering process
15.	Cleaning Agent	Light yellow	✓	-	Cleaning process
16.	Cleaning Agent	Transparent Liquid	✓	-	Cleaning process
17.	Cleaning Agent	Light yellow	✓	-	Cleaning process
18.	Cleanser (Methylene Chloride)	Clear, colorless liquid	-	✓	Cleaning process
19.	Calcium Carbonate	Solid	-	✓	Cleaning process
20.	Cutting Fluid	Liquid	-	✓	Grinding / SC grinding
21.	Cutting Liquid (Green cut), Water Soluble Grinding Fluid	Green Transparent Liquid	-	✓	Grinding / SC grinding
22.	Cutting Oil	Liquid	-	✓	Grinding / SC grinding
23.	Cutting Oil	Colorless .Transparent .Liquid	✓	-	Centering reprocess
24.	Cenoflex 2621	Black volatility Liquid	-	✓	KCG process /centering cutting reprocess
25.	Deinking Agent	Yellow transparent liquid	-	✓	Centering reprocess
26.	Detergent SAT-686	Clear Liquid	-	✓	Cleaning process
27.	Chloroprene Rubber Solvent A-521	Thixotropic Liquid	-	✓	Polishing process
28.	Diethyl Ether	The substance is a liquid at 20 °C and 1013 hPa	-	✓	Centering reprocess, painting process, coating process

Sr. No.	Commodity Name	Physical Appearance	Hazardous Identification		Type of Work Used
			Non-Hazardous	Hazardous	
29.	EPOLLA #2000 BLACK A Liquid	Black Liquid	-	✓	Painting process
30.	EPOLLA #2000 SM B Liquid	Milky white	-	✓	Painting process
31.	EPOLLA #2000 Thinner	Colorless Transparent Liquid	-	✓	Painting process
32.	Ethanol (Denatured Ethanol)	Clear colorless liquid	-	✓	Centering reprocess, painting process, coating process, cleaning PVC Boxes
33.	Film-stripping Agent	-	✓	-	Cleaning process
34.	Glycerin	Transparent Liquid	-	✓	Cleaning process
35.	Glue Removing Agent	Yellow Oil	✓	-	Cementing process
36.	Hardener GT-7 II B	Pale yellow, opaque liquid	-	✓	Painting process
37.	Isopropyl alcohol	Clear colorless liquid	-	✓	Cleaning process
38.	Magnesium Fluoride	Whit Granules	-	✓	Coating process
39.	Norland Optical Adhesive 61	Translucent paste	-	✓	Cementing process
40.	Paint GT-7 II A	Black liquid	-	✓	Painting process
41.	Paint FASTITE No.140 (N) TL1 Black	Black liquid	-	✓	Painting process
42.	Paint (Lens coating Black B No.3)				
43.	Photo Bond #150	Black liquid	-	✓	Cementing process
44.	Photo Bond #300/300K	Yellow Liquid	-	✓	Cementing process
45.	Polishing Liquid	Yellow Liquid	-	✓	Polishing process
46.	Polyacrylamide	Colorless Pink	-	✓	Sewage treatment
47.	Polyaluminium Chloride	White powder	✓	-	Sewage treatment
48.	Vacuum Pump Oil	Yellow granular or powdered solid	-	✓	Coating process
49.	Vacuum Pump oil (Lubricant)	Yellow light liquid	-	✓	Coating process
50.	Diffuse Pump Oil	Liquid	✓	-	Coating process
51.	NT Silane Coupling Agent				Painting process

Sr. No.	Commodity Name	Physical Appearance	Hazardous Identification		Type of Work Used
			Non-Hazardous	Hazardous	
52.	Rare Earth Polishing Powder	Brown Powder	✓		Polishing process
53.	Rare Earth Polishing Powder	White Powder	-	✓	Polishing process
54.	Shin-Etsu Silicone	Milk-white paste	-	✓	Cementing process
55.	Silica Scale Cleaning Agent	Colorless transparent smoke liquid	-	✓	Cooling tower
56.	SX-Lubricant for Glass Glazing	Liquid	-	✓	Centering reprocesses
57.	Surfclear 100	Solid	-	✓	Coating process
58.	Silicon Dioxide	Solid	✓	-	Coating process
59.	Thinner GT-7 II	Colorless and transparent liquid	-	✓	Painting process
60.	Thinner (Lens YOU B Thinner)	White solid	-	✓	Painting process
61.	Thinner No.2350 (90-7309)	Liquid	-	✓	Painting process
62.	Zirconium dioxide	Colorless and transparent	-	✓	Coating process
63.	Zirconium Titanium Oxide	Colorless liquid	-	✓	Coating process
64.	Paraffin Wax	Black brown solid	✓	-	Centering reprocesses
65.	Cutting Fluid	White solid	-	✓	Centering reprocesses
66.	Norland Optical Adhesive 63	Liquid	-	✓	Cementing
67.	Ink	Liquid	✓	-	Painting process
68.	Deinking Agent				Painting process

#### 8.4.7 Chemicals Risk Control Measure

It is imperative to conduct risk analysis for all the projects where hazardous materials, either as raw material or the product are handled. In regard to chemicals, a hazard is a set of properties that are associated with the chemical that may cause adverse effects to organisms or the environment.

Hazardous chemicals pose many risks upon the people, property and environment of the workplace and it is very important that a methodical risk management process is in place to mitigate the risks associated with hazardous



chemicals. The risk assessment is required for use and storage of large quantities of hazardous substances to establish health and safety zones to prevent knock-on effects of neighboring hazardous installations and protect the public from fire, explosion, toxic fumes dispersal hazards, detrimental effects on health and chemical contamination.

### **Administrative Control**

No hazardous substances or dangerous goods is authorized to be purchased or used.

- The proposed uses and storage of each substance has been risk assessed and approved in accordance with national rules and regulation.
- The risk assessment is documented and its recommendations for management are implemented through incorporation into standard operation procedures and other internal documents, where appropriate.
- Chemicals and fuels are reassessed based on the certain conditions and/ or changes.
- Control measures identified by the risk assessments are to be implemented.
- Where a significant risk is identified, the control measures must be implemented prior to use of the chemicals.
- Labeling is an important control measure for the transportation, storage, handling and disposing of chemicals. All containers of chemicals, products and waste materials are to be labeled correctly.

Furthermore, dangerous goods cabinets are to be kept in good condition and appropriately signed. The following requirements must be met or exceeded.

- Storage base is impermeable
- Storage is away from storm-water drains, pits and surface waters
- Storage is undercover, wherever practicable and
- Equipment is in place to allow immediate recovery of spilt material.
- Installation of adequate firefighting system.
- Spill kits are to be regularly checked to ensure they are restocked in a timely manner. The type of spill kits prescribed is to be appropriate for the chemicals, fuels and classes of dangerous goods stored at the location.

### **Engineering Control**

MAOI has installed the pollution control facilities. There are:

- (1) Wastewater treatment plant for the industrial wastewater quality control
- (2) Septic tanks for the domestic wastewater quality control
- (3) Fire extinguishers, hose reel, hydrant, alarm system, smoke detector and automatic firefighting pump for the fire protection.

### **Safe Work Procedures (SWP) and Personal Protective Equipment (PPE)**

The Head of Sections and Supervisors (Person In-charge) are responsible to develop and maintain the SWP, but employees executing the works are to report for

any work deficiency in the SWP for continuous improvement purposes. It includes the safety and health precautions, which are to be taken during the course of work, and the use of personal protective appliances.

The primary objective of using PPE is to protect the employees against the entry of hazardous chemicals into the body through inhalation or through skin contact. It is supplementary to engineering control measures. PPE should be selected appropriate to the hazardous nature of the chemical operation, and should be properly used and maintained. Inappropriate PPE, or PPE improperly used or maintained may do more harm than good.

MAOI's Management are responsible for ensuring their employees are provided with appropriate PPE and received appropriate training in the use, maintenance and replacement of the PPE.

#### **8.4.8 Training**

All employees and contractors in MAOI undergo an internal orientation training (ref. General safety, Environmental & Security Rules for Staff and Contractors) that includes a brief explanation of the plant process, information on the hazardous substances manufactured/used in MAOI and OSH requirements in MAOI. All employees who work in the field must attend the available equivalent course of Safety Orientation Course (SOC) or Safety Supervisor Course (SSC) and undergo an OJT with mentoring before being assigned to work with such chemicals. SDS is used as the basis for employees and contractors who handle hazardous substances or may be potentially affected by it and the information includes the hazards, procedures for safe handling, minimizing exposure and first aid.

#### **8.4.9 Waste Disposal**

- ❖ All Managers/Department Head/Supervisors shall be responsible for ensuring that all hazardous substances are disposed in an appropriate manner as required by regulations and the SDS.
- ❖ Improper handling of waste may cause pollution and endanger the safety and health of the workers.
- ❖ Work practices and procedures shall comply with local regulations or EMP report for the disposal of solid, liquid and/or gas wastes.
- ❖ Documentation must be maintained for waste collection, storage, recycling / disposal and frequency in each of the waste categories identified, if available.
- ❖ All employees will be provided with suitable PPE that will adequately control exposure to injury or harm from waste material.

The hazardous waste that generate from operation shall be governed by a hazardous waste management system. This includes:

- ❖ proper labeling of waste according to the national codes
- ❖ proper waste
- ❖ storage and treatment facilities
- ❖ proper waste transport
- ❖ disposal facilities by licensed or toxic waste collectors, and

- ❖ proper emergency action plan to deal with any accidental release of hazardous waste.

#### 8.4.10 Emergency Preparedness

- ❖ For emergency environmental incidents, the Emergency Preparedness plan is to be followed.
- ❖ Spills, leaks or inadvertent resulting in soil, surface or groundwater contamination shall be immediately reported, managed and /or remediated in accordance with the MSDS.
- ❖ Location and installation of storage and handling systems should be designed for safety (e.g. racking systems, tanks).
- ❖ Incompatible substances should be stored separately to prevent reactive chemicals interacting.
- ❖ Potential ignition sources must be away from flammable substances.
- ❖ Appropriate safety signage and placards must be displayed.
- ❖ Spill containment and clean up systems must be ready
- ❖ Emergency plans must be in place to deal with an incident involving the hazardous chemicals
- ❖ The appropriate personal protective equipment (PPE) must be provided and stored correctly (e.g. respirators sealed).
- ❖ Fire-fighting equipment must be easily accessible.



Figure 8-3 Systematically Storage of Chemicals

#### 8.4.11 Emergency Response Plan (ERP) for Chemical Leakage / Spillage or Fire Hazards in MAOI

The ERP is focused on emergency preparedness and action taken in the event of chemical leakage / spillage or fire outbreak in MAOI. In order to minimize injury to personal, damage to property and environment impact, the ERP will be reviewed annually or upon any major changes in practice and facility and updated as required.

## 9.0 EMERGENCY PLAN

A clearly defined emergency response and preparedness policy will be developed and brought to the proposed project. An effective response is seen as the direct outcome of quality environmental management and comprehensive training and awareness of safety procedures.

The principal objective of emergency preparedness is to localize accidents, and if possible, contain and minimize them. The proposed development will have an Emergency Response Plan, which will provide guidelines to allow for flexible response to a range of potential circumstances. The plan would include:

- Chain of command and coordination procedures
- Lines of communication
- Means of obtaining needed information and assistance

Copies of the plan or relevant portions will be strategically located at vantage points across the property to allow for immediate access. All employees will receive safety and emergency response training as a part of the initiation process.

### 9.1 Emergency Management Team

The emergency management includes measures that provide for the safety of personnel, property and facilities. Elements of emergency management plan are fire hazard, natural hazard, food toxic, contagion, chemical hazard, transportation accident, earthquake, tsunami, and emergency accident.

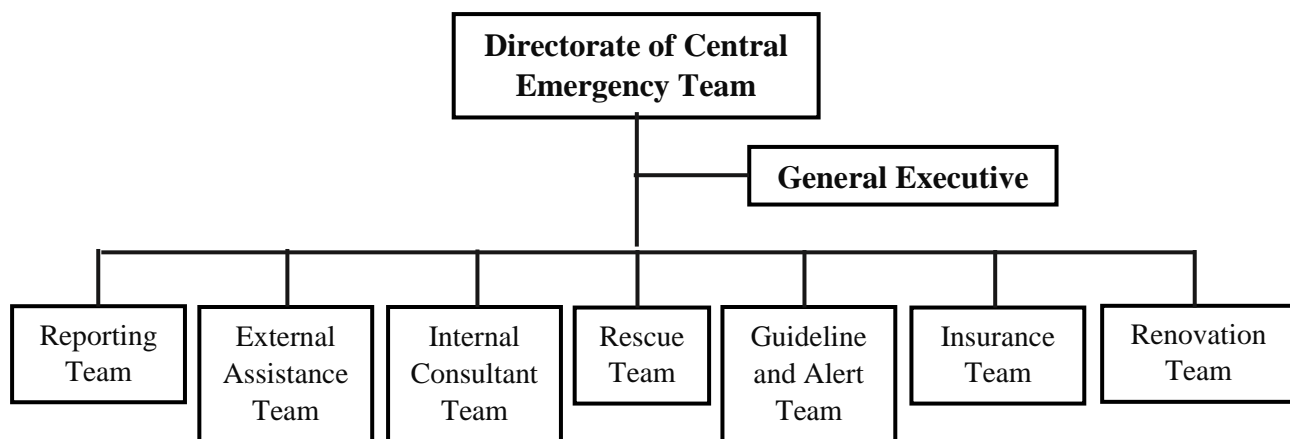


Figure 9-1 Organization Chart of Emergency Management Team

Table 9-1 Duties of the Emergency Management Team

Sr. No.	Position	Duties/Responsibilities
1.	Directorate of Central Emergency Team	<ul style="list-style-type: none"><li>➤ To decide the emergency case</li><li>➤ To do the emergency prevention</li><li>➤ To solve the problems of employees and to safe the property and loss</li></ul>
2.	Reporting Team	<ul style="list-style-type: none"><li>➤ To report the central department first and then the emergency</li></ul>

Sr. No.	Position	Duties/Responsibilities
		conditions are distributed to each department if any emergency case
3.	External Assistance Team	➤ To contact the government organizations and fight the emergency case corporation with them if unsolved problems by the MAOI' emergency department
4.	Internal Consultant Team	➤ To collect the information of emergency case
5.	Rescue Team	➤ To operate the emergency case, the difficult case and extension are solved by using the technology ➤ To safe the employees and property
6.	Guideline and Alert Team	➤ To leave from the emergency exit, to incorporate the rescue team and at the same time, normal cases are protected carefully
7.	Insurance Team	➤ To provide for insurance, transportation, communication and health care materials, regular insurance service for employees and even in emergency case, the regular operation for production and living
8.	Renovation Team	➤ To confirm the emergency case ➤ To operate to the original condition in time, ➤ To perform the normal production systematically ➤ To adjudicate the emergency cases ➤ To brief the experience and lesson ➤ To analyze the after-effect and employees are trained and demonstrated for the emergency protection plan

## 9.2 Emergency Response Plan

Health, safety and environmental (HSE) coordinator is responsible for the emergency response plan for the Occupational Health, Safety and Environmental program (OHSE) part. The emergency respond procedure should be listed as follows:

- ❖ Assemble the employees for the rescue operation and at the same time, help the relevant external departments and government organization.
- ❖ Record the emergency information to take the emergency rescue operation.
- ❖ Guide the right ways not to loss employees and property by the Human Resource department and supervisors.
- ❖ Negotiate the HR department and financial department to provide the insurance.
- ❖ Use the automatic alarm system to detect the emergency cases.
- ❖ Train the employees to protect and safe from the emergency cases.



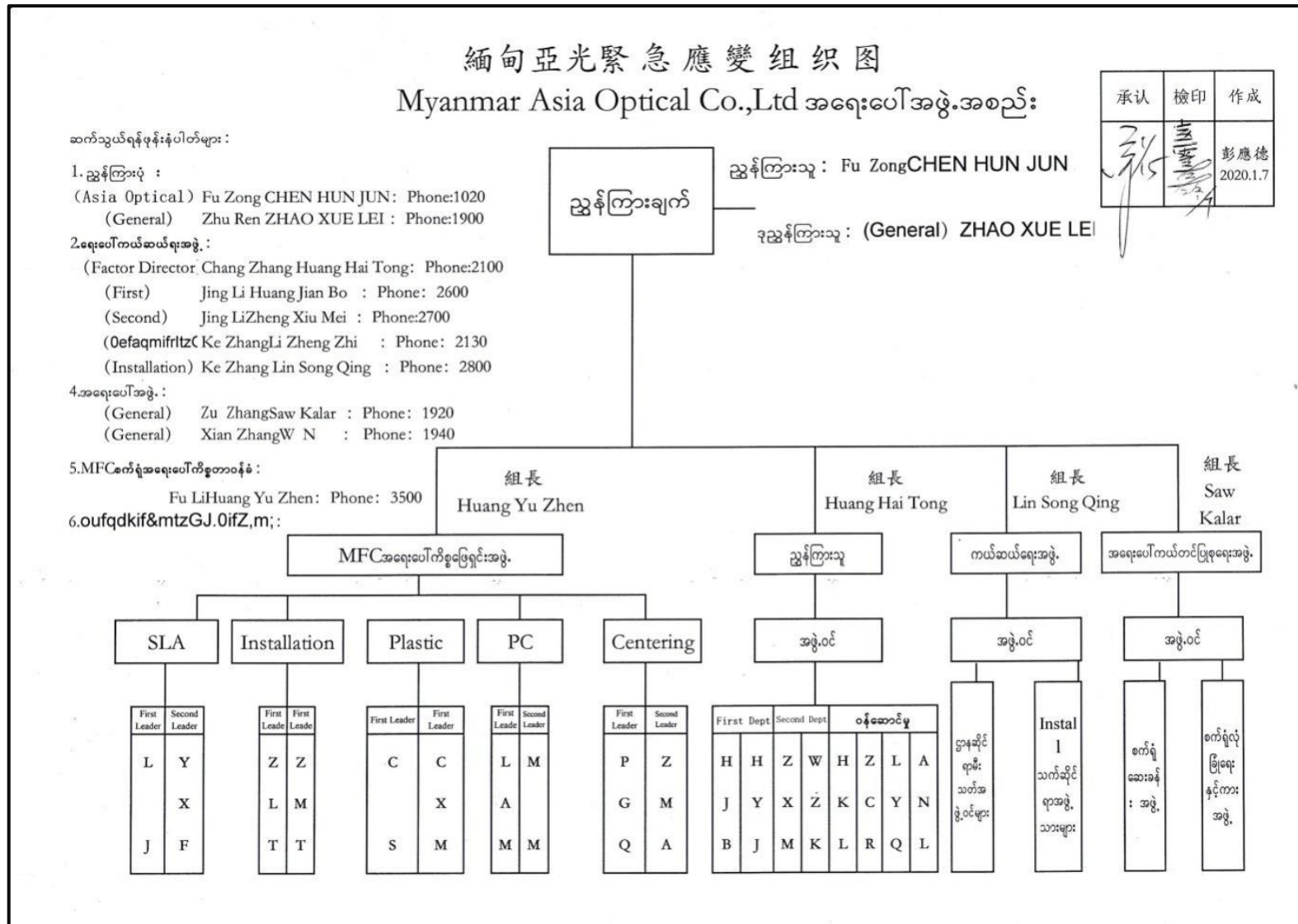


Figure 9-2 Emergency Response Team Organization Chart

### 9.3 Evacuation Routes

Evacuation routes maps have been posted in each work area. The following information is marked on evacuation maps.

- Emergency exists
- Primary and secondary evacuation routes
- Locations of fire extinguishers
- Fire alarm pull stations' location (e.g., Assembly points)

All the employees in the factory should know at least two evacuation routes. Each individual factory owner needs to take responsibility for ensuring the safety of his /her employees by taking adequate steps to rectify these problems. All buildings, including extensions to the factory, must meet legal standards and electrical equipment should be properly maintained. At the same time, they must ensure that managers, supervisors and workers are properly trained in fire and safety procedures; and that exit routes are sufficient for the number of workers employed in the factory. Factory gates should be kept unlocked at all times whenever workers are in the building.

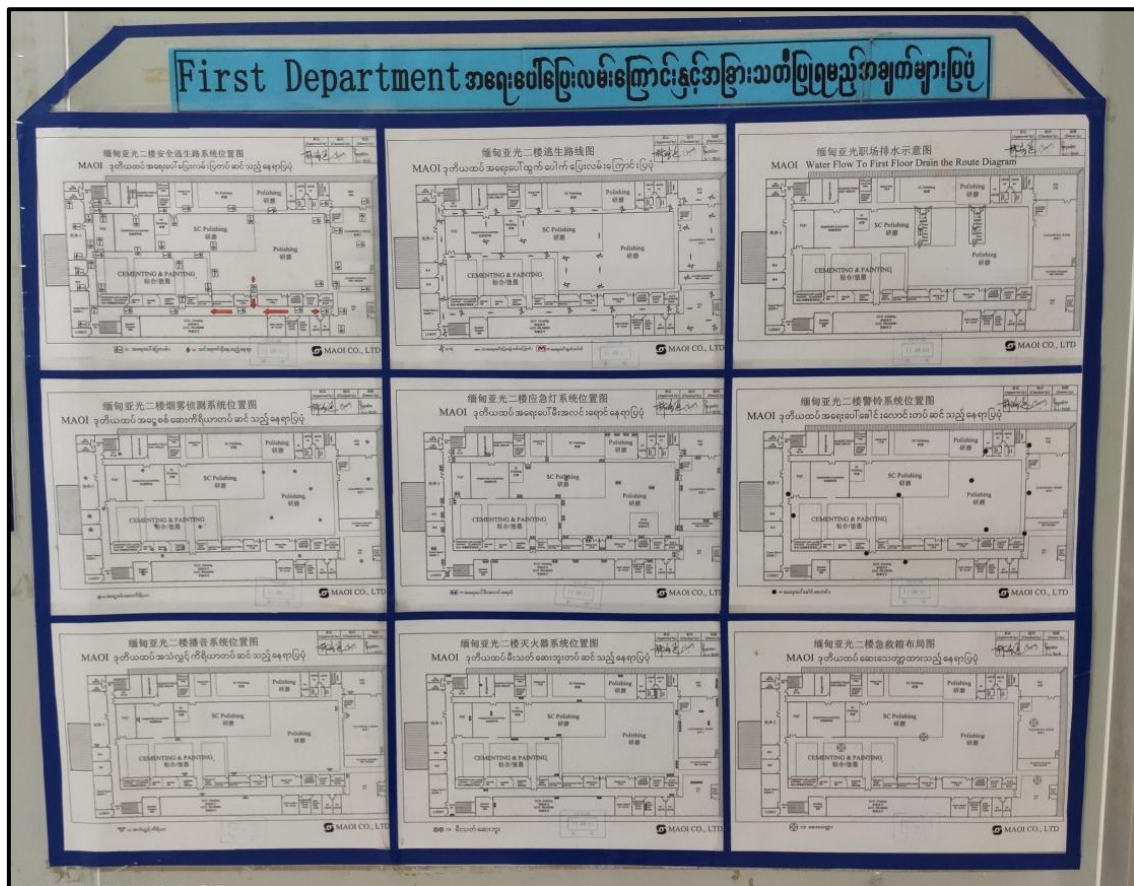


Figure 9-3 Emergency Routes Hanged up on the Wall

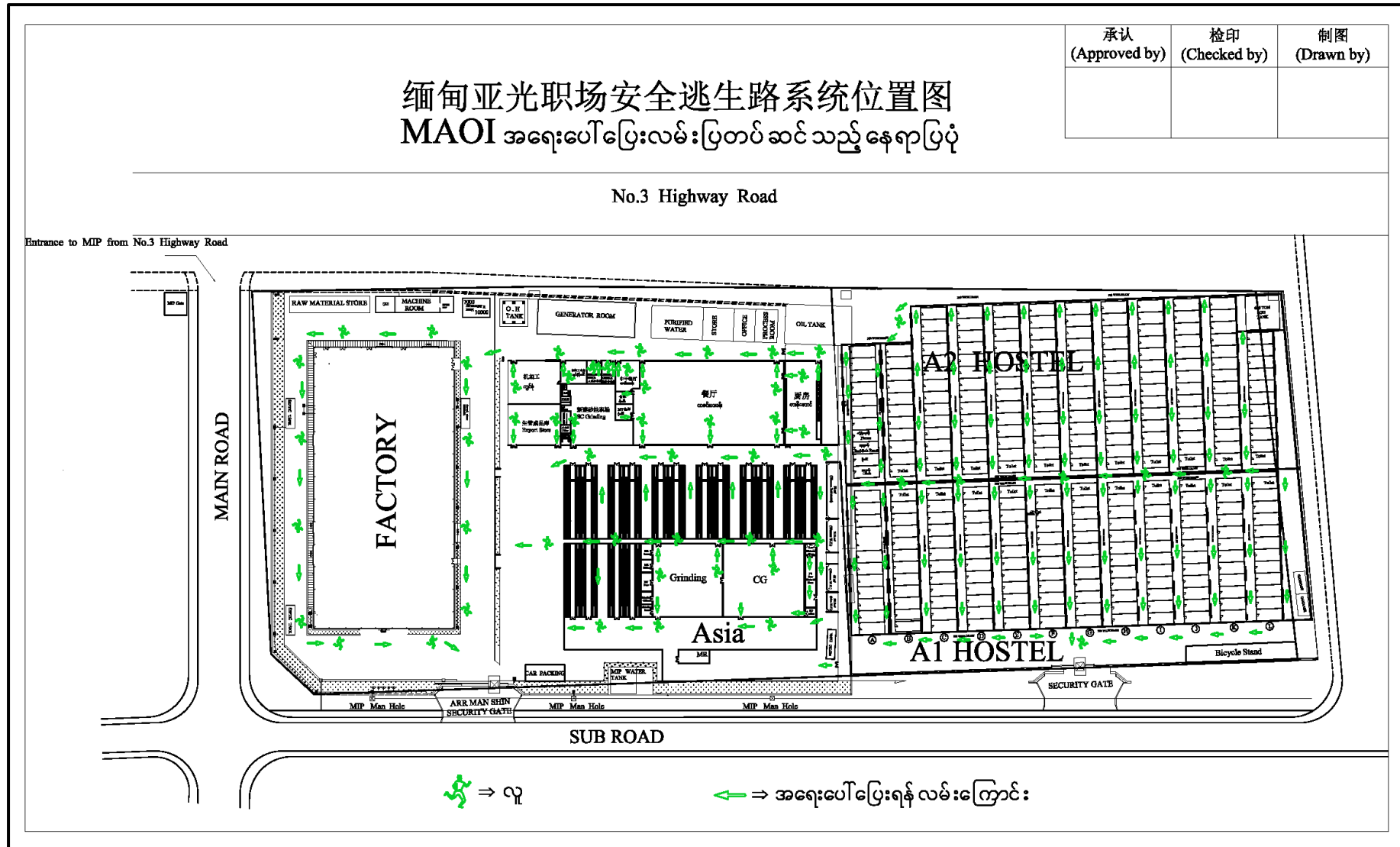


Figure 9-4 Emergency Route Map of Factory-1

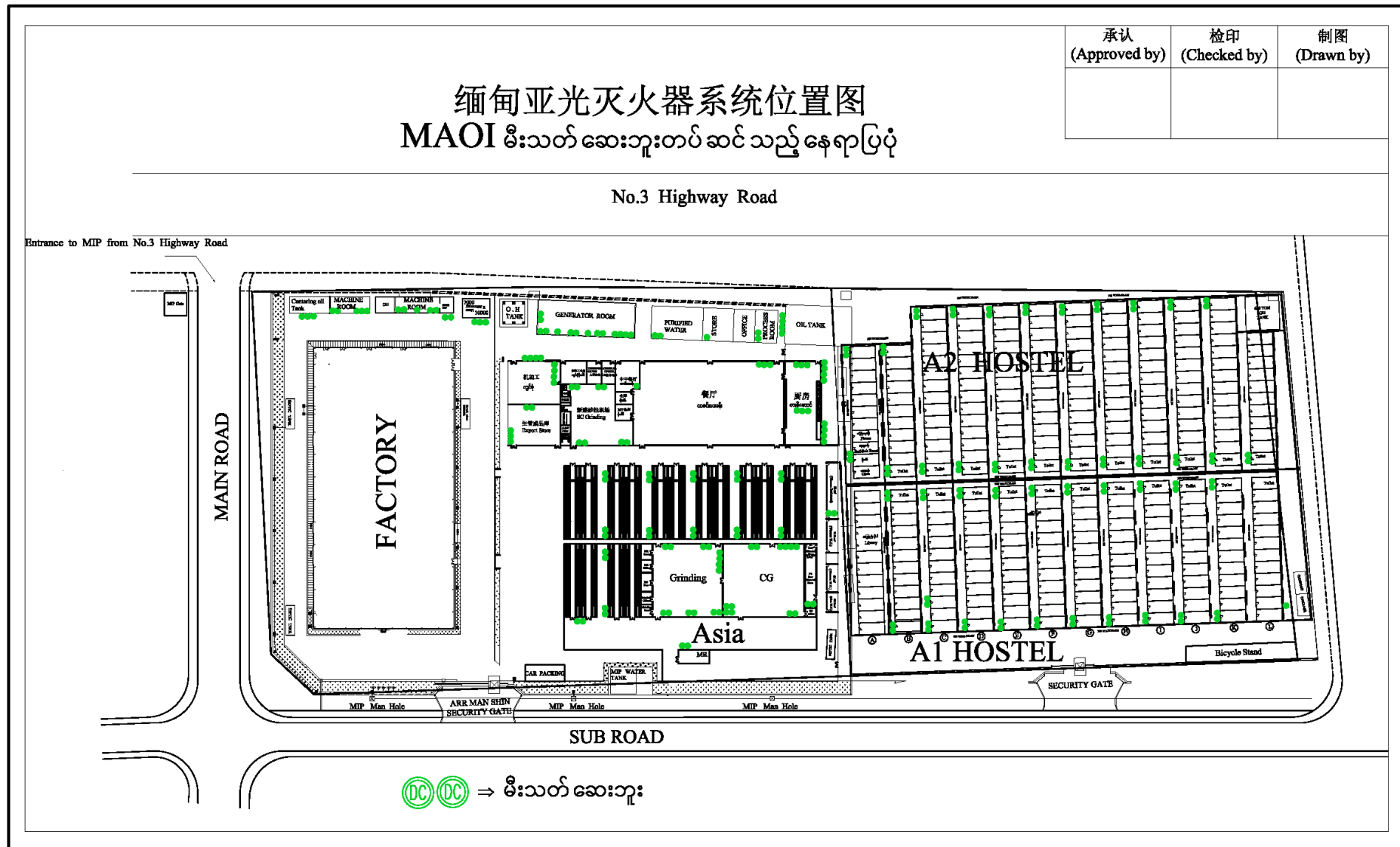


Figure 9-5 Fire Extinguisher Installed in Factory-1

## 9.4 Fire Emergency Plan

The factory has an emergency plan deals with any fire situation. The purpose of an emergency plan is to ensure that the people in factory premise know what to do if there is a fire and that the factory premise can be safely evacuated.

The factory gives clear and relevant information and appropriate instructions to their employees about how to prevent fires and what they should do if there is a fire.

- If the location of the fire is detected by a fire smoke detector, the security must immediately check.
- After receiving information from the Executive Steering Committee, go to the scene and report the incident to senior management of the company as soon as possible.

### 9.4.1 Organization and Responsibilities

The organization chart and their responsibilities of the fire emergency management team are as follow.

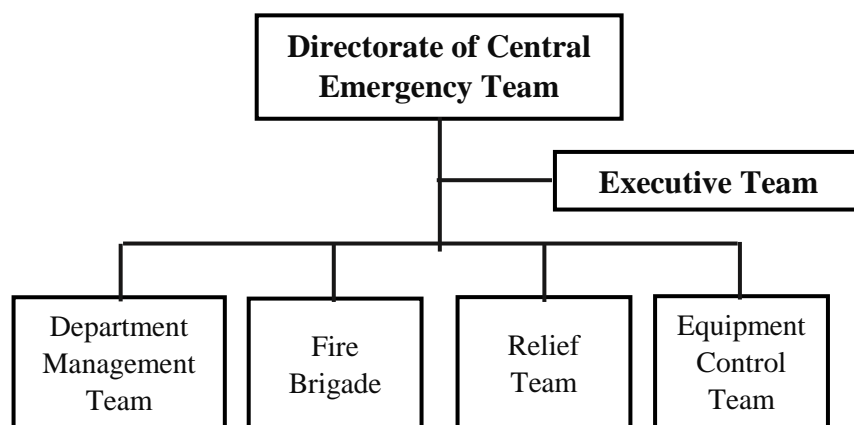


Figure 9-6 Organization Chart of Fire Emergency Management Team

Table 9-2 Duties of the Fire Emergency Management Team

Sr. No.	Position	Duties/Responsibilities
1.	Directorate of Central Emergency Team	<ul style="list-style-type: none"> <li>➤ To nominate significant decision and guidelines on large fire hazards</li> <li>➤ To confirm emergency plan deals with any fire situation</li> <li>➤ To start directive of fire hazards</li> </ul>
2.	Executive Team	<ul style="list-style-type: none"> <li>➤ The appointment and organization of designated supervisory employees to carry out fire safety duties</li> <li>➤ To check the fire safety plan and fire code when fire systems are in need of repair</li> <li>➤ To advise the fire department of the system status</li> </ul>
3.	Department Management Team	<ul style="list-style-type: none"> <li>➤ To arrange for the emergency plan to be issued to their employees, visitors, etc. to inform them what to do in the event of fire, particularly safe evacuation</li> </ul>
4.	Fire Brigade	<ul style="list-style-type: none"> <li>➤ To protect property in the event of fire and extinguish fire</li> </ul>
5.	Relief Team	<ul style="list-style-type: none"> <li>➤ To Rescue employees</li> </ul>



Sr. No.	Position	Duties/Responsibilities
		➤ To do relevant communication
6.	Equipment Control Team	➤ Oversee and arrange for the maintenance procedures of fire protection equipment and other electrical systems after occurring fire hazards

#### 9.4.2 Emergency Resolutions Procedure

The fire emergency resolutions procedure of the MAOI is described in the following chart.

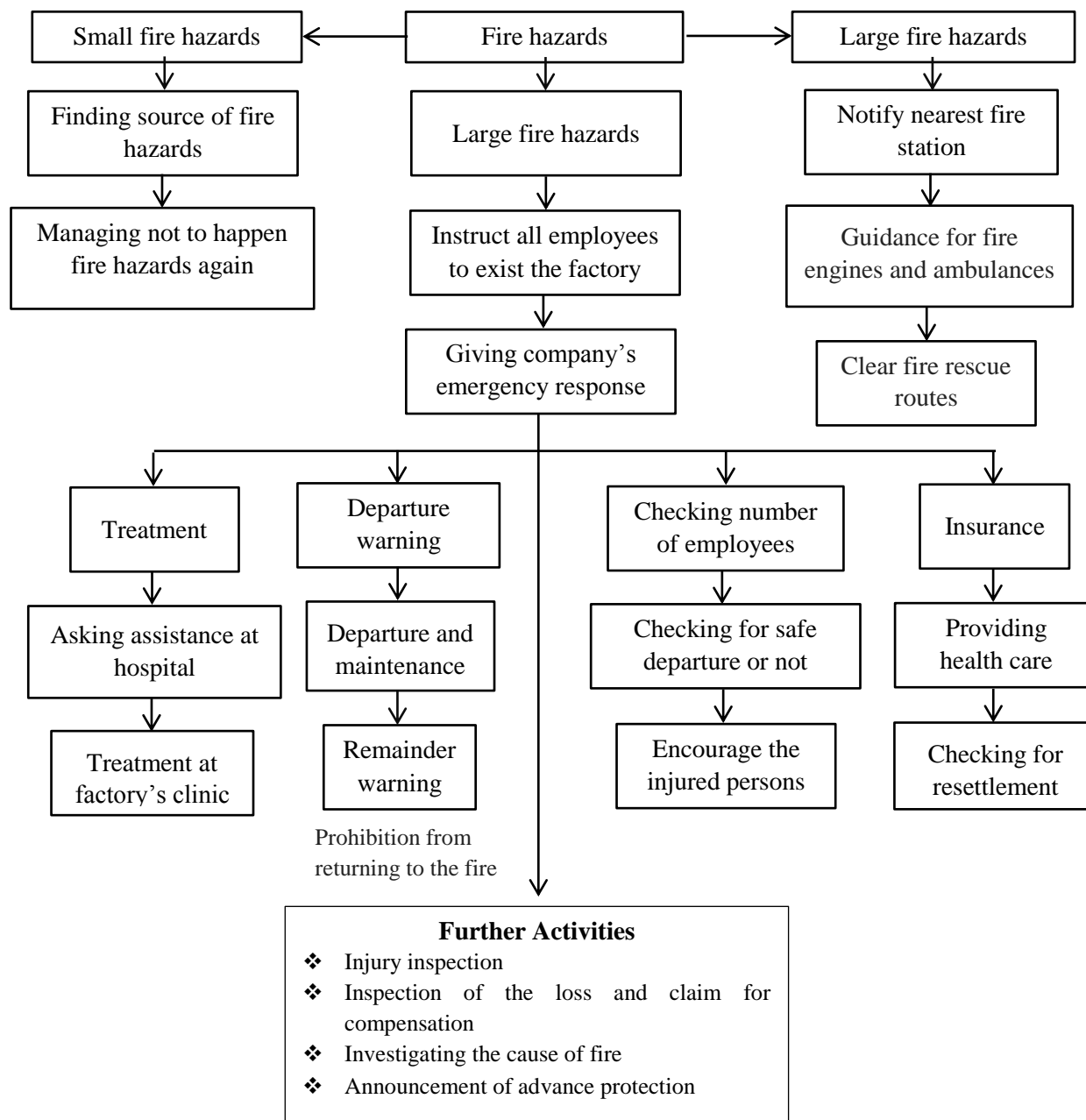


Figure 9-7 Fire Emergency Resolutions Procedure Flow Chart

### **Departure Activities**

- ❖ To evacuate employees from the fire as quickly as possible
- ❖ To guide clearly the runners by sound system
- ❖ To confirm all employees are safe from fire or not
- ❖ Not to take place robbery, must maintain the company's property
- ❖ To guide fire engines to the site of the fire

### **Fire Fighting Activities**

- ❖ Before firefighters arrive, fire extinguishers must be used to extinguish or control the scene of the fire.
- ❖ When firefighters arrive, employees must help to extinguish the fire.
- ❖ To rescue employees who are trapped in a fire
- ❖ To carry out company's property if you are safe from fire

### **First Aid Activities**

- ❖ To rescue the injured persons
- ❖ To report the injury status

### **Equipment Control Activities**

- ❖ After an accident, lights must be switched off and emergency lights must be lit.
- ❖ After confirming there is no people in the elevator, it must be stopped in a safe place and the lights must be switched off.

### **Troubleshooting Activity**

- ❖ After the fire, the Department of General Services is responsible for implementing the company's repairs.
- ❖ The pollution and wastes caused by fire must be collected and disposed as soon as possible.

### **Insurance Claim**

- ❖ After the fire, the fire department must immediately contact the insurance agency and conduct field inspections. Company's finance department shall carry out the insurance claim.

### **Investigation**

- ❖ The central directive team organizes investigation team to investigate the cause of the fire and to assess the consequences of the incident. If necessary, experts will be invited and investigated.
- ❖ Resolutions will be collected by the Department of General Affairs. The relative department will be notified by conference call or announcement.
- ❖ The Department of General Affairs will take the relative department and employees, discuss the accident and pre-planning not to happen again.

- ❖ The executive team shall cooperate fully in the judicial investigation and resolution of any government sponsored activities.

The company conducts firefighting demonstrations and emergency departure twice a year.

#### **9.4.3 Fire Fighting and Protection Measure**

- In every section of the factory, there shall be provided and kept in readiness adequate equipment for firefighting and protection.
- Each item of firefighting equipment shall be inspected and tested at appropriate intervals by a competent person. The date of the last inspection shall be entered in a logbook kept for that purpose.
- All the personnel employed in the installation shall be instructed on the use of firefighting equipment.
- Instruction to personnel in case of fire shall be clearly and concisely expressed in writing and prominently displayed on the site.
- "NO SMOKING" signs shall be conspicuously displayed at strategic locations in the factory and was highlighted in the case of identification in dull bright.
- Be alert around electrical equipment. If electrical equipment is not working properly or if it gives off an unusual odor - often the first sign of a problem that could cause a fire - disconnect the equipment and call an appropriate maintenance contractor.
- Whenever a fire or any accident occurs in the installation, notify the nearest fire station.

The diagram below illustrates the color coding of fire extinguishers (so it should be printed in color) and can be used as a guideline for Fire Extinguisher selection.











Symbols found on fire extinguishers & what they mean						
		Water	Foam spray	ABC powder	Carbon dioxide	Wet chemical
Wood, paper & textiles 		✓	✓	✓	✗	✓
Flammable liquids 		✗	✓	✓	✓	✗
Flammable gases 		✗	✗	✓	✗	✗
Electrical contact 		✗	✗	✓	✓	✗
Cooking oils & fats 		✗	✗	✗	✗	✓

Figure 9-8 Selection Guidelines for Fire Extinguishers

#### 9.4.4 Fire Fighting Equipment

Firefighting equipment can reduce the risk of a small fire, e.g. a fire in a waste-paper bin, developing into a large one. The safe use of an appropriate fire extinguisher to control a fire in its early stages can also significantly reduce the risk to other people in the factory premise by allowing people to assist others who are at risk. The equipment will need to comprise enough portable extinguishers that must be suitable for the risk.





Figure 9-9 Firefighting Equipment Used in Factory-1

The following requirements must be considered for installing firefighting equipment:

- **Location** – smoke detectors, sprinklers, fire extinguishers and hoses are to be placed in readily accessible locations and in all areas where risk of fire is likely.
- **Access** - clear access is always to be maintained around fire extinguishers and hoses.
- **Signage** - signage is to be provided at each location, indicating the type of fire extinguisher and fire types that they are suited for.
- **Mounting** - fire extinguishers are to be mounted on purpose-made hooks or brackets and suspended above the floor.
- **Inspection** - fire extinguishers are to be inspected and serviced every six months.

#### (a) Signs

Signs must be used, where necessary, to help people identify escape routes and find firefighting equipment. Where the locations of escape routes and firefighting equipment are readily apparent and the firefighting equipment is visible at all times, then signs are not necessary. In all other situations it is likely that the fire risk assessment will indicate that signs will be necessary.





Figure 9-10 Photos of Emergency Exit Way

**(b) Notices**

Notices must be used, where necessary, to provide the following:

- Instructions on how to use any fire safety equipment;
- The actions to be taken in the event of fire; and
- Help for the fire and rescue service (e.g. location of electrical cut-off switches)

All signs and notices should be positioned so that they can be easily seen and understood.



Figure 9-11 Photos of Notices

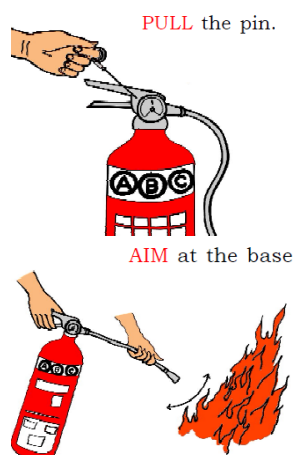
**(c) Positioning of Escape Signs**

The presence of other signs in factory such as employees' notices can distract attention from, or obscure the visibility of, escape signs. This could affect people's ability to see and understand escape signs, particularly if there is a fire evacuation. Escape signs should meet the following criteria:

- ❖ They should provide clear, unambiguous information to enable people to safely leave a building in an emergency.
- ❖ Every escape route sign should, where necessary, incorporate, or be accompanied by, a directional arrow. Arrows should not be used on their own.
- ❖ If the escape route to the nearest exit is not obvious then it should be indicated by a sign.
- ❖ Signs should be positioned so that a person escaping will always have the next escape route sign in sight.
- ❖ Escape signs should be fixed above the door in the direction of escape and not be fixed to doors, as they will not be visible if the door is open.
- ❖ Signs mounted above doors should be at a height of between 2.0 m and 2.5 m above the floor.
- ❖ Signs on walls should be mounted between 1.7 m and 2.0 m above the floor.
- ❖ Signs should be sited at the same height throughout the escape route, so far as is reasonably practicable.

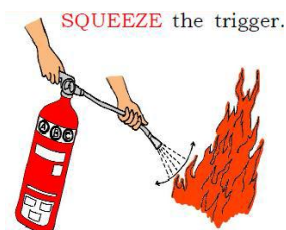
**9.4.5 Operating a Fire Extinguishers**

Fire extinguishers should be only used if safe and if trained to do so. Even though extinguishers come in a number of shapes and sizes, they all operate in a similar manner. To employ the extinguisher with proper technique, just remember the acronym "**PASS**."



**P** - Pull the pin at the top of the extinguisher that keeps the handle from being accidentally pressed.

**A** - Aim at the base-not the flames. This is important-in order to put out the fire, you must extinguish the fuel.



**S** - Stand approximately 8 feet away from the fire and squeeze the handle to discharge the extinguisher. If you release the handle, the discharge will stop.



**S** - Sweep the nozzle back and forth at the base of the fire and then move towards the fire once it starts to diminish.

After the fire appears to be out, watch it carefully since it may re-ignite! Be sure to read the instructions on your fire extinguisher different fire extinguishers recommend operating them from different distances.

### Precautions for Using Fire Extinguishers

1. Ensure that you use the correct extinguisher.
2. Always keep an emergency exit behind you. (Away from the fire)
3. Stay low to avoid the effects of smoke/heat.\
4. Direct extinguisher stream at base of flames.
5. Move stream in a side to side, sweeping motion.
6. If the fire gets to the point where you can no longer able to control it, retreat and close the doors. (Do not lock)

Fires have been classified into six categories involving different substances:

- **Class A**, combustible carbon-based solids e.g. paper, wood or textiles
- **Class B**, flammable liquids e.g. paraffin, petrol, diesel or oil (but not cooking oil)
- **Class C**, flammable gases, e.g. butane, propane or methane
- **Class D**, burning metals, e.g. aluminum, lithium or magnesium
- **Fires caused by electrical equipment** (indicated by an electric spark symbol and not the letter E)
- **Class F**, fats and cooking oils.

### Types of extinguishers to use

- Class A fires – water, water mist, foam, dry powder, wet chemical
- Class B – water mist, foam, dry powder, CO<sub>2</sub>, some wet chemical
- Class C – water mist, dry powder
- Class D – specialist dry powder
- Electrical – water mist, foam, CO<sub>2</sub>
- Class F – water mist, wet chemical.

## 9.5 Emergency Medical Services

### 9.5.1 Health Care in the Factory

Staffs are the company's most important asset. The protection of the health of workers is the greatest responsibility of MAOI.

The MAOI has on-site medical services. Factory-paid nurses may be pressured to prioritize production over improving workers' health. Without adequate care, minor illnesses or injuries can become major problems. The factory owners care and support for injured workers and also pay medical costs for those injured on the site. They also support the health education because it reduces worker illness, absence and turnover and so increases worker productivity.



Figure 9-12 Clinic in Factory Compound

### 9.5.2 First Aid and Emergency Care

It is important that every workplace has first aid supplies and provides training to help themselves and others response to emergencies. Trainings are happening regularly.

First aid supplies are kept in safe, clean places throughout the factory. Workers are able to access them easily. The first aid kits include materials to treat common injuries such as burns, cuts, falls, and other minor injuries. Workers and supervisors are trained in how to do first aid and stabilize and injured person until they can get to help.

### 9.5.3 Women Workers and Women's Health

Most of the workers in factory are women. Their health needs are not considered part of basic care and occupational health. Since many chemicals affect



women's reproductive systems, pregnant workers are paid leave to care for problems with the mother's health and with the baby.

## **9.6 Occupational Health and Safety System**

The company is concerned with the health, safety and environment protection. The company will formulate and develop an "Occupational Health & Safety System" to ensure good health and safety of its employees.

The following key safety measures shall be a part of the Health & Safety system of the company and shall be followed:

- Safety Training shall be provided to the employees.
- Safety Sirens with Alarm System in case of emergency shall be provided.
- Fire Extinguishers shall be provided.
- Mock drills shall be periodically conducted and factors like response time shall be evaluated.
- First Aid Facility and training shall be provided.
- PPEs shall be provided to the employees.
- Health check-ups shall be organized at regular intervals.
- Safety/Health records and MSDS shall be maintained.

### **9.6.1 Occupational Health Surveillance Programme**

Occupational Health Surveillance (also termed as medical surveillance for employees) constitutes an important component in efforts to protect and improve employees' health. It is the systematic collection, analysis, and dissemination of disease data on groups of employees and is designed to detect early signs of work-related illness. A well-run medical surveillance program can aid in the early recognition of a relationship between exposure to a hazard and disease, in the assurance of the safety of new substances, and as an indicator of the effectiveness of existing control measures.

As a vital control measure, medical surveillance employs the use of questionnaires, physical examinations, ancillary testing, and biologic monitoring. Effective use of biologic monitoring – that is, the testing of various body specimens for the toxic substance itself, its metabolites, or physiologic dysfunction. The Factories Act, 1948 and the rules framed there under provide for pre-employment and periodical medical examinations of workers employed in industries with hazardous processes and dangerous operations.

### **9.6.2 Industrial Accidents Survey Management**

The occurrence of industrial accidents caused directly or indirectly employee of life or property damage, from small wound, e.g. skin broken, to large casualty. And that also demonstrate the loophole in the management or design. By managing the accidents investigation, MAOI can find out the cause root, and then make countermeasures to prevent or reduce the risk of reoccurrence.



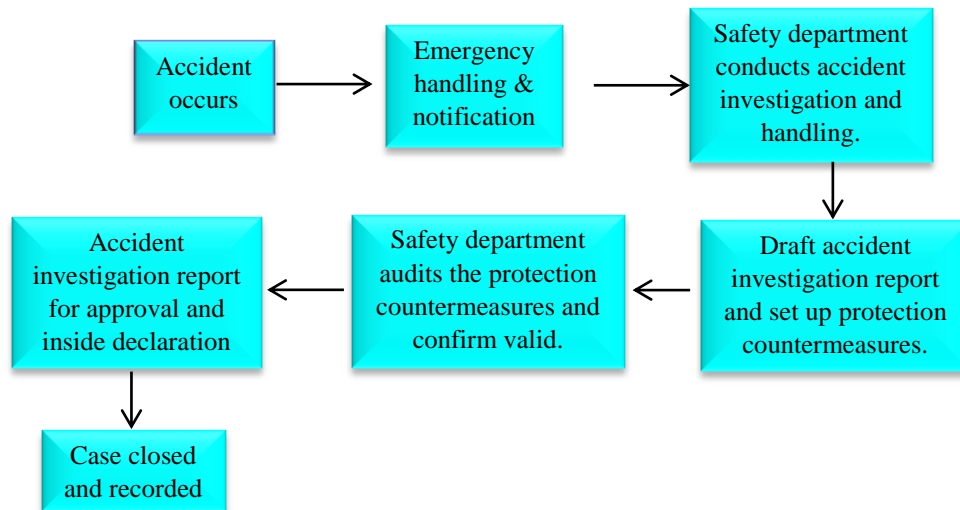


Figure 9-13 Flow Chart for Industrial Accidents Survey Management

## 9.7 Natural Hazard

The “Hazard Profile of Myanmar” prepared by five government ministries and departments of Myanmar and four non-governmental agencies in July 2009 describes nine types of disasters in Myanmar: (1) Cyclone, (2) Drought/ Dry zone, (3) Earthquake, (4) Fire, (5) Flood, (6) Forest Fire, (7) Landslide, (8) Storm, and (9) Tsunami.

Fifty percent of the total number of disasters in Myanmar was related to floods followed by storm (23%), earthquake (15%), and mass movement-wet (12%), whereas 73% of the total affected people by disasters were due to storm followed by floods in 1980-2011. Similarly, storm is a major cause of disaster-related death and biggest estimated damage cost (86%). Earthquake (11%) and flood (3%) are next on the estimated damage cost.

### 9.7.1 Flood

Many floods are caused by storm rainfalls from the southwest monsoons in July to October. Rainfall in the mountains and highlands causes flood damage in the central plain and coastal areas. Flooding spanned over the long term at the delta near the river mouth. Locations of flood disasters in Myanmar are as shown in **Figure 9-14**.

Floods in Greater Yangon can be classified into three types: (i) river flood; (ii) localized flood inundation in urban areas due to a combination of factors such as cloudburst, poor infiltration rate, poor drainage infrastructure (possibly due to climate change, heat island phenomenon); and in rural areas due to decrepit dams, dikes and levees, and (iii) floods due to cyclone and storm surge.



Figure 9-14 Locations of Flood Disaster in Myanmar

### 9.7.2 Earthquake

The country is exposed to earthquakes due to its geographical location within the Alpide Belt, which is noted to be the most seismically active zone in the world with multiple damaging earthquakes and volcanic eruptions having occurred there. The country itself is besieged by a series of faults, of which the Sagaing fault is the longest, trending north to south across the central part of the country. Yangon City is about 30 kilometers west of the Sagaing fault. History suggests that earthquakes have had grim consequences on lives, social assets, and physical systems in the region. According to the seismicity and the records of the previous considerably high magnitude earthquakes, Yangon Region can be regarded as the low to medium seismicity region. Moreover, tectonically the region is surrounded by the subduction zone between the Indian Plate and Burma Plate to the west and the right lateral Sagaing fault to the east. Based on the Peak Ground Acceleration (PGA) values and

past records, the cities are classified as Low Zone, Moderate Zone, Strong Zone, Severe Zone and Destructive Zone.

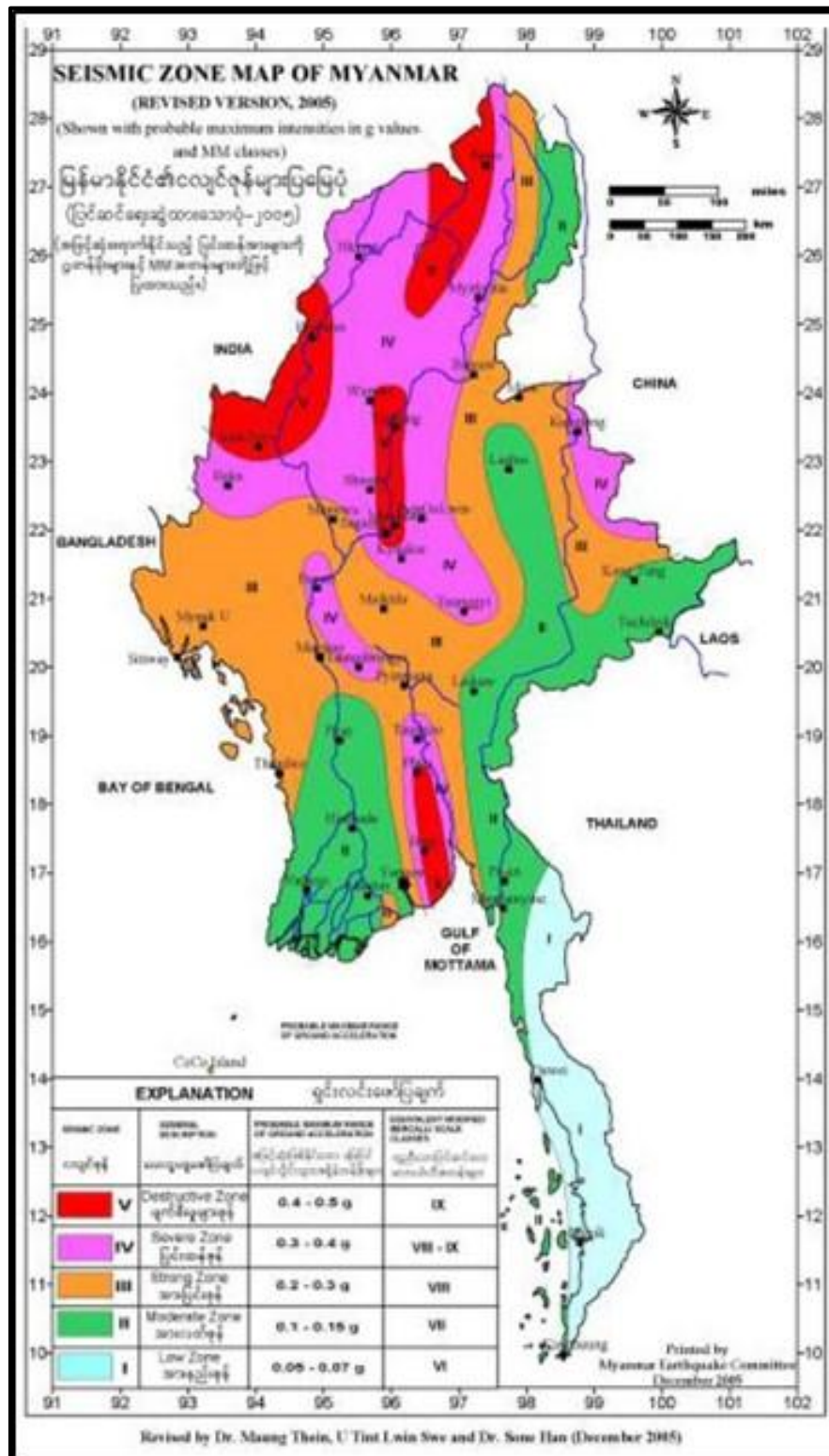


Figure 9-15 Seismic Zone Map of Myanmar

## **10.0 CAPACITY DEVELOPMENT AND TRAINING**

Capacity building of the factory officers will enhance the awareness of the manufacturing case of cleaner production and possibly also of the need for ensuring compliance with local legislation. The training programme begins with a detailed needs assessment phase, involving engagement with factory owners, management, supervisors, trade union representatives and workers to understand each factory's priorities and needs. The HR training modules focus on a number of key topics, including establishing clear roles and responsibilities, as well as introducing support networks (such as buddying schemes) and formal and accessible communications and feedback systems.

### **10.1 Company Working Task Force**

#### **10.1.1 Human Resource Policy**

The human resource policy relevant to employment, recruitment, dismissal, salary, welfare, labor insurance, labor protection and labor discipline of the employees of the Company shall be carried out in accordance with the relevant policies.

The company has the right to give a warning to workers who violate the rules and regulations of the company and disciplines of labor discipline, and pay a reduction of wages. If the circumstances are serious, they may be dismissed, and the dismissed workers shall be reported.

Wages and salaries of employees of the Company shall be in accordance with the relevant laws and the board of directors shall determine the standards in accordance with the operating conditions of the Company.

Employee benefits, bonuses, labor insurance and other matters, the company will be provided in the system.

The Company provides training to employees in terms of occupation, work skills and working knowledge, so as to promote positive progress and improve their abilities.

#### **10.1.2 Employee Complaint Mechanism**

There are several reasons to set up the Employee Complaint Mechanism:

- ✓ to safeguard the legitimate rights and interests of the company and employees,
- ✓ to detect and deal with hidden problems in time,
- ✓ to smooth the communication between employees and the management,
- ✓ to improve work motivation,
- ✓ to establish a harmonious labor relation, enhance enterprise cohesion,
- ✓ to improve employee satisfaction

The scope of the appeal shall be within the functions of the Human Resources Department, including but not limited to the following:

- if employees disagree with the performance appraisal, rewards & punishments they should follow the policy of "staff performance evaluation feedback and rewards and punishments management approach",
- the objection about the position, grade rank adjustment,
- the objection about recruitment, training,
- the objections about salary, benefits, attendance,
- the objection about signing labor contract, and renewal, change, release, termination and other aspects of employment contract,
- the objection about meal, reasonable vehicle arrangement and other administrative stuffs,
- the complaint about unfairly treatment by superior or colleagues,
- the other matters which complainants have evidence to prove that his/her rights have been violated.

If employees disagree with the performance between them according to the scope, the Workplace Coordinating Committee (WCC) will solve the problems.

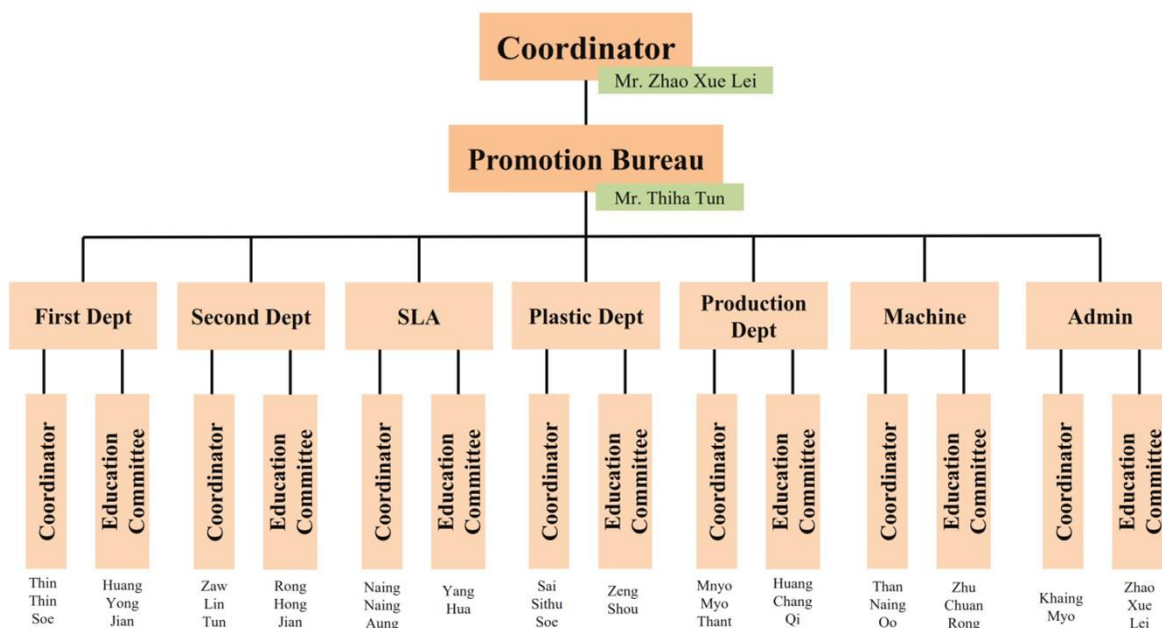


Figure 10-1 Organization Chart of WCC

### 10.1.3 Emergency Response Team

The emergency contact numbers of township and district fire department must be printed and tagged at easily visible places fire emergency cases.



2020年緬甸亞光緊急應變各組人員明細 ၂၀၂၀ခုနှစ် Myanmar Asia Optical အရေးပေါ်အဖွဲ့ဝင်များ			
		承認:	3/15 檢印: 作成: 彭應德 1/7
၁။	အရေးပေါ်ညွှန်ကြားချက်	(Myanmar Asia Optical) CHEN HUN JUN 副總、(General) ZHAO XUE LEI 主任	
၂။	အရေးပေါ်ပြေးအဖွဲ့	(Factor Director) Huang Hai Tong 廠長、(First) Huang Jian Bo 經理/Huang Yong Jian 課長、 (Second) Zhang Xiu Mei 經理/Wu Zhen Kui 課長、 (အကူအညီထောက်ပံ့ရေးအဖွဲ့) Li Zheng Zhi 課長/Zhu Chuan Rong 課長/Li Yong Qiu 主任/A N L 組長	
၃။	ကယ်ဆယ်ရေးအဖွဲ့	(Install) Lin Song Qing 課長/Yan Sen Lin 主任/Chen Yu Feng 主任/Zheng Fei 主任/ Li Dai Cheng 主任/Z L T 組長/A M T 組長/ N N N 組長/ A J 組長/	
		(မီးသတ်အဖွဲ့ဝင်)	Sai Si Thu Soe/Myint Thein/Ohnmar Htay/Tin Zar Oo/Myo Thwe/Tin Lin Aung Aung Zaya/Thi Ha Kyaw/Win Moe Aung/Naing Myo Htet/Thu Ra Aung/Myo Min Thu Myo Thein Htet/Chan Lin Oo/Kaung Myat Htay/Daw Win New/Than Than/Po Po Aung Zar Li Myint/Saw Mon Than/Win Than Aung/Lin Htwe/Aung San/Kyaw Kyaw Htay Thant Zin Tun/Myo Thet Tun/Aung Tun Oo/Ye Ko Win/Sai Wai Htet Aung Thein Min Htay/Aung Kyaw
၄။	သတိပေး အရေးပေါ်ကယ်ဆယ် ရေးအဖွဲ့	(General) Saw Kalar 組長/WN 線長/ZLM 線長/HHA 線長	
၅။	MFC ဝန်ရုံ	(SLA 部) Huang Yu Zhen 副理/Hu Jie 主任/Li Jiang 主任/Luo Qing 主任/yang yong fu 線長/NNA 線長/AHN 線長	
		(Installation) ZLT 組長/ZMT 組長/TC 線長/MM 線長/NNL 組長/MW 線長	
		(PC) Li Ai Min 主任/TLW 線長/MM 線長	
		(Centering) Peng Guo Quan 主任/ZMA 線長	
		(Plastic) Ceng Shou 課長, Cui Xiao Mei 線長	

Figure 10-2 Emergency Response Team

#### 10.1.4 Internal Emergency Communication (Factory-1)

The internal emergency communication for MAOI-1 is as follow.

Table 10-1 Firefighting Team

Sr. No.	Name	Department	Sr. No.	Name	Department
1.	U Myo Aung	MR	19.	U Soe Min Thu	CG
2.	U Thant Zin Htun	MR	20.	U Nan Oo	CG
3.	U Hein Latt Zaw	MR	21.	U Hlaing Myo Thu	Pc
4.	U Than Kyaw Soe	Machine	22.	U Phyo Aung Aung	Pc
5.	U Linn Aung Phyo	Machine	23.	U Tun Tun Aung	Coating
6.	U Aye Maw	Machine	24.	U Pyae Phyo	C1-2
7.	U Nay Myo Naung	Sc-Grinding	25.	Daw Pan Ei Phyu	C1-2
8.	U Aung Kyaw Kyaw	Sc-Grinding	26.	Daw Myat Lay New	Polishing
9.	U Bo Bo	Curve Generation	27.	Daw Su Yee Nandar	Polishing
10.	U Myat Thu Win	Curve Generation	28.	U Kyaw Htet Linn	QA
11.	U Ye Linn Naing	Curve Generation	29.	Daw Mar Win Shein	Cementing-Painting
12.	U Kyaw Kyaw Lwin	C1-1	30.	U Pyae Phyo Aung	MR
13.	U Aung Moe Myint	C1-1	31.	Daw Khet Khet Mar	Coating
14.	U Aung Pyae Phyo	SC-Polishing	32.	Daw Ei Thandar	Coating
15.	U Hla Phyo	KCG	33.	U Htet Wai Oo	CG
16.	Daw Yu Yu Shwe	KCG	34.	U Ye Aung	Grinding
17.	U Ye Soe Aung	Centering	35.	Daw Khin Phone	BQC
18.	U Ye Soe Aung	Centering			

Table 10-2 Equipment Moving Team

Sr. No.	Name	Department	Sr. No.	Name	Department
19.	U Tin Myint Oo	Generation	11.	U Kyi San	Generation
20.	U Htay Zaw Oo	Polishing	12.	Daw Aye Win	Generation
21.	U Thura Lin	C1-3	13.	Daw Aye Khaine Thein	Generation
22.	U Chit Phue	C1-2	14.	Daw Khin Yee	Generation
23.	U Ye Zar Naing	KCG	15.	Daw Myint Myint Soe	Generation
24.	Daw Lin Lin	Machine	16.	Daw San San Maw	Generation
25.	U Mg Mg Gyi	Machine	17.	Daw Win Win May	Generation
26.	U Kyaw Naing Lin	Installation	18.	Daw Tin Tin Nwet	Generation
27.	U Tin Mg Than	Generation	19.	Daw Aye Aye Khaing	Generation
28.	Daw Zar Zar Mon	Generation	20.	Daw Yin Yin Htay	Generation

Table 10-3 Security

Sr. No.	Name	Department	Sr. No.	Name	Department
1.	U Win Than Aung	Generation	8.	U Ye Ko Win	Generation
2.	U Lin Htwe	Generation	9.	U Aung Kyaw	Generation

Sr. No.	Name	Department	Sr. No.	Name	Department
3.	U Aung San	Generation	10.	U Aung Khant Mg	Generation
4.	U Kyaw Kyaw Htay	Generation	11.	U Chit Phoo Aung	Generation
5.	U Aung Tun Oo	Generation	12.	U Kyaw Zin Khaing	Generation
6.	U Thant Zin Tun	Generation	13.	U Than Than	Generation
7.	U Khaing Htet Lin	Generation			

Table 10-4 Rescue Team

Sr. No.	Name	Department	Sr. No.	Name	Department
1.	Daw Win Win New	Generation	7.	Daw Pan Nu Swe	Generation
2.	Daw Hnin Hnin Wai	Generation	8.	Daw Chaw Ei Hmone	Generation
3.	Daw Zarli Myint	Generation	9.	Daw Lwin Marlar Oo	Generation
4.	Daw Po Po Aung	Generation	10.	Daw Win Min Swe	Generation
5.	Daw Saw Mon Than	Generation	11.	U Aung Kyaw Kyaw	Generation
6.	Daw Thet Yee Mon Kyaw	Generation	12.	U Aung Kyaw Min	Generation

Table 10-5 Reporting Team

Sr. No.	Name	Department	Sr. No.	Name	Department
1.	U Aung Myat Hein	Installation	11.	Daw Khin Phone Myint	QA
2.	U Myo Myo That	QA	12.	U Thet Naing Oo	C1-3
3.	U Than Naing Oo	Sc-Grind	13.	U Chit Ko Ko	Sc-Polishing
4.	Daw Theingi Htay	KCG	14.	U Aung Kyaw	Polishing
5.	Daw Hnin Hnin New	Grinding	15.	U Tun Lin Aung	C1-2
6.	U Si Thu	MT	16.	U Chan Linn Oo	C1-1
7.	U Zin Min Htwe	MR	17.	U Aye Moe Kyaw	Machine
8.	U Than Naing Tun	C1-1	18.	U Kyaw Kyaw Htun	Machine
9.	U Chan Myae Paing	Centering	19.	U Phyo Nyein Naing	MR
10.	U Tun Ko Ko Naing	Coating	20.	U Than Toe Aung	MT

## 10.2 Employee's Welfare Plan

Employee welfare raises the company's expenses but if it is done correctly, it has huge benefits for both the employee and the employer. In fact, employee welfare is in the interest of the employee, the employer and the society as a whole. The objectives of employee welfare are:

- It helps to improve the loyalty and morale of the employees.
- It reduces labour turnover and absenteeism.
- It helps to improve employee productivity.
- Welfare measures help to improve the goodwill and public image of the company.

The project proponent has set up the following items as employees' welfare plan.

- Provide the dormitory and social security expense.
- Provide the accommodation for foreigner staff.
- Provide food store, library and clinic inside the factory compound
- Provide the transportation charges and dormitory expense for leaders lived in rent.
- Have 306 toilets in total for employee.
- Discharge the domestic water and process water, according to government's guideline.
- Install the wastewater treatment plant and wastes are discharged according to emissions standard.
- Plan the trips, year-end party including the game and lucky draw sections, yearly.
- Award the best employee as 5<sup>th</sup> year, 10<sup>th</sup> year company anniversary.
- Celebrate the birthdays, cakes and meal for extra.
- Held the sport matches monthly.
- Held the Dahmah Thabin Pwel yearly.
- Provide the wedding present, pregnancy and funeral allowance.

#### 10.2.1 Accommodation

The project proponent arranges dormitory with full facilities for foreign technicians at the factory-2 and for local employees at the factory-1.



Figure 10-3 Dormitories (Factory-1)









Figure 10-6 Kitchen



Figure 10-7 Canteen for Staffs (Factory-1)

#### 10.2.4 Health Care

The company provides clinic with nurse aid, certificate holder (free of charge) for all employees in addition, purified water is provided for staff drinking water. Appropriate sanitation facilities are installed, and regular disinfection work carried out. The project proponent provides the following health programs.

- Medicine and first aid kits are available in every section of the factory to address emergency cases.
- The factory has a clinic for staffs who feel sick.
- The project proponent trains employees on basic health care. It aims to teach staff how to provide first aids for injured person during emergency cases.

Table 10-6 Medicine List

Sr. No.	Name	Sr. No.	Name	Sr. No.	Name
1.	75% Alcohol	82.	Local inj:	163.	Contac NT
2.	3/0 Thread	83.	Menthol plaster	164.	Dexamethasone tab china
3.	3/0 Cutgut	84.	Metoclopramide (Maxalon)	165.	Dexamethasone cream
4.	25% Glucose inj	85.	Metronidazole	166.	Duo Pan Li tong Pian
5.	27 G needle	86.	Mannyl inj	167.	Ephedrine Nasal HydrochlorideNosal Drops
6.	3" Syringe	87.	Metro inj	168.	Erythromycin eye ointment
7.	3" Bandage	88.	Maxalon inj	169.	Fu Fang An
8.	4" Bandage	89.	MOM	170.	Feng You Jing
9.	5" Syringe	90.	Norflox * eye drop	171.	Chloramphenicol maleate
10.	5% Glucose inf (DW)	91.	Norflox	172.	Gan Kang 2
11.	20 ml 20 cc syringe	92.	Neurobian tab blue	173.	Gan Mao Ling Keli
12.	Ascpitol	93.	Normal Saline	174.	Gan Mao Ling Jiannang
13.	Atenolol	94.	Omezal	175.	Gan Mao Ling
14.	Antacid gel	95.	ORS	176.	Golden Throat
15.	Atropine Inj:	96.	Battery 3V	177.	Ke Ke Jiao Nang*
16.	Kemose 2	97.	Paper Plaster	178.	Qu Xiang Zheng Qi Shui
17.	Amoxycillin	98.	Paracetamol BPI	179.	Hou tong ling pian
18.	Amoxycillin Cap	99.	Plastic Glove	180.	Ichthammol Ointment
19.	Ampiclox	100.	Plastic Bag	181.	Jian Wei Xiao Shi Pian
20.	Aminophylline inj	101.	Propornolol	182.	Ji ng Wan Hong
21.	Analgesic Plasterfor Arthritis	102.	Pressure Calf pad	183.	Josamycin tab
22.	Andrographitis	103.	Ranitidine tab	184.	Keyangmin xu
23.	ATT	104.	R/L	185.	Keteling
24.	Azeptil Inj:	105.	Ranitidine inj	186.	Levoflox china
25.	Begesic	106.	Septidine	187.	Li Jun Sha
26.	Bisolvin inj	107.	Silverdern	188.	Long Ma Yi Fu Ning *
27.	Bladge	108.	Skinel cream	189.	Lincomycin
28.	BP card	109.	Sofratulle	190.	China Tiger *
29.	Brom	110.	Surgical Glove	191.	Metronidazole and Fenbufen Cap
30.	Burmeton inj	111.	Salbutamol inhaler	192.	Yan Yan Pian *
31.	Burmeton	112.	Slow K	193.	Kang Jun Xiao Yan Jiao Nang *
32.	Buscopan Inj:	113.	Scalp vein	194.	Mycostatin
33.	Buscopan Tab	114.	Sonexa-c	195.	Norfloxacin(china)
34.	Cifran Eye Drop	115.	Stethosco	196.	Neomycin cream
35.	Steel Cup	116.	Stimitil	197.	NiuHuang Jiedu Pian
36.	compound miconazole	117.	Sticking tape ( coconut	198.	Ofloxain Ear Drop

Sr. No.	Name	Sr. No.	Name	Sr. No.	Name
			tree)		
37.	Cifram Tab	118.	Thermometer	199.	Panadol
38.	Celexin	119.	Tetracycline Eye Ointment	200.	Qutong pian (COX II ) Hansa
39.	Cannular	120.	Tetracycline Eye Tab	201.	Roxithromycin
40.	Cloxa Cap	121.	UCG	202.	Roxithromycin Dispersible
41.	Cifran Tab	122.	Sprit	203.	Shuang huang Liang Kou Fu Ye
42.	Caladyl solution	123.	Ventolin Tab	204.	sulfer ointment
43.	Cotton Bud	124.	Vitamin B1	205.	Tiger Plaster
44.	Cotton rod	125.	Vitamin B2 Tab	206.	Wei C line
45.	Cup	126.	Vitamin B6 Amp	207.	Wei C green
46.	Digene	127.	Vitamin B6 Tab	208.	Xie Li Ting
47.	Dexamethasone Inj	128.	Vicee Tab	209.	Fu Zhi Fang
48.	Doxycycline Tab	129.	Vitamin C inj	210.	Yun Nan Bai yao Powder
49.	Dextro	130.	Vitamin C Tab	211.	Zhenggu shui
50.	Diclo Fenac tab	131.	Wokadine (Small Size)	212.	zhan zhu min mu yan ye
51.	Diclo Fenac inj	132.	Wokadine (Large Size)	213.	Trimetazidine
52.	Dit gel	133.	Weight Machine	214.	Greengel
53.	Diclo gel	134.	Zocovin Cream	215.	Ferrovit
54.	Dettol	135.	Zocovin Tab	216.	Oramin.G
55.	Dopamine Inj:	136.	Glass measuring cup	217.	Cetrazine
56.	D/L	137.	Theophylline ephedrine tablets	218.	Cotton roll Small
57.	N/S	138.	Long hemostatic forceps	219.	Scissor
58.	Dicotil Tab	139.	Needle holder	220.	zinc oxide
59.	Dexona Eye drop	140.	Big can	221.	Sonaderm GM
60.	Dexa Tab	141.	Big can	222.	panbiccort inj
61.	Dolfenal Tab	142.	Knife handle	223.	panbiccort inj
62.	DripSet	143.	Flashlight	224.	Pan Bu
63.	E glove	144.	Short hemostatic forceps	225.	Bcomplex Tab
64.	Erythromycin cream	145.	Square box	226.	Bcomplex inj
65.	Erythromycin	146.	Square plate	227.	Mico-bio
66.	Flumol	147.	Dressing can	228.	Counter plast
67.	Frusid tab	148.	Compound Paracetamol Amines (Gangkang)	229.	Ibuprofen (China)
68.	Face mask	149.	Ribavirin inj	230.	Houjiling jiaonang
69.	Furosemide Inj	150.	Tweezers	231.	San Huang Pian
70.	Gauze	151.	Hot water bottle	232.	Wai U [Vit V]
71.	Gener Log	152.	Triangle needle	233.	neurobian Tab red
72.	Gentamicin	153.	Sand cloth pliers	234.	K. Vit Inj
73.	Glucose	154.	Silk thread	235.	Water
74.	Hansaplast	155.	Curved shear	236.	Eye Drop

Environmental Management Plan (EMP) Report for Factory-1(Part-I)  
Myanmar Asia Optical International Company Limited

Sr. No.	Name	Sr. No.	Name	Sr. No.	Name
75.	Hot Bag	156.	Di Tong Bi Yan Shui	237.	Zong Sheng Wan
76.	Hydrocortisone	157.	Paracetamol BPI	238.	Folic Acid
77.	Ibuprofen(Myanmar)	158.	Ren Gong Nihuang Jiao Xiao Zuo jiaoNang	239.	Cup
78.	Inj: Nuramin Forte	159.	China Amoxicillin	240.	Biogesic
79.	K Vitamin tab	160.	Axe Brand red Flower oil	241.	Asipilin ChanGrong
80.	Kemose 1	161.	Balange Keli	242.	Pudilan xiao yan Pian*
81.	Levo Flox Tab	162.	Belladonna	243.	Bioplaceton

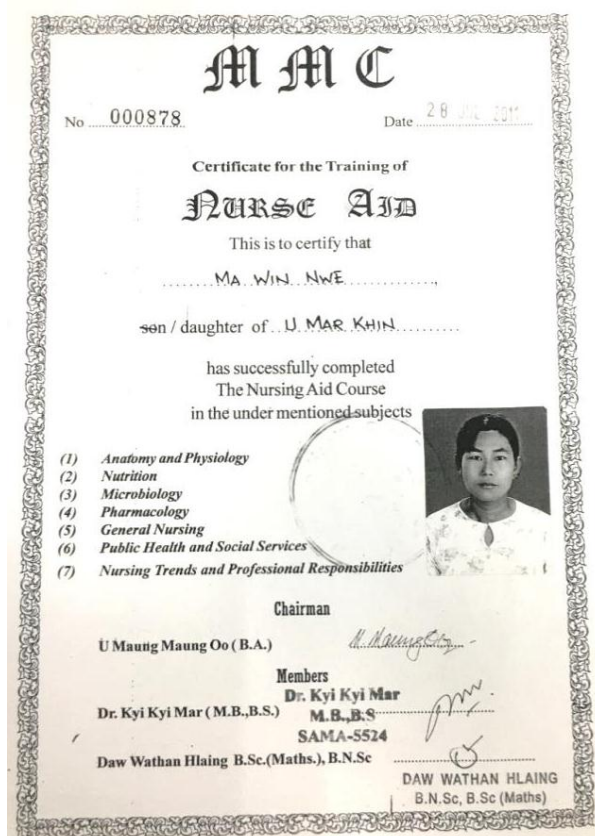


Figure 10-8 Certificate of Nurse







Figure 10-9 Clinic

### 10.2.5 Parking

The project proponent provided parking area for trucks, cars, and motorbikes with safety lines and broad space.



Figure 10-10 Parking Areas (Factory-1)

### 10.2.6 Locker Room

The employees worked at the factory are supplied with lockers. Before the entering the workplace, they can temporarily store their important things in them.



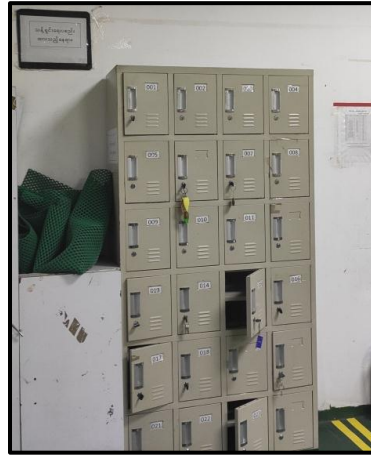


Figure 10-11 Lockers

### 10.2.7 Social Security Fund

All employees are given an additional 2% of their salary for SSP (Statutory sick pay) contributed by the company toward health care, social security and injury fund. In addition, workers are provided aid-money for both good events and funerary ceremony. For giving birth of female workers, they can get 90 days' leaves, 2 days leave for wedding and other leave (sick leave, annual leave etc.) will be drawn up.

### 10.2.8 Staff Activities

The project proponent organizes and pays for additional out of work activities for the employees to participate in. e.g., fusel football match, karaoke competition, cooking master competition, annual staff party, trip, dancing competition, donation and so on.









Figure 10-12 Donation

## 10.3 Reporting requirements

### 10.3.1 Documentation

The following documentation must be kept at Project Manager Office in order to maintain the record of compliance to the EMP for future references:

- Record of Complaints
- Monitoring Results
- Notification of Emergencies and Incidents.

Environmental Register which is maintained and kept in custody of the manager responsible for operations at the factory. It may contain the following information, observations and records:

- The manager will report incidents involving employees and / or the public that could potentially cause negative sentiments and perception towards the project.

- Report environmental complaints and correspondence received from the public to the Project HR Manager or the Environmental Manager.
- Record and report incidents that cause harm or may cause harm to the environment to the Environmental Manager.
- Record all hazardous materials used on site.
- Maintain a record of all hazardous waste disposal manifests detailing the nature of the hazardous waste disposed of the hazardous waste classification and the location of the site to which such waste was sent.
- These records will be kept with the EMP, and will be made available for scrutiny if so, requested by the Project Manager or his delegate or the Environmental Manager.
- The Environmental Manager will ensure that the following information is recorded for all complaints / incidents:
  - Nature of complaint /incident
  - Causes of complaint /incident
  - Party/parties responsible for causing complaint/incident
  - Immediate actions undertaken and/or to be taken to address and to prevent reoccurrence of the complaint/incident
  - Timeframes and the parties responsible for the implementation of the corrective or remedial actions
  - Copies of all correspondence received regarding complaints /incidents.

### **10.3.2 Reporting**

The project proponent will establish and maintain a procedure to monitor and report key characteristics of its operations and activities that have potential to have a significant impact on the environment.

Reports are to be forwarded to the Project Manager. This will comprise the incident reporting protocol and will allow the Project Manager to determine the effectiveness of environmental measures implemented in reducing impacts on the environment and/or to determine the extent of potential environmental harm. The measures ensure the management of the activity will achieve ongoing minimization of the activity's environmental harm through cost effective measures.

Environmental harm is defined as any adverse effect on the environment (of whatever degree or duration) and includes an environmental nuisance. The responsibilities for reporting environmental incidents are as follows:

- The person discovering a reportable environmental incident, as described below, on the proponent's site must report it to the proponent,
- The proponent may report the incident to external organizations that are needed to provide response support,

Figure 10-13 Workplace Incident Records



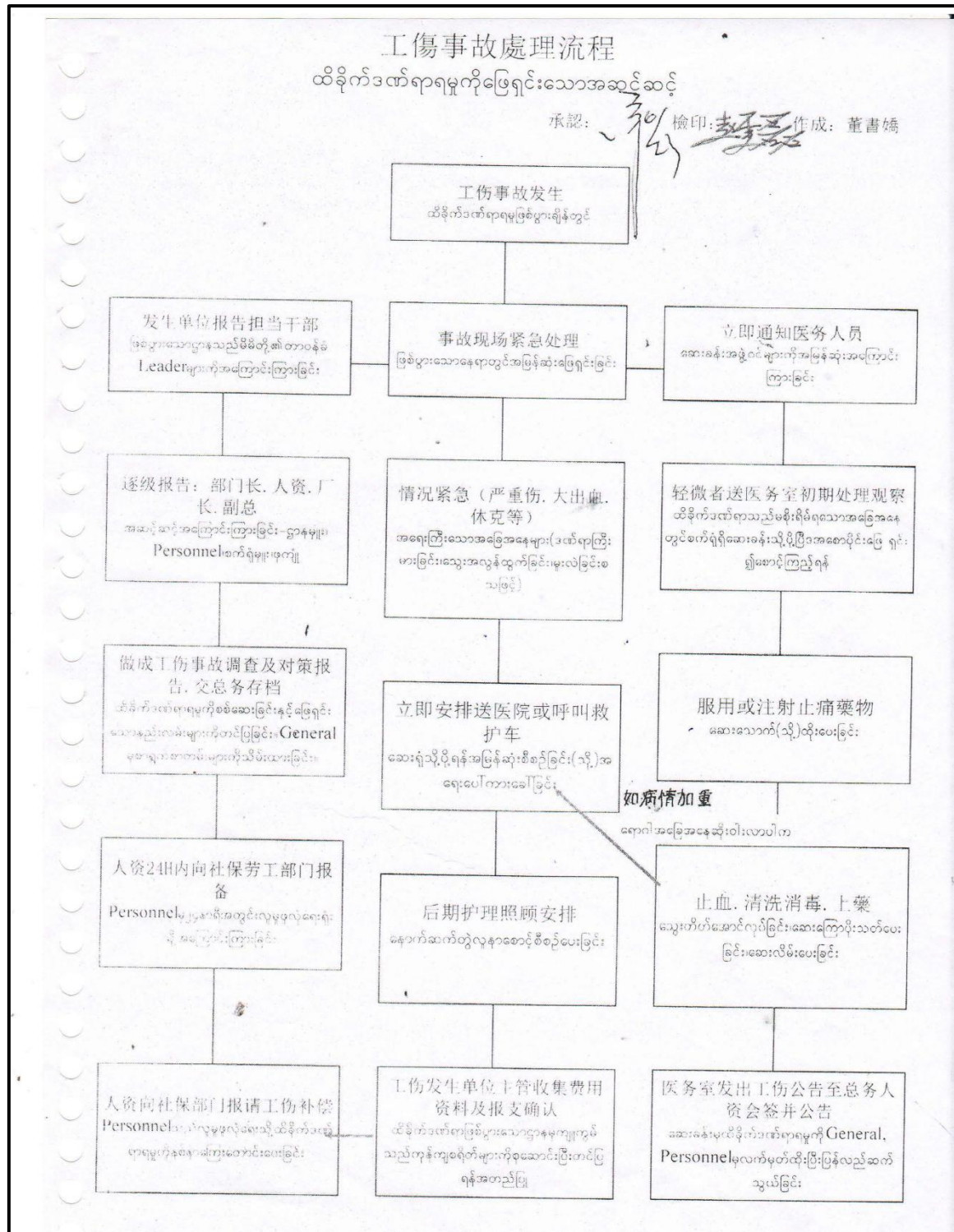


Figure 10-14 Step by Step of Solving Accident Injury

## 10.4 Safety Training

### 10.4.1 Chemical Safety Training

Chemical management requires that employees who handle chemicals in one way or another, or make decisions that affect chemical handling, have sufficient expertise for their tasks.

It is a matter of knowing the company's effect on the environment and ambitions in the chemicals area and understanding one's own role in contributing to safer chemicals handling. Many companies choose to provide basic training for all their staff, and further special training for those who need deeper knowledge. Training in chemicals could contain the following components:

- ❖ Basic knowledge concerning chemical issues in the company's operations,
- ❖ Tasks and responsibilities within the company,
- ❖ An overview of the regulatory system and authorities in Sweden and the EU,
- ❖ How to search for information and help via the Internet,
- ❖ Handling of chemicals in the workplace,
- ❖ The responsibilities of producers of goods, choice of chemical products and the place of chemicals in design,
- ❖ The phasing out of hazardous substances and preventive work,
- ❖ The position of chemicals in negotiating, purchasing and supplier assessment,
- ❖ Classification, labeling and safety data sheets (SDS),
- ❖ Risk assessments







# 教育訓練記錄表

သင်တန်းတက်ရောက်သူမှတ်တမ်း

1. 教育訓練内容(課程):

ရန်ကုန်မြို့တော်အတွင်း

2. 日期:

2020

年

2

月

20

日

時間:

AM

3. 地點:

+

00

分

00

時

PM

5.00

-

6.00

4. 教育訓練地點(講堂):

+

00

分

00

時

PM

5.00

-

6.00

5. 參與者:

+

00

分

00

時

PM

5.00

-

6.00

6. 意見反饋:

+

00

分

00

時

PM

5.00

-

6.00

7. 簽名:

+

00

分

00

時

PM

5.00

-

6.00

8. 簽名:

+

00

分

00

時

PM

5.00

-

6.00

9. 簽名:

+

00

分

00

時

PM

5.00

-

6.00

10. 簽名:

+

00

分

00

時

PM

5.00

-

6.00

11. 簽名:

+

00

分

00

時

PM

5.00

-

6.00

12. 簽名:

#### 10.4.2 Fire Safety Training

The factory provides adequate fire safety training for their employees. Training plans include the following:

- ❖ What to do on discovering a fire;
- ❖ How to raise the alarm and what happens then;
- ❖ What to do upon hearing the fire alarm;
- ❖ The procedures for alerting employees, where appropriate, directing them to exists;
- ❖ The arrangements for calling the fire and rescue service;
- ❖ The evacuation procedures for employees in the factory to reach an assembly point at a place of total safety;
- ❖ The location and, when appropriate, the use of firefighting equipment;
- ❖ The location of escape routes, especially those not in regular use;
- ❖ How to open all emergency exit doors;

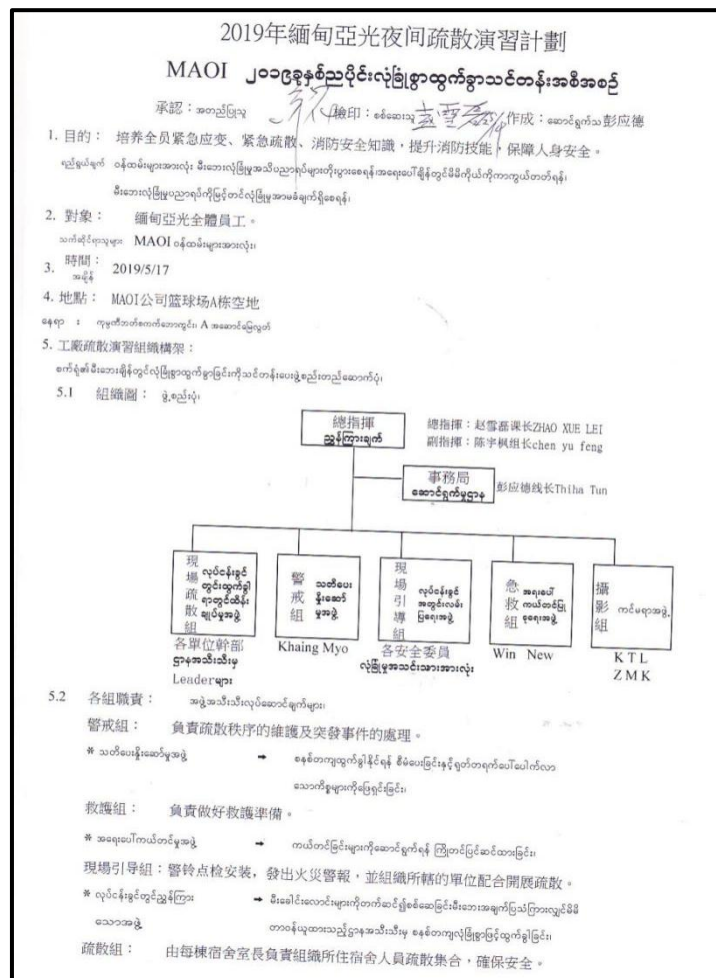
All the employees identified in the emergency plan that have a supervisory role if there is a fire, heads of department, fire marshals and firefighting team should be given details of fire risk assessment and receive additional training.







The purpose of a fire drill is to familiarize and re-enforce proper evacuation routes and practices. The goal is to have the proper actions be an automatic response whenever fire alarms sound, so that everyone safely evacuates the area in an orderly manner. Fire drills are required annually for most facilities and should be used to evaluate warning features and occupant knowledge.





# Environmental Management Plan (EMP) Report for Factory-1(Part-I)

## Myanmar Asia Optical International Company Limited

\* လျှောက်ပို့ရာတွင်ထည့်သွင်းရမည့် အချက်များကို အောက်ဖော်ပြပါအတိုင်းထည့်သွင်းရမည်။

သော့ခွဲ: နာမည်နှင့်လိပ်စာမှည့်သွင်းရမည်။

攝影組: 對異常情況照像，對疏散全過程照像。

\* ခေါ်ဝေါ်ရန်အတွက်: လျှောက်ပို့ရာတွင်ထည့်သွင်းရမည့် အချက်များကို အောက်ဖော်ပြပါအတိုင်းထည့်သွင်းရမည်။

6. 宿舍疏散演習前的宣傳教育: 6. 宿舍疏散演習前的宣傳教育: 宿舍疏散演習前的宣傳教育

日期(နေ့ရက်)	內容(အကြောင်းအရာ)	擔當(တာဝန်ခံ)	參加者(ပါဝင်သူ)
5月17日	逃生的基本常識宣傳 အသက်ကယ်ခြင်းနှင့်အန္တရာယ်ကင်းရှင်းရေးအချက်အလက်များကို သတိပြုစေရန်	Khaing Myo	全員 (公告張貼形式) ခန့်အပ်မှုအားလုံး
	疏散演習計劃說明 လျှောက်ပို့ရာတွင်ထည့်သွင်းရမည့် အချက်များကိုအကြောင်းအရာ		疏散組人員及安全委員 ဌာနအသီးသီးမှပါဝင်သူများ
	疏散宣傳資料配布 လျှောက်ပို့ရာတွင်ထည့်သွင်းရမည့် အချက်များကိုအကြောင်းအရာ		各安全委員 လျှောက်ပို့ရာတွင်ထည့်သွင်းရမည့် အချက်များကိုအကြောင်းအရာ
	火災發生時，人員疏散路線安排 မီးဘေးဖြစ်ပေါ်ပါကလျှောက်ပို့ရာတွင်ထည့်သွင်းရမည့် အချက်များကိုအကြောင်းအရာ		

7. 疏散演習: 7. 疏散演習: 疏散演習

日期(နေ့ရက်)	內容(အကြောင်းအရာ)	擔當(တာဝန်ခံ)	參加者(ပါဝင်သူ)
5月17日 PM 8:00-8:30	疏散演習 5分鐘 ထွက်ခွာရန်လက်တွေ့ပြသမှု ၅မိနစ်	趙雪磊/葉森林	全員 ခန့်အပ်မှုအားလုံး
	總結10分鐘စာတမ်းချုပ်ချင်းချုပ်(၁၀)မိနစ်	Khaing Myo	

8. 疏散演習的推進: 8. 疏散演習的推進: 疏散演習

8.1 疏散演習:

內容 (အကြောင်းအရာ)	時間 (အချိန်)	推進 (အကြောင်းအရာ)	備注(မှတ်ချက်)
			(1) 禁止事先準備外出。 ဦးစီးအဖွဲ့အစည်းကိုတားမြစ်ထားရမည်။
			(2) 安排留守人員作安全防範工作，並督促其它人員快速疏散。每組 1 名幹部。 လျှောက်ပို့ရာတွင်ထည့်သွင်းရမည့် အချက်များကိုအကြောင်းအရာ
			(3) 按指定路線逃生 (按逃生路線圖方向疏散) သတ်မှတ်ထားသောလမ်းကြောင်းအတိုင်းထွက်ခွာရမည်။(အရေးအခင်းထွက်ပေါ်လာပါကလမ်းကြောင်းအတိုင်းထွက်ခွာရမည်)

疏散演習

疏散演習 လျှောက်ပို့ရာတွင်ထည့်သွင်းရမည့် အချက်များကိုအကြောင်းအရာ	疏散演習 လျှောက်ပို့ရာတွင်ထည့်သွင်းရမည့် အချက်များကိုအကြောင်းအရာ	疏散演習 လျှောက်ပို့ရာတွင်ထည့်သွင်းရမည့် အချက်များကိုအကြောင်းအရာ	疏散演習 လျှောက်ပို့ရာတွင်ထည့်သွင်းရမည့် အချက်များကိုအကြောင်းအရာ
安全宣傳	疏散前宣傳和安排	疏散演習	疏散演習

(4) 到達指定地點整隊，結束後安排負責人帶領疏散。  
တာဝန်ခံမှုနှင့်စီစဉ်မှုများကိုအကြောင်းအရာ

(5) 禁止大聲喧嘩及故意製造混亂。  
အေးချမ်းစေရန်အတွက်အကြောင်းအရာ

(6) 嚴禁攜帶任何物品進行疏散。  
ထွက်ခွာရန်အတွက်အကြောင်းအရာ

(7) 安排留守人員作疏散完成時間記錄，退後人員登錄，問問題記錄。  
တာဝန်ခံမှုနှင့်စီစဉ်မှုများကိုအကြောင်းအရာ

(8) 活動結束後，由最高長官講話，並指出疏散演習問題點。  
တာဝန်ခံမှုနှင့်စီစဉ်မှုများကိုအကြောင်းအရာ

警戒組: 疏散秩序的維護及突發事件的處理  
အရေးအခင်းထွက်ပေါ်လာပါကလမ်းကြောင်းအတိုင်းထွက်ခွာရမည်။

急救組: 做好救護準備 關切人員安全。 安撫人員應隨時準備。  
တာဝန်ခံမှုနှင့်စီစဉ်မှုများကိုအကြောင်းအရာ

現場引導組: 發出火災警報，關閉照明電源，並組織所轄的宿舍配合疏散。  
တာဝန်ခံမှုနှင့်စီစဉ်မှုများကိုအကြောင်းအရာ

現場警戒組: 負責組織本宿舍的人員有序的疏散到指定場所集合，並組織整隊。  
တာဝန်ခံမှုနှင့်စီစဉ်မှုများကိုအကြောင်းအရာ

報警後疏散開始  
按廠區2樓及一樓逃生路線圖逃生，A樓、A1/A2宿舍逃生路線圖疏散。  
တာဝန်ခံမှုနှင့်စီစဉ်မှုများကိုအကြောင်းအရာ

到達集合地點  
宿舍員工到達籃球場所屬部門指定集合點，集合完畢後由安撫人員及講解。  
တာဝန်ခံမှုနှင့်စီစဉ်မှုများကိုအကြောင်းအရာ

警戒組人員維護秩序。 安撫人員應隨時準備。  
တာဝန်ခံမှုနှင့်စီစဉ်မှုများကိုအကြောင်းအရာ

備注: 1. 疏散演習如果遇雨在演習前 30分鐘通知各部門。  
မှတ်ချက်: 1. 疏散演習如果遇雨在演習前 30分鐘通知各部門。

2. 消防疏散演習，備用並光生年消防疏散演習不能超過5分鐘，所以請大家盡快跑到指定地點。  
2. 消防疏散演習，備用並光生年消防疏散演習不能超過5分鐘，所以請大家盡快跑到指定地點。

3. 疏散演習中應注意的安全事項，應隨時準備。  
3. 疏散演習中應注意的安全事項，應隨時準備。

Figure 10-18 Fire Drill Plan (Factory 1)

**2019缅甸亚光上半年疏散演习总结报告**  
၂၀၁၉ခုနှစ် MAOI ထုတ်ဝေသော လုံခြုံရေးကိစ္စများအကြောင်း သင်တန်းပေးပို့ပေးခြင်းတင်ပြချက်

承认:                      检查:                      作成: 彭应德

(一)、疏散演习概况: 1. လုံခြုံရေးကိစ္စများအကြောင်း သင်တန်းပေးပို့ပေးသည့် အချိန်အခါ

演习时间(သင်တန်းအချိန်)	2019年5月17日 PM3:50-PM4:05 2019/5/17	
开始疏散时间: PM3:55 စတင်ချိန်	结束时间: PM4:05 ပြီးဆုံးချိန်	合计: 10分钟 စုစုပေါင်းအချိန်
人员核对 လုပ်ငန်းစဉ်ဆောင်ရွက်ခြင်း	用时: 5分钟 အသုံးပြုချိန် ၅ မိနစ်	
演习问题点及相关安全知识讲解 သင်တန်းပေးခြင်း၏ ပြဿနာနှင့် သက်ဆိုင်ရာ လုံခြုံရေးဗဟုသုတများကို ပြောပြခြင်း	用时: ၅分钟 အသုံးပြုချိန် ၅ မိနစ်	
演习地点 သင်တန်းပေးသောနေရာ	公司篮球场 စက်ရုံဘတ်ဇောတံဆိပ်ကွင်း	

(二)、疏散演习中的问题点: 2. လုံခြုံရေးကိစ္စများအကြောင်း သင်တန်းပေးခြင်း၏ ပြဿနာများ

2.1 警铃响, 芯取课有些员工疏散时动作比较缓慢。  
2.1 Alarm ချဉ်းသံနဲ့ Centering ရှာဖွေမှုအချိန်အတွင်း သင်တန်းပေးသည့် လုံခြုံရေးကိစ္စများအကြောင်း သင်တန်းပေးခြင်း။

2.2 研磨的员工到鞋柜更换鞋子。 2.2 Polishing မှုဝန်ထမ်းများသည် မိနစ်လောက်တာတွင် သွားရုံစီမံခန့်ခွဲခြင်း။

2.3. 每半年推动一次消防疏散演习实际操作。  
2.3. မြောက်လတစ်ကြိမ်စီ သင်တန်းပေးမှုကို လက်တွေ့လုပ်ဆောင်ခြင်း။



Figure 10-19 Fire Drill Exercise (Factory 1)

#### 10.4.4 Health Safety Trainings

Myanmar Asia Optical International Co., Ltd. (MAOI) holds occupational health and safety workshops with organizers. They have trained better local knowledge and practical workplace experience to have a real impact on workers' lives. They organize to remove dangers from the factory, train workers and employees on basic safety and lobby for personal protective equipment.

## 11.0 PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

### 11.1 Purpose

Public consultations on environmental management programs are designed to provide a real understanding of industry issues and the aim is to make the public aware of the environmental impact of industrial operations and the increase in job opportunities caused by industry. By participating in the consultation process with anyone affected by the proposed project, the business community will be able to resolve any issues that may arise in advance.

### 11.2 Methodology and Approach

Green Myanmar Environmental Services Co., Ltd. (GMES) approaches two methods for consultation and disclosure, which are meeting and receiving suggestion letters. For public consultation meeting, GMES had arranged in two ways:

- i. Quantitative approach and
- ii. Qualitative approach.

For quantitative approach, suggestion forms have been used for factory employees in the proposed area. On the other hand, for qualitative approach, group discussion has been arranged.

There are two group discussions: one for meeting with employees of the factory and another for consultation meeting with the relevant government organizations and local community in the vicinity of project.

### 11.3 Meeting with Factory Employees

This meeting aims for the health and safety of workers. Regarding to the EMP report for Myanmar Asia Optical International (MAOI) Co., Ltd., the employees were met and discussed about drinking water system, cleaning system, sanitation system, noise level, dust amount, particles, smell smoke, lighting system, ventilation system and the social situation at the workplace.

Method: Meeting  
Date: 12.3.2021  
Participants: Factory Employees from both Factories (242) Persons  
Venue: Factory's Canteen

The attendee lists, and suggestion forms from discussion with factory employees are attached as **Appendix 29** and **Appendix 30**. The main points of discussion, questions and answers were mentioned in the **Table 11-1**.



Figure 11-1 Employees Discussion Program

Table 11-1 Excerpts from Suggestion of the Factory Employees

Sr. No.	Issues	Suggestions/ Comments	Responses of Factory In-charge
1. Suggestion on Occupational Health and Safety			
1.1	Personal Protective Equipment	▪ All persons mentioned that they were provided adequately.	✓ PPE is provided to all employees in the factory.
1.2	Drinking Water	▪ All persons mentioned that they were provided with good drinking water.	✓ The company provides healthy drinking water. In addition, the water quality is monitored annually.
1.3	Sanitation System	▪ All persons recommended it is good and enough.	✓ There are hand basins, soaps and hand sanitizer in toilets, public areas and canteen entrances of the factory.
1.4	Cleaning System	▪ All staff members who attended the meeting stated those soap / hand sanitizers are provided for washing.	
2. Suggestion on Working Conditions in the Workplace			



Sr. No.	Issues	Suggestions/ Comments	Responses of Factory In-charge
2.1	Noise in Workplace	<ul style="list-style-type: none"> <li>The 40 persons mentioned there is no noise, but 7 persons mentioned there was a little noise.</li> </ul>	<ul style="list-style-type: none"> <li>✓ Noise is monitored monthly.</li> <li>✓ Earplugs and ear masks are provided for employees who exceed the limit in the workplace.</li> </ul>
2.2	Bad Odor	<ul style="list-style-type: none"> <li>The 45 persons mentioned there is no odor, but 2 persons mentioned there was a little odor.</li> </ul>	<ul style="list-style-type: none"> <li>✓ Ventilation system will be cleaned regularly every month.</li> </ul>
2.3	Workplace Light Intensity	<ul style="list-style-type: none"> <li>All persons recommend.</li> </ul>	<ul style="list-style-type: none"> <li>✓ There are enough standard lamps in every workplace of the company.</li> </ul>
2.4	Particles/dust in Workplace	<ul style="list-style-type: none"> <li>The 9 persons mentioned it was no particles, but 8 persons mentioned there was a little.</li> </ul>	<ul style="list-style-type: none"> <li>✓ Workers at the site will be fitted with a mask and regularly cleaned to remove particles.</li> </ul>
2.5	Ventilation System in Workplace	<ul style="list-style-type: none"> <li>All persons recommend.</li> </ul>	<ul style="list-style-type: none"> <li>✓ There is adequate ventilation in the workplace. There are exhaust system and air conditioning system.</li> </ul>
<b>3. Suggestion on the Social Relation in Workplace</b>			
3.1	Social Relation between Employees	<ul style="list-style-type: none"> <li>All persons mentioned it was convenient with upper level.</li> </ul>	<ul style="list-style-type: none"> <li>✓ Employees from different level work or act together with good collaboration</li> </ul>

#### 11.4 Consultation Meeting with the Relevant Government Organization and Neighbors of the Factory

For the reporting of environmental management plan, the purpose of consultation meeting is to inform and request comments about of the project to the local community. There were 16 persons attended to the meeting, responsible person of Industry Zone Management Committee, relevant to the government organization, responsible person from the vicinity of the factory, responsible persons from both factories and third-party organization. There were received 14 comments in the meeting. The facts of public consultation meeting were shown in **Table 11-2**. The attendance lists are attached in **Appendix 31** and also suggestion sheets in **Appendix 32**.

Method: Meeting

Date: 16.10.2021

Participant: Responsible person of Industrial Zone Management Committee, relevant to the government organization, responsible person from the vicinity of the factory, responsible persons of the factory and third-party organization.

Venue: Industrial Zone Management Committee Office, Mingaladon Industrial Park (MIP), Mingalardon Township, Yangon Region.





Figure 11-2 Consultation Meeting with the Relevant Government Organization and the Neighbors of the Factory

Table 11-2 Summary of Discussion in the Meeting

Sr. No.	Participants	Explanations/ Responses of Factory
1	<b>Daw Nyo Lin Htet</b> (Deputy Officer) Yangon Region (North district), Environmental Conservation Department <ul style="list-style-type: none"> <li>An environmental team must be formed at the factory.</li> <li>Trainings Program and the environmental awareness program should be provided to the workers by the team.</li> <li>For more information on environmental conservation, please visit the Department of Environmental Conservation's website and social media pages.</li> <li>The guidelines set by the Department of Environmental Conservation should be followed.</li> <li>Emphasis should be placed on health care for employees working in the factory.</li> <li>It is recommended that the required business licenses for the factory business be submitted to the relevant department for approval.</li> </ul>	<b>U Kyaw Soe Win</b> - Managing Director (Green Myanmar Environmental Services Co., Ltd) <ul style="list-style-type: none"> <li>The skilled staff such as Pollution Control Manager or Safety Officer will be appointed in their factories.</li> <li>The proponent needs to take care of the occupational safety and environmental protection of the employees in the relevant factories.</li> <li>Participants were also encouraged to submit comments on the suggestion letter if they did not wish to do so in person.</li> </ul>

Table 11-3 Description of Suggestion Letter from the Meeting

Sr. No.	Name	Comments
1	U Aung Thu	➤ Good environmental management arrangements
2	Daw May Myo Shwe	➤ Convenient to prevent environmental damage ➤ Complete in all respects
3	U Tun Lin Kyaw	➤ Social welfare of employees ➤ Health and employment ➤ Please try to get a regular salary
4	U Thet Myo Htike	➤ Wastewater treatment system is found at the factory ➤ Water pH is 6.35 according to Green Myanmar Analysis ➤ Wastewater treatment should be maintained regularly due to the use of chemicals ➤ Plastic Injection machines are running. Ventilation system should be provided for odors and should be maintained ➤ Chemical management plans should be developed and implemented to protect the workplace and the environment
5	Daw Zin Mar Hlaing	➤ No comments
6	Ma May Chan Khaing	➤ No comments

Sr. No.	Name	Comments
7	Daw May Aye	➤ Follow to the laws and regulations issued by the government
8	Daw Nyo Lin Htet	➤ Apply for a license from the relevant department for handling and handling chemicals ➤ Describe daily/monthly energy consumption in a report ➤ There is follow to the national environmental quality (emission) guidelines for discharging of wastewater, emission of Exhaust fumes, Noise in workplace ➤ It is suggested that staff be educated on environmental awareness dissemination and environmental awareness on the Environmental Conservation Department Yangon Region Facebook Page

## 12.0 WORK PLAN AND IMPLEMENTATION SCHEDULE

### 12.1 Social Environmental Aspects

- There is No rehabilitation/resettlement issues are involved
- The project on implementation will generate direct employment opportunities
- The project is a manufacturing factory, which is owned by Myanmar Asia Optical International (MAOI) Company Limited, hence the tax revenue for proposed project will be directly paid to the Government.
- Activities such as donation and charity had been implemented.
- Project proponent is already engaged with many activities under various sector such as public educational, health, cultural as well as welfare activities, and will continue the activities with updated mechanisms.

### 12.2 Time Schedule for Implementation of the EMP

The time schedule for implementation of the EMP is as follows.

Actions	Responsible Party/ Person	Monitoring/ Measurement
Develop action plans against mitigation measures	Myanmar Asia Optical International (MAOI) Company Limited	Will do in future
Implement mitigation action plans, re-layout, install new equipment		No need yet
Install fire protection system at storage area		Done
Provide training and on EMP implementation		Training Records

## 13.0 CONCLUSIONS AND RECOMMENDATIONS

During the preparation of EMP report, it was observed that most of the negative impacts on the environment are largely localized. The negative environment impacts that will result from the project include waste generation, emissions, and fire hazards during operation which, however, can be mitigated if adequate control measures are taken. Based on this environmental study, environmental management and mitigation measures are proposed to ensure that there are no environmental impacts that exceed acceptable levels.

### 13.1 Findings

The impact on the social environment shall be positive because the local people is hired during operation of the project, and here, improving the livelihood. Since the proposed project area is in the industrial zone, there is no significant impacts for biodiversity, cultural and heritages.

For the environmental quality monitoring, **Ambient air quality** was measured for 24 hours within the project area. The collected air quality monitoring data were checked with the target values and the results are recorded in Tables. It was found that the particulate matters (PM<sub>10</sub> and PM<sub>2.5</sub>) were much higher than the guideline values because vehicles and humans are moving around the air measuring station. The other parameters of the ambient air quality are within the National Environmental Quality (Emission) Guidelines. The **workplace (indoor) air quality** was measured at 15 locations, although there are no specific guidelines. The **stack emission measurement** was done. The results of stack emission gases from generators are within the desirable limits and the other parameters do not have the specific guidelines.

**Ambient noise level** measuring was measured for 24 hours within the project area at the same ambient air quality measuring points. According to the investigation, both daytime and nighttime results are within the guidelines, and it can be said that the noise values cannot affect the workers and the environment. The **workplace (indoor) noise level** measuring was done at 17 locations and the results are compared with OHS exposure guidelines. According to the measuring results of average noise levels at workplace, the noise levels were within the acceptable conditions except generator rooms. The major noise pollution source inside the factory may be happened due to operation of generators and they are used in case of emergency only when the electricity goes out.

**Light intensity** measuring was done at six locations in the workplace and all the results were within the acceptable limits.

For **water quality**, selected water quality parameters of ground water have been studied for assessing the water environment and evaluating the anticipated impact of the proposed project. tube well water and wastewater samples were collected and analyzed at the laboratory of Green Myanmar Environmental Services Co., Ltd. and ALARM ecological laboratory. According to the water quality results, although the chloride and manganese, TDS, total iron and turbidity from WSP-3 (raw water) and WSP-8 (Tube well water) are higher than the WHO drinking water standards, it is found that these parameters are within the standards after treatment expect the turbidity values. According to the wastewater analysis results, pH values from WSP-6 (Drain 5 in front of the Factory) and WSP-9 (Drain 1



in front of the Factory) are a little lower than the guidelines and COD of all wastewater samplings, oil and grease from WSP-4 (Wastewater Treatment Outlet) and WSP-5 (Wastewater Treatment Inlet) and TSS values from WSP-4, WSP-5, WSP-7 (Drain 3 in front of the Factory) are higher than the guideline values. The other parameters are within the limits. This impact can be reduced by mitigation measures.

In order to monitor the **soil quality**, soil sample is collected from inside the project site and tested at GMES laboratory. The analysis results of the physico- chemical parameters are presented in Tables.

The main impact for this project is solid waste generation, wastewater generation and fire hazards. Even though the project proponent provides the firefighting equipment and waste disposal system, make sure to follow the instruction every time.

### 13.2 Recommendations

The following recommendations have been made for efficient and effective implementation of environmental conservation, ecosystem management, health and safety, social responsibilities measure through the lifespan of the proposed project:

- Follow the comments and suggestions made by ECD after reviewing this EMP report
- Once EMP is approved by concerned authorities, strict implementation is essential
- For full and proper implementation of EMP, well understanding and supports by proponent and its administrative authority is deeming necessity
- Fully implement Corporate Social Responsibility (CSR) Plan as an ethical business obligation, so as to be regarded as good neighbor/investor in the neighborhood
- Daily, monthly and annual action plan shall be formulated based on EMP and fully practiced
- Environmental Management Plan (EMP) in this report mainly deals through awareness campaigns, provision of safety measures and sanitation such as clean toilets, provision of first-aid kit, training and estimated cost required for implementation of EMP.

The project proponent also needs to provide -

1. Separate clinic room with patient beds where injury employees can rest for a while
2. First-aid kits at operation rooms in order to give medical assistance for less severe accident at workplace
3. Write Emergency Calls Numbers clearly on notice board
4. Keep ready Standard Operation Procedure for machines and Safety Data Sheet (SDS) for materials at visible working place
5. Provide more ventilation at workplaces
6. Clean regularly to remove foul odor from toilets
7. Use two languages (Chinese and Myanmar) in instructions and notices so that all employees can understand clearly.
8. Plant trees for fresh air

### 13.3 Conclusions

The positive impacts will arise from the project if well implemented and laws adhered to and will benefit all stakeholders in the region. The project proponent has promised to adhere to prudent implementation of the environmental management plan in addition to carrying out annual environmental audits which identify and mitigate any unforeseen negative impact.

In addition, the following conclusions are drawn:

- There will be no significant negative impacts arising from the operation of the proposed development.
- The proposed development and associated infrastructure implementations are of an appropriate scale relative to the existing layout.
- The development is consistent with the national development ambitions for the area.
- No significant adverse impacts on cultural and industrial heritage arise from the development.

The Project will cause some minor environmental impacts, which will be both positive and negative. The impacts resulting from the Project include

- air emission and suspension of dust,
- increased traffic within the industrial zone due to the transportation of raw materials and products,
- increased growth in the economy of the region,
- substantial income and employment opportunities and
- reduced poverty.

Implementation of appropriate mitigation measures during operation phases will minimize the negative impacts of the project to acceptable low levels. Environmental monitoring of the project will be undertaken regularly and through the first five years of its operation to ensure that the measures are being implemented properly and in compliance with the environmental rules and regulations.

In conclusion, the project will have overall beneficial impacts in reducing air pollution, dust, and improving socioeconomic conditions along the project corridor, and will have insignificant negative impacts, which will be carefully monitored and adequately mitigated.