ENVIROMNENTAL IMPACT ASSESSMENT

[Manufacturing and marketing of Pharmaceutical Products]

RVK Myanmar Co., Ltd.

Block No. 662-Ka (N 14 to N 47), Block No. 655 (N 1 to N 10), Kan Gyi Kone village tract, Mandalay-Lashio Road, Pyin Oo Lwin Township, Mandalay Region, Myanmar.

27 February 2024

Green Enviro Services Ltd.

Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

%	Percentage
ºC	Degrees Celsius
dB (A)	Decibel unit
km	Kilometer
µg/m^3	Micro Gram per Cubic meter
mg/l	Milligram per Liter
ppm	Part Per Million
MWh	Mega Watt per Hour
MT	Metric Ton
BOD	Biochemical Oxygen Demand
CH_4	Methane
CO	Carbon Monoxide
CO_2	Carbon Dioxide
COD	Chemical Oxygen Demand
NO_2	Nitrogen Dioxide
O_3	Ozone
pH	Pond us Hydronium
PM	Particulate Matter
SO_2	Sulfur dioxide
VOC	Volatile Organic Compound
CSR	Corporate Social Responsibilities
ECD	Environmental Conservation Department
ECL	Environmental Conservation Law
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
GIS	Geographic Information System
GMP	Good Manufacturing Practice
EHS	Environmental, Health, and Safety
IEE	Initial Environmental Examination
IFC	International Finance Cooperation
MEHL	Myanmar Economic Holdings Ltd.
MIC	Myanmar Investment Commission

MOH	Ministry of Health
MONREC	Ministry of Natural Resources and Environmental Conservation
NAA	National Ambient Air Quality Standard
NECC	National Environmental Conservation Committee
NEQG	National Environmental Quality (Emission) Guideline
UNFCCC	United Nations Framework Convention on Climate Change
WHO	World Health Organization

RVK Myanmar
RV Group Company

Factory - Block No.16, Kan Gyi Kone Village, Group, Nearby Anesakhan Airport, Mandalay Lashio Road
Pyin Oo Lwin Township, Mandalay Region, Myanmar.
Yangon Office - Room No. (1101), Level 11, Time City Office Tower(3), Kyundaw Street
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"ENVIRONMENTAL COMMITMENT AND ACCOUNTABILITY STATEMENT"

Subject: Commitment to Environmental Compliance for the Pharmaceutical Factory Project

In reference to the Environmental Impact Assessment (EIA) report prepared by Green Enviro Services Ltd. in accordance with established procedures and legal frameworks, RVK Myanmar Co., Ltd. hereby affirms its unwavering commitment to environmental stewardship and compliance.

We pledge to adhere strictly to the following principles:

1. We will uphold all commitments outlined in the EIA report, ensuring their full implementation throughout the lifecycle of the "Manufacturing and Marketing of Pharmaceutical Products Project."
2. Our operations will consistently align with environmental laws and regulations, with particular emphasis on compliance with the Environmental Conservation Law 2012, Environmental Conservation Rules 2014, National Environmental Quality (Emission) Guideline (2015), and pertinent environmental standards.
3. We will meticulously execute all plans and measures delineated in the EIA report, including strategies for impact avoidance, mitigation, and comprehensive management of the project's operations and eventual decommissioning.
4. We affirm the accuracy and completeness of the Environmental Impact Assessment, conducted in strict accordance with relevant legal procedures.
5. The project's commitment to environmental impact reduction, as articulated in the Environmental Impact Assessment report, will be rigorously upheld and continuously monitored.
6. In the event of factory closure, we will diligently implement the environmental impact reduction measures outlined in the decommissioning phase of the report.
7. RVK Myanmar Co., Ltd. recognizes the critical importance of environmental preservation and pledges unwavering dedication to fulfilling our obligations as responsible corporate citizens. We remain steadfast in our commitment to sustainable practices and environmental accountability.

Sign:

Myat Myat Soe
Factory Director
RVK Myanmar Co., Ltd.
Myamar Pharmaceutical Factory
Pyin Oo Lwin

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"ENVIRONMENTAL COMMITMENT AND ACCOUNTABILITY STATEMENT"

Subject: Commitment to Environmental Compliance for the Pharmaceutical Factory Project

As the team responsible for the preparation of the Environmental Impact Assessment (EIA) report, Green Enviro Services Ltd. hereby affirms our commitment to environmental stewardship and compliance with applicable laws and regulations.

The EIA report, meticulously crafted in accordance with the EIA procedure (December 2015) and other pertinent legal frameworks, reflects our unwavering dedication to accuracy, completeness, and adherence to established procedures.

We assert, with confidence, that:

A. The EIA report is accurate and comprehensive, representing a thorough examination of the project's potential environmental impacts and mitigation measures.

B. The preparation of the EIA report adhered strictly to all relevant laws, rules, regulations, and procedures governing environmental assessments.

Green Enviro Services Ltd. stands behind the integrity of the EIA report, which was crafted in full compliance with the Environmental Conservati on Law (2012), Environmental Conservation Rules (2014), National Environmental Quality (Emission) Guideline (2015), and other pertinent environmental standards.

Through the successful integration of mitigation measures outlined in the Environmental Management Plan (EMP), we are committed to ensuring that the proposed project operates in harmony with the environment while meeting all regulatory requirements.

Daw Phyu Sin Maung

Team Leader

Green Enviro Services Ltd.

အကျဉ်းချုပ်အစီရင်ခံစာ

RVK Myanmar Co., Ltd. သည် မြန်မာနိုင်ငံတွင် တည်ဆဲဥပဒေများနှင့်အညီ ဆေးဝါးထွက်ကုန်များ ထုတ်လုပ်သည့်လုပ်ငန်းကို လုပ်ကိုင်ရန် ရည်ရွယ်ချက်ဖြင့် တည်ထောင်ခဲ့ပါသည်။ ပြင်ဦးလွင်မြို့ရှိ မြန်မာ့ဆေးဝါးစက်ရုံ (MPF) ကို မြန်မာစီးပွားရေးဦးပိုင်လီမိတက် (MEHL) ထံမှ နှစ်ရှည်ငှားရမ်း ဆောင်ရွက်ခွင့်ရရှိထားပြီးဖြစ်သည်။ RVK Myanmar Co., Ltd. သည် မြန်မာနိုင်ငံတော်၏ နိုင်ငံခြားရင်းနှီးမြှုပ်နှံမှု ဥပဒေနှင့်အညီ မြန်မာနိုင်ငံတွင် ပေါင်းစပ်ဖွဲ့စည်းထားသော RVK Myanmar Co., Ltd. နှင့် စင်္ကာပူနိုင်ငံတွင် ပေါင်းစပ်ဖွဲ့စည်းထားသော RV Group (S) Pte Ltd. တို ပါဝင်သော ဖက်စပ်နိုင်ငံခြားရင်းနှီးမြှုပ်နှံမှုကုမ္ပဏီတစ်ခုဖြစ်ပြီး ဒေါ်မေသူဝင်း၏ ရှယ်ယာအချိုး – ၁.၅ ရာခိုင်နှုန်း၊ Mr.Rajesh Kumar – ၈ ရာခိုင်နှုန်းနှင့် RV Group (s) pte ltd. – 90.5 ရာခိုင်နှုန်းအချိုးကျပါဝင်ထားသည်။ RVK Myanmar Co., Ltd. သည် မြန်မာနိုင်ငံ ဆေးဝါးစက်ရုံ (POL) တံဆိပ်များဖြင့် ငါးနှစ်ကြာ ထုတ်လုပ်ပြီးနောက် အမြတ်၏သုံးရာခိုင်နှုန်းအောက်ရှိသော Royalty Fees ကို မြန်မာ့စီးပွားရေး ဦးပိုင်လီမိတက်သို့ ပေးဆောင်ရန် သဘောတူညီခဲ့သည်။

မြန်မာ့ဆေးဝါးစက်ရုံ၏ စီမံကိန်းနေရာသည် အရှေ့ဘက်တောင်တန်းပေါ် ပင်လယ်ရေမျက်နှာပြင် အထက် ၁,၀၇၈ မီတာနှင့် မန္တလေးမြို့မှ ၅၄.၅ ကီလိုမီတာအကွာ ပြင်ဦးလွင်မြို့၊ ကန်ကြီးကုန်းကျေးရွာ အနီး မြောက်လတ္တီတွဒ် ၂၁°၅၆'၄၃.၅၉" နှင့် အရှေ့လောင်ဂျီတွဒ် ၉၆°၂၄'၂၂.၇၄" တွင် တည်ရှိပါသည်။ မန္တလေး-လားရှိုးလမ်းမှ အလွယ်တကူ သွားလာနိုင်ပြီး မီးရထားသယ်ယူပို့ဆောင်ရေးတိုက်ရိုက်မရှိပေ။

စုစုပေါင်း ရင်းနှီးမြှုပ်နှံမှုမှာ အမေရိကန်ဒေါ်လာ ၅ သန်း (ပြည်တွင်းသုံးအတွက် ကျပ် ၁၀,၀၈၀ ဒသမ ၂၉ သန်းနှင့် စက်ယန္တရားများနှင့် ကုန်ကြမ်းအတွက် အမေရိကန်ဒေါ်လာ ၄,၃၂၉,၆၂၈ ဒသမ ၈၀) ကို အစုရှယ်ယာရှင်သုံးဦးက ရင်းနှီးမြှုပ်နှံထားပြီး မြန်မာနိုင်ငံကုမ္ပဏီများအက်ဥပဒေအရ ဖွဲ့စည်းခြင်းဆိုင်ရာ သက်သေခံလက်မှတ် (ကုမ္ပဏီမှတ်ပုံတင်လက်မှတ်) အမှတ် ၁၀၇၅၀၇၂၇၆၉ (177 FC/2015-2016)၊ ရရှိထားပြီးဖြစ်သည်။

ဆေးဝါးထုတ်လုပ်သည့် စက်ရုံတွင် လည်ပတ်ဆောင်ရွက်သည့် လုပ်ငန်းစဉ်များသည် ရှုပ်ထွေးပြီး အလွန်အထိခိုက်မခံသော၊ တိကျမှုများစွာလိုအပ်သော၊ လုပ်ထုံးလုပ်နည်းများကို တင်းတင်းကျပ်ကျပ်လိုက်နာခြင်းဖြင့် ဆောင်ရွက်ရပါသည်။ ကုန်ကြမ်းများကို လက်ခံစစ်ဆေးပြီးသည်နှင့် ထိန်းချုပ်ထားသော အပူချိန်ဖြင့် သင့်လျော်သော သိုလှောင်မှုတွင် ချက်ချင်းထားရှိရန် လိုအပ်ပါသည်။ RVK စက်ရုံမှ ထုတ်လုပ်သော ဆေးဝါးအမျိုးအစားများမှာ ဆေးပြားများ၊ ဆေးတောင့်များ၊ ခံတွင်းဆေးအရည်၊ ခံတွင်းဆေးအမှုန့်၊ ထိုးဆေးမှုန့်၊ သွေးကြောသွင်းဆေးရည်၊ ထိုးဆေး၊ ပြင်ပသုံးဆေးရည်၊ မျက်စဉ်းဆေး၊များဖြစ်သည်။ ဆေးဝါးထုတ်လုပ်သည့်စက်ရုံတစ်ခု၏ ထုတ်လုပ်မှုလုပ်ငန်းစဉ်တွင် လုပ်ငန်းစဉ်အမျိုးအစားများစွာပါဝင်ပြီး ထုတ်လုပ်မှုလုပ်ငန်းစဉ် အမျိုးအစားတစ်ခုစီမှာ အောက်ပါအတိုင်းဖြစ်သည်။

ထိုးဆေးအမှုန့်ထုတ်လုပ်ပုံအဆင့်ဆင့် (Antibiotic Powder for Injection)

WFI ဖြင့် ပြန်လည်ရောစပ် ပြန်လည်ပြုလုပ်ပြီးမှ အသုံးပြုရသော ထိုးဆေးအမှုန့် ဖြစ်သည်။ ယင်းထိုးဆေးအမှုန့်များမှာ အလွန်ဂရုစိုက်ရသော Coephalosporin အုပ်စု Third generator product များဖြစ်သည့် အလျောက် ကိုင်တွယ်ဆောင်ရွက်ရာတွင် အထူးဂရုပြုဆောင်ရွက်ရသည်။ အာနိသင်ဆေးရင်းသည် အလုံပိတ်ပိုးသတ်ပြီး ထုတ်ပိုးခြင်းဖြင့် လက်ခံရယူရသည်။ ၎င်းထိုးဆေးအမှုန့်များကို သန့်စင်မှုအဆင့် Grade A/B (သို့မဟုတ်) 100 class (သို့မဟုတ်) ISO အဆင့် (၅)ရှိ Laminar Air Flow အောက်တွင်သာဖွင့်၍ ဆေးမှုန့်ဖြည့်

စက်တွင် ထည့်သွင်း၍ အသန့်စင်ဆုံး အခြေအနေအောက်တွင် vial ခေါ် ဆေးပုလင်းငယ်များတွင်းသို့ သတ်မှတ်အလေးချိန်ပမာဏအတိုင်း တိကျစွာဖြည့်တင်းခြင်း၊ ယင်းသန့်စင်မှုအဆင့်အောက်တွင်ပင် Rubber insert ချက်ချင်းပိတ်ခြင်း ဆက်လက်၍ Aluminium flip off cap အဖုံးများပိတ်ခြင်းများဆောင်ရွက်ရသည်။ အခန်းသန့်အဆင့် (100 class) တွင် ယင်းသို့ဆောင်ရွက်ပြီး အခန်းသန့်အဆင့် (10000) ရှိသော အခန်းသို့ conveyor ဖြင့်ပို့ဆောင်ပြီး မျက်မြင်စစ်ဆေးခြင်း ဆောင်ရွက်ရသည်။ စစ်ဆေးမှုအောင်မြင်သော ထိုးဆေးမှုန့်ပုလင်းများကို အလိုအလျောက်တံဆိပ်ကပ်စက်သို့ ပို့ဆောင်ပြီး ထုတ်လုပ်မှုအမှတ်စဉ်၊ ထုတ်လုပ်သည့်ရက်စွဲ၊ သက်တမ်းကုန်ဆုံးရက်များရိုက်နှိပ်၍ တံဆိပ်ကပ် ဆောင်ရွက်ရသည်။ ယင်းနောက် ဆက်လက်၍ ထုပ်ပိုးမှုအဆင့်များ ဆောင်ရွက်ရသည်။ ထိုဆေးဝါးထုတ်လုပ်မှုနည်းစဉ်တွင် မန်းကင်းသန့်စင်သော အခြေအနေတွင် အားလုံးတပြိုင်တည်း လုပ်ဆောင်ရခြင်းဖြစ်သည်။ ထိုးဆေး မှုန့်ထည့်သွင်းသော vial ပုလင်းနှင့် အဖုံးပိတ်များမှာလည်း ထိုးဆေးသုံးပစ္စည်းများဖြစ်သည့်အလျောက် ထိုးဆေးအဆင့်ရေဖြင့် ဆေးကြောခြင်း ပေါင်းတင်ပိုးသတ်ခြင်းများ၊ pyrogen ဖယ်ရှားခြင်းများ ဆောင်ရွက်ပြီးမှ အသုံးပြုရမည်ဖြစ်သည်။

ဆေးတောင့်ထုတ်လုပ်ပုံအဆင့်ဆင့် (Capsule Production Process)

ဆေးတောင့်ထုတ်လုပ်ရန်အတွက် လိုအပ်သော အာနိသင်ဆေးရင်းများနှင့် တွဲဖက်ပစ္စည်းများကို သတ်မှတ်ထားသည့် အရေအတွက်ပမာဏအတိုင်း ကုန်ကြမ်းပစ္စည်းသိုလှောင်ရုံမှ ထုတ်ယူပါသည်။ သတ်မှတ်ထားသည့် ဆေးမှုန့် အရွယ်အစားရရှိရန်အတွက် ဇကာချခြင်းကို ဆောင်ရွက်ပါ။ ပါဝင်ပစ္စည်းများကို တစ်ခုချင်းစီအလိုက် တိတိကျကျ ချိန်တွယ်ပါသည်။ ဆေးတောင့်ဖြည့်တင်းရန်အတွက် အာနိသင်ဆေးရင်းနှင့် တွဲဖက်ပစ္စည်းများကို သမစွာရောနှောမှုရှိစေရန် ရောမွှေခြင်းဆောင်ရွက်ပါသည်။ အရည်အသွေးစစ်ဆေးခြင်းကိုလည်း သတ်မှတ်စံချိန်များနှင့် ကိုက်ညီမှု ရှိ/မရှိကို ထုတ်လုပ်နေစဉ်အတွင်း စစ်ဆေးပါသည်။ ရရှိလာသောဆေးမှုန့်များကို ဆေးတောင့်များအတွင်းသို့ ဖြည့်တင်းခြင်းကို ဆောင်ရွက်ပါသည်။ ထိုသို့မလုပ်ဆောင်မီနှင့် လုပ်ဆောင်ချိန်အတွင်း ဆေးတောင့်တစ်ခုအတွင်းဖြည့်တင်းမည့် ဆေးအလေးချိန်နှင့် အခြားလိုအပ်ချက်များကို စံချိန်စံညွှန်းနှင့်ကိုက်ညီမှုရှိစေရန် ထုတ်လုပ်နေစဉ် အရည်အသွေးစစ်ဆေးခြင်းကို ဆောင်ရွက်ပါသည်။ ၄င်းအပြင် အရည်အသွေးစစ်ဆေးရေးဌာနသို့လည်း နမူနာများပေးပို့စစ်ဆေးပါသည်။ ဆေးဖြည့်တင်းပြီး ဆေးတောင့်များ၏ အပြစ်အနာအစာများကို စစ်ဆေးပါသည်။ စစ်ဆေးပြီး ဆေးတောင့်များကို ဘူးဖြည့်တင်းခြင်း (သို့) ဆေးကဒ်ဖြည့်တင်းခြင်း၊ တံဆိပ်ကပ်ခြင်းတို့ကို ဆောင်ရွက်ပါသည်။ အရည်အသွေးစစ်ဆေးရေးဌာနသို့ ပေးပို့စစ်ဆေးပါသည်။ သတ်မှတ်ထားသော အရေအတွက်များအတိုင်း နောက်ဆုံးအဆင့်ထုတ်ပိုးပါသည်။ ရရှိလာသော ကုန်ချောများကို ကုန်ချောသိုလှောင်ရုံသို့ လွှဲပြောင်းအပ်နှံပါသည်။

သွေးကြောသွင်းဆေးရည်ထုတ်လုပ်ပုံအဆင့်ဆင့် (Large volume parenteral solution)

သွေးကြောသွင်းဆေးရည်ထုတ်လုပ်ရန်လိုအပ်သော အာနိသင်ဆေးရင်းများကို ကုန်ကြမ်းသိုလှောင်ရုံမှ ရယူ၍ ဖော်နည်းကားအတိုင်း ပမာဏများကို ချိန်တွယ်ပြီး သတ်မှတ်ထားသော နည်းစဉ်အတိုင်းလိုက်နာ၍ ဆေးဝါးဖော်စပ်ခြင်းကို ဆောင်ရွက်သည်။ ဖော်စပ်ရာတွင် အသုံးပြုသော ရေသည်ထုတ်လုပ်မှုနည်းစဉ်အရ အဆင့်ဆင့်

သန့်စင်ပြုပြင်ပြီး ပေါင်းတင်ပိုးသတ်ထားသော မန်းကင်းခြင်းကင်းစင်အောင် ပြုလုပ်ထားသော ထိုးဆေးအဆင့် အသန့်စင်ဆုံး ရေပုလင်းဖြစ်ရသည်။ ဖော်စပ်ပြီးသောဆေးရည်များကို မန်းကင်းအခြေအနေအောက်တွင် ပုလင်းဖြည့်တင်းရပါသည်။ ဆေးရည်ပုလင်းများမှာ ဆေးဝါးသုံးအဆင့်ရှိသည့် LDPE အမျိုးအစား ပလတ်စတစ် ကော်ဇော်များဖြင့် ပြုလုပ်ထားပြီး ထိုးဆေးအဆင့်ရေဖြင့် ဆေးကြောထားသော ပုလင်းသန့်များကို အသုံးပြုရပါသည်။ ဆေးရည်ဖြည့်ပြီးသော ပုလင်းများကို မန်းကင်းအခြေအနေအောက်တွင်ပင် rubber insert နှင့် flip-off alu cap များဖြင့် ပိတ်ရပါသည်။ အသုံးပြုသော rubber insert များမှာ ဆေးရည်နှင့် တိုက်ရိုက်ထိတွေ့သည့် ပစ္စည်းဖြစ်၍ ဆေးဝါးသုံးအဆင့်ဖြစ် ခြင်း၊ မန်းကင်းပိုးသတ်ထားပြီး ပစ္စည်းများဖြစ်သည်။ ဖြည့်တင်းပြီးသော ဆေးရည်ပုလင်းများကို terminal sterilization ပြုလုပ်ခြင်း အမှုန်အမွှားပါဝင်မှုကို မျက်မြင်စစ်ဆေးခြင်းများ ဆောင်ရွက်ပြီး တံဆိပ်ကပ်ခြင်း ထုတ်လုပ်ခွင့်လိုင်စင် ထုတ်လုပ်မှုအမှတ်စဉ်၊ ထုတ်လုပ်သည့်ရက်စွဲ၊ သက်တမ်းကုန်ဆုံးရက်များကိုရိုက်နှိပ်ခြင်းပြုပြီး pp plastic အိတ်ဖြင့် လေလုံအောင် ထပ်မံထုပ်ပိုးခြင်းကို ဆောင်ရွက်သည်။ ၄င်းတို့ကို အနည်းဆုံး (၂)ပတ်မျှ ယာယီ သိုလှောင်ထားရှိခြင်းဖြင့် LDPE container ပုလင်းထုတ်လုပ်ခြင်း၏ Sem line များယိုစိမ့်မှု၊ plastic ပုလင်းပြုလုပ်စဉ်က မတွေ့ရသော်လည်း ဆေးရည်ဖြည့်ခြင်း၊ ပေါင်းတင်ပိုးသတ်ခြင်း၊ pressure test စမ်းသပ်ခြင်းများ ဆောင်ရွက်ပြီးနောက် ဖြစ်ပေါ်လာနိုင်သည့် အားနည်းချက်များကို ပြန်လည်သန့်စင်နိုင်ရန်ဖြစ်သည်။ ယင်းသို့ ယာယီသိုလှောင်မှုအနည်းဆုံး (၂)ပတ်ထားရှိပြီးသောအခါ ချို့ယွင်းချက်မရှိ အရည်အသွေးစစ်ဆေးခြင်းမှ ဆေးကျမ်းများအလိုအရ သတ်မှတ်ချက်များပြည့်စုံ၍ ကုန်ချောသိုလှောင်ရုံသို့ လွှဲပြောင်း အပ်နှံရသည်။

ထိုးဆေးထုတ်လုပ်ပုံအဆင့်ဆင့် (Small volume parenteral solution production process)

သွေးကြောသွင်းဆေးရည်ထုတ်လုပ်ရန်လိုအပ်သော အာနိသင်ဆေးရင်းများကို ကုန်ကြမ်းသိုလှောင်ရုံမှ ရယူ၍ ဖော်နည်းကားအတိုင်း ပမာဏများကို ချိန်တွယ်ပြီး သတ်မှတ်ထားသော နည်းစဉ်အတိုင်းလိုက်နာ၍ ဆေးဝါးဖော်စပ်ခြင်းကို ဆောင်ရွက်သည်။ ဖော်စပ်ရာတွင် အသုံးပြုသောရေသည်ထုတ်လုပ်မှုနည်းစဉ်အရ အဆင့်ဆင့် သန့်စင်ပြုပြင်ပြီး ပေါင်းတင် ပိုးသတ်ထားသော မန်းကင်းခြင်း (Sterilized) pyrogen ကင်းစင်အောင် ပြုလုပ်ထားသော ထိုးဆေးအဆင့် အသန့်စင်ဆုံး ရေပုလင်းဖြစ်ရသည်။ ဆေးဝါးဖော်စပ်၍ ထိုးဆေးရည်ဖြည့်တင်းမည့် ထိုးဆေးပုလင်းများမှာလည်း စံသတ်မှတ်ထားသောလုပ်ဆောင်ချက် SOP အရ ဆေးကြောသန့်စင်ပြီး ပိုးသတ်ခြင်း၊ pyrogen ဖယ်ရှားခြင်းများ ဆောင်ရွက်ရသည်။ ၎င်းဆေးပုလင်းများအတွင်းသို့ ဖော်စပ်ပြီးဆေးရည်များကို မန်းကင်းအခြေအနေအောက်တွင် သတ်မှတ်ပမာဏအတိုင်းဖြည့်ပြီးတပြိုင်နက် မီးဖြင့်အပြီးသတ် ပိတ်ရပါသည်။ ထိုးဆေးပုလင်းများအတွင်းသို့ ဆေးရည်ဖြည့်သွင်းခြင်း၊ ပိတ်ခြင်းများဆောင်ရွက်ပြီးသည့်အခါတွင် အပြီးသတ်ပိုး သတ်ခြင်း (terminal sterilization) ကို အသုံးပြုရသည့်ဆေးများအတွက် ဆောင်ရွက်ရပါသည်။ ပိုးသတ်ပြီး ထိုးဆေးပုလင်းများကို ချွတ်ယွင်းချက်များနှင့် အမှုန်အမွှားများကို မီးထွန်းစနစ်ဖြင့် အပြင်စစ်ဆေးခြင်းကို ဆောင်ရွက်ရသည်။ စစ်ဆေးပြီးသော ထိုးဆေးပုလင်းများကို ထုတ်လုပ်သောရက်စွဲ၊ သက်တမ်းကုန်ဆုံးမည့်ရက်စွဲ၊ ဆေးအမျိုးအမည်၊ ထုတ်လုပ်ခွင့်လိုင်စင်အမှတ်၊ ထုတ်လုပ်သည့် အပတ်စဉ်များကို အသားတံဆိပ်ရိုက်နှိပ်ရသည်။ ၎င်းနောက်ယာယီသိမ်းဆည်းခြင်းတွင်ထားပြီး အရည်အသွေးစစ်ဆေးရေးဌာနမှ COA

ရရှိသည်နှင့် secondary packing တွင် ထည့်သွင်းထုတ်ပိုးခြင်း SOP အရ စစ်ဆေးရေတွက်လက်ခံ ထားသော တံဆိပ်များကို ကပ်ရပါသည်။ ကုန်ချောများကို ကုန်ချောသိုလှောင်ရုံသို့ လွှဲပြောင်းပေးပို့ရပါသည်။

ဆေးရည်ထုတ်လုပ်ပုံအဆင့်ဆင့် (Liquid for External Use Production Process)

ဆေးရည်ထုတ်လုပ်ရန်အတွက်လိုအပ်သော ဆေးဝါးကုန်ကြမ်းပစ္စည်းများကို ဆေးဝါး ကုန်ကြမ်းသိုလှောင်ရုံမှ စနစ်တကျလက်ခံရယူပြီးပါက အလေးချိန်ချိန်တွယ်ပါသည်။ ဖော်နည်းကားတွင်ပါရှိသည့်အတိုင်း စံလုပ်ဆောင်ချက်များ(SOP)ကို လိုက်နာ၍ ဆေးဝါးဖော်စပ်ပြုပြင်ပါသည်။ ရရှိလာသော ဆေးရည်ကို အရည်အသွေးစစ်ဆေးရေးဌာနသို့ ပေးပို့စစ်ဆေးရပါသည်။ အရည်အသွေးစစ်ဆေးခြင်းလုပ်ဆောင်ပြီးပါက ဆေးရည်ဖြည့်တင်းခြင်း၊ အဖုံးပိတ်ခြင်းတို့ကို ဆောင်ရွက်ပါသည်။ စနစ်တကျ လက်ခံရရှိသော တံဆိပ်များတွင် ထုတ်လုပ်သည့် အမှတ်စဉ်၊ ထုတ်လုပ်သည့်နေ့စွဲ၊ သက်တမ်း ကုန်ဆုံးရက်တို့ကို ရိုက်နှိပ်ပြီး ပုလင်းများတွင် စနစ်တကျ ကပ်ပါသည်။ ထို့နောက် သတ်မှတ်အရေအတွက်များ အတိုင်း နောက်ဆုံးအဆင့် ထုပ်ပိုးရသည်။ ရရှိလာသော ကုန်ချောများကို ကုန်ချောသိုလှောင်ရုံသို့ စနစ်တကျ လွှဲပြောင်းအပ်နှံပါသည်။

မျက်စဉ်းထုတ်လုပ်ပုံအဆင့်ဆင့် (Ophthalmic Ointment Production Process)

မျက်စဉ်းထုတ်လုပ်ရန်အတွက် လိုအပ်သော အာနိသင်ဆေးရင်းများနှင့် တွဲဖက်ပစ္စည်းများကို သတ်မှတ်ထားသည့် အရေအတွက်ပမာဏအတိုင်း ကုန်ကြမ်းပစ္စည်းသိုလှောင်ရုံမှ ထုတ်ယူပါသည်။ မျက်စဉ်းဖော်စပ်ရာတွင် ပါဝင်သော အခြေခံပစ္စည်းများကို သတ်မှတ်ထားသော ပမာဏအတိုင်း ချိန်တွယ်ပါသည်။ ပြီးလျှင် နည်းစဉ်များအတိုင်း ဖော်စပ်ပြီးပါက စစ်ချရပါသည်။ မျက်စဉ်းဖော်စပ်ရာတွင် အသုံးပြုရမည့် အခြေခံပစ္စည်းများသည် ပိုးမွှားသန့်စင်ရန် လို အပ်သဖြင့် ပိုးမွှားသန့်စင်ခြင်းကို ဆောင်ရွက်သည်။ အာနိသင်ရှိ ဆေးရင်းကို တိကျစွာချိန်တွယ်ပါသည်။ အာနိသင်ရှိဆေးရင်းနှင့် ပိုးမွှားသန့်စင်ပြီးသောပစ္စည်းကို သမစွာရောမွှေခြင်း၊ ကြိတ်ချေခြင်းနှင့် နောက်ဆုံးအဆင့် ရောမွှေပေါင်းစပ်ခြင်းတို့ ဆောင်ရွက်ရသည်။ အရည်အသွေးစစ်ဆေးရန်အတွက် ဆေးနမူနာများကို အရည်အသွေးစစ်ဆေးရေးဌာနသို့ ပေးပို့ရပါသည်။ စနစ်တကျလက်ခံထားသော မျက်စဉ်းဆေးထည့်မည့်ဆေးတောင့်များကို ဆေးကြောခြင်း၊ အခြောက်ခံခြင်း၊ ပိုးသတ်ခြင်းတို့ကို ဆောင်ရွက်ရပါသည်။ မျက်စဉ်းဆေးများကို ပိုးသတ်ထားသော ဆေးတောင့်များဖြင့် ဖြည့်တင်းခြင်းကို ဆောင်ရွက်ရပါသည်။ ထုတ်လုပ်ပြီး မျက်စဉ်းဆေးတောင့်များကို စစ်ဆေးခြင်း၊ ထုတ်ပိုးခြင်းများကို ဆောင်ရွက်ရပါသည်။ ထုပ်ပိုးပြီးပါက အားနည်းချက်များဖြစ်ပေါ်လာမှု ရှိ/မရှိကို သိရှိနိုင်ရန် ယာယီသိုလှောင်ထားရပါသည်။ ထုတ်လုပ်ပြီးကုန်ချောများကို ကုန်ချောသိုလှောင်ရုံသို့ လွှဲပြောင်းအပ်နှံရပါသည်။

ဆေးမှုန့်ထုတ်လုပ်ပုံအဆင့်ဆင့် (Oral Powder Production Process)

ဆေးမှုန့်ထုတ်လုပ်ရန်လိုအပ်သော အာနိသင်ဆေးရင်းများကို သတ်မှတ်ထားသည့် အရေအတွက်ပမာဏများအတိုင်း ကုန်ကြမ်းပစ္စည်းသိုလှောင်ရုံမှ ထုတ်ယူပါသည်။ ၎င်းထုတ်ယူလာသည့် ဆေးဝါးကုန်ကြမ်းပစ္စည်းများကို သတ်မှတ်ထားသောအပူချိန်တွင် အခြောက်ခံကိရိယာကိုအသုံးပြု၍ သတ်မှတ်ထားသည့်အချိန်အတိုင်း

အခြောက်ခံပါသည်။ အခြောက်ခံရရှိသော ဆေးဝါးကုန်ကြမ်းပစ္စည်းများကို လိုအပ်သောအမှုန့်အရွယ်အစားရရှိစေရန် ဓာတုချခြင်းကို ဆောင်ရွက်ပါသည်။ ရရှိလာသောအမှုန့်များကို ထုတ်လုပ်မှုဖော်နည်းကားများတွင် ဖော်ပြထားသည့် ပမာဏများအတိုင်းရရှိရန် အလေးချိန် ချိန်တွယ်ပါသည်။ ဆေးမှုန့်များ အချိုးကျ သမစွာရောစပ်နိုင်ရန်အတွက် ဆေးမှုန့်ရောမွှေစက်ကို အသုံးပြု၍ သတ်မှတ်ချိန်အတိုင်း ဆောင်ရွက်ပါသည်။ ထို့နောက် အရည်အသွေးစစ်ဆေး ရေးဌာနသို့ စံချိန်စံညွှန်းများနှင့် ကိုက်ညီမှု ရှိ/မရှိ ပေးပို့စစ်ဆေးပါသည်။ ဆေးမှုန့်များကို သတ်မှတ်ထားသော အလေးချိန်အတိုင်း ဆေးမှုန့်ဖြည့်တင်းခြင်းနှင့် ဆေးထုပ်များပိတ်ခြင်းကို စက်များကို အသုံးပြု၍ လုပ်ဆောင်ပါသည်။ ပြီးလျှင် အရည်အသွေး စစ်ဆေးရေးဌာနသို့ ပေးပို့စစ်ဆေးပါသည်။ ထုပ်ပိုးရေးဌာနစိတ်တွင် လက်ခံရရှိသော တံဆိပ်များကို အရေအတွက် မှန်/မမှန်စစ်ဆေးခြင်း၊ ထုတ်လုပ်သည့်အပတ်စဉ်၊ သက်တမ်းကုန်ဆုံးရက် ရိုက်နှိပ်ခြင်းများကို ဆောင်ရွက်ပြီး အရည်အသွေးစစ်ဆေးရေးဌာန၌ မှန်ကန်ကြောင်း အတည်ပြုချက်ရယူပါသည်။ ဆေးမှုန့်ဖြည့်တင်းပြီး အထုပ်များကို အပြစ်အနာအဆာများ ရှိ/မရှိ စစ်ဆေးပါသည်။ စစ်ဆေးပြီး ဆေးမှုန့်ထုပ်များ သက်ဆိုင်ရာ carton box များအတွင်းသို့ သတ်မှတ်အရေအတွက်အတိုင်း ထုပ်ပိုးပြီး တံဆိပ်ကပ်ပါသည်။ ထုတ်ပိုးပြီးစီးသော ကုန်ချောများကို ကုန်ချောပစ္စည်း သိုလှောင်ရုံသို့ လွှဲပြောင်းအပ်နှံပါသည်။

ဆေးရည်ထုတ်လုပ်ပုံအဆင့်ဆင့် (Oral Liquid Production Process)

ဆေးရည်ထုတ်လုပ်ရန်လိုအပ်သော အာနိသင်ဆေးရင်းများနှင့် တွဲဖက်ပစ္စည်းများကို သတ်မှတ်ထားသော ပမာဏများအတိုင်း ဆေးဝါးကုန်ကြမ်းပစ္စည်းသိုလှောင်ရုံမှ ထုတ်ယူပါသည်။ ပါဝင်ပစ္စည်းများ၏ ပမာဏကို တစ်ခုခြင်းစီ ချိန်တွယ်ပါသည်။ ပထမအဆင့် သကြားရည် ဖျော်စပ်ရပါမည်။ ဖျော်စပ်ပြီးပါက အရည်အသွေးစစ်ဆေးရေးဌာနသို့ နမူနာပေးပို့ စစ်ဆေးပါသည်။ ဒုတိယအဆင့် ဗီတာမင်ဆေးများကို ဖျော်စပ်ပါသည်။ နောက်ဆုံးအဆင့်တွင် သကြားရည်နှင့် ဗီတာမင်ဆေးရည်များကို သမမျှတမှုရှိစေရန် ရောစပ်ရပါမည်။ ထို့နောက် အမှုန်အမွှားများအား စစ်ချခြင်းနည်းကို အသုံးပြု၍ ဖယ်ရှားရပါသည်။ ပြီးလျှင် အရည်အသွေးစစ်ဆေး ရေးဌာနသို့ နမူနာပေးပို့ စစ်ဆေးပါသည်။ ဆေးရည်ဖြည့်တင်းမည့် ပုလင်းနှင့်အဖုံးများကို အရေအတွက် စိစစ်လက်ခံပြီး၊ ဆေးကြောခြင်း၊ အခြောက်ခံခြင်းများကို ဆောင်ရွက်ပါသည်။ ထို့နောက် ၄င်းပုလင်းနှင့် အဖုံးများကို ဆေးရည်ဖြည့်တင်းသောဌာနသို့ ပို့ဆောင်ပါသည်။ ဆေးရည်ဖြည့်တင်းခြင်း၊ အဖုံးပိတ်ခြင်းကို သတ်မှတ်စက်ကိရိယာများဖြင့် ဆောင်ရွက်ပါသည်။ ထို့နောက် ဆေးဖြည့်ပြီးဘူးများတွင် အပြစ်အနာအဆာများ ရှိ/မရှိ စစ်ဆေးပါသည်။ ထုတ်လုပ်သည့် အပတ်စဉ်၊ ထုတ်လုပ်သည့်ရက်၊ သက်တမ်းကုန်ဆုံးရက်များ ရိုက်နှိပ်ထားသော တံဆိပ်များကို ကပ်ပါသည်။ သတ်မှတ်အရေအတွက် များအတိုင်း ထုပ်ပိုးပါသည်။ ရရှိလာသော ကုန်ချောပစ္စည်းများကို ကုန်ချောပစ္စည်း သိုလှောင်ရုံသို့ လွှဲပြောင်းအပ်နှံပါသည်။

ဆေးပြားထုတ်လုပ်ပုံအဆင့်ဆင့် (Tablet Production Process)

ဆေးပြားထုတ်လုပ်ရန်အတွက် လိုအပ်သောအာနိသင်ဆေးရင်းများနှင့် တွဲဖက်ပစ္စည်းများကို သတ်မှတ်ထား သော အရေအတွက်ပမာဏအတိုင်း ကုန်ကြမ်းပစ္စည်းသိုလှောင်ရုံမှ ထုတ်ယူပါသည်။ သတ်မှတ်ထားသည့် ဆေးမှုန့်အရွယ် အစားရရှိရန်အတွက် ဇကာချခြင်းကို ဆောင်ရွက်ပါသည်။ ပါဝင်ပစ္စည်းများကို တစ်ခုချင်းစီ အလိုက် တိတိကျကျချိန် တွယ်ပါသည်။ ဆေးမှုန့်ခဲပြုလုပ်ရန်အတွက် ဆေးမှုန့်များကို ဦးစွာသမအောင်ရောမွေ ပါသည်။ သမစွာရောမွေထားသော ဆေးမှုန့်များကို ကော်ရည်လိုသလောက်ထည့်ပြီး ဆေးမှုန့်ခဲပြုလုပ်သည့် စက်ကို အသုံးပြု၍ ဆေးမှုန့်ခဲပြုလုပ်ပါသည်။ ရရှိလာသော ဆေးမှုန့်ခဲများကို သတ်မှတ်ထားသော အပူချိန်တွင် ထားပြီး အခြောက်ခံပါသည်။ အခြောက်ခံ၍ ရရှိလာသောဆေးမှုန့်ခဲများကို သတ်မှတ်ထားသော အရွယ်အစား တူညီစွာရရှိစေရန်အတွက် ဇကာချခြင်းလုပ် ဆောင်ပါသည်။ အကယ်၍ အရွယ်အစားကြီးမားသည်များပါရှိလာ ပါက ပြန်လည်ကြိတ်ချေခြင်းကို ဆောင်ရွက်ပါ။ ထို့နောက် အရည်အသွေးစစ်ဆေးရေးဌာနသို့ နမူနာပေးပို့စစ် ဆေးပါသည်။ ရရှိလာသော ဆေးမှုန့်ခဲများနှင့် ဆေးပြားရိုက်ရာတွင် လွယ်ကူမှုရှိစေရန် အသုံးပြုသည့် တွဲဖက် ပစ္စည်းများကို သတ်မှတ်ထားသည့်အတိုင်း သမအောင်ရောမွေပါသည်။ ရောမွေပြီး ရရှိလာသည့်ဆေးမှုန့်ခဲများ ကို ထုတ်လုပ်နေစဉ် အရည်အသွေးစစ်ဆေးရေးဆောင် ရွက်ပါသည်။ သတ်မှတ်ထားသောအလေးချိန်၊ အရွယ် အစားများအတိုင်း ဆေးပြားရိုက်စက်ကို အသုံးပြု၍ ဆေးပြား ရိုက်ခြင်း ဆောင်ရွက်ပါသည်။ ဆေးပြားရိုက်ခြင်း မဆောင်ရွက်မီနှင့် ဆောင်ရွက်နေစဉ်အတွင်း သတ်မှတ်စံချိန်စံညွှန်းနှင့် ကိုက်ညီမှုရှိစေခြင်း၊ ထုတ်လုပ်နေစဉ် အရည်အသွေးစစ်ဆေးခြင်းကို ဆောင်ရွက်ပါသည်။ ၎င်းအပြင် အရည်အသွေးစစ်ဆေးရေးဌာနမှလည်း ဆေး ပြားအရည်အသွေးစမ်းသပ်ရန်အတွက် နမူနာများရယူပါသည်။ ရရှိလာသောဆေးပြားများကို အပြစ်အနာ အဆာများ စစ်ဆေးပါသည်။ စစ်ဆေးပြီးဆေးပြားများကို စစ်ဆေးပါသည်။ အရည်အသွေးစစ်ဆေးရေးဌာနသို့ နမူနာပေးပို့စစ်ဆေးပါသည်။ ဆေးပြားအလွှာပါးအုပ်ခြင်း ဆက်လက်ဆောင်ရွက်ပါသည်။ ဆေးပြားအလွှာဖုံး အုပ်ပြီး ဆေးပြားများကို အပြစ်အနာအဆာ ရှိ/မရှိ ထပ်မံစစ်ဆေးပါသည်။ ဆေးပြားများကို ဖြည့်တင်းခြင်း၊ တံဆိပ်ကပ်ခြင်း၊ ထုတ်လုပ်သည့်အပတ်စဉ်၊ ထုတ်လုပ်သည့်ရက်စွဲ၊ သက်တမ်းကုန်ဆုံးရက်များ ရိုက်နှိပ်ခြင်း တို့ကို ဆောင်ရွက်ပါသည်။ ပုလင်းဖြင့် ဖြည့်တင်းခြင်း မပြုလုပ်သည့် ဆေးပြားများကို ဆေးကဒ်အတွင်း ဖြည့် တင်းခြင်းနှင့် ဆေးဘူးထဲသို့ ထုပ်ပိုးမှု ဆောင်ရွက်ပါသည်။ ရရှိသောဆေးဘူးများကို Carton Box များဖြင့် နောက်ဆုံးအဆင့် ထုပ်ပိုးမှု ဆောင်ရွက်ပါသည်။ ရရှိလာသော ကုန်ချောပစ္စည်းများကို ကုန်ချောသိုလှောင်ရုံသို့ လွှဲပြောင်းအပ်နှံပါသည်။

ဆေးဝါးပစ္စည်းများကို သင့်လျော်စွာထုပ်ပိုးပြီး စက်ရုံမှ ကုန်တင်ကားများဖြင့် မြန်မာနိုင်ငံတစ်ဝှမ်းရှိ နေရာအ သီးသီးသို့ ပို့ဆောင်မည်ဖြစ်သည်။ အဆိုပါစီမံကိန်းကို အကောင်အထည်ဖော်ခြင်းဖြင့် နိုင်ငံအတွက် များစွာ အကျိုး ဖြစ်စေမည်ဖြစ်သည်။

(က) RVK Myanmar Co.Ltd. သည် လူမှုရေးဆိုင်ရာတာဝန်ယူမှု (CSR) အကောင်အထည်ဖော်ဆောင်ရွက် ရန်အတွက် ကုမ္ပဏီ၏အမြတ်ငွေ (3%) ကို အသုံးပြုသွားမည်ဖြစ်ပါသည်။ ကုမ္ပဏီသည် လမ်းပြုပြင်ထိန်းသိမ်း

ခြင်း၊ ကျေးရွာစာသင်ကျောင်းများနှင့် ကျေးရွာစာကြည့်တိုက်များအတွက် ပညာရေးဆိုင်ရာ ပံ့ပိုးကူညီမှုစသည့် ကျေးလက်ဒေသဖွံ့ဖြိုးရေးအတွက် လျာထားငွေ၏ (၂၅%) ကို ပံ့ပိုးပေးရန် ရည်ရွယ်ထားပါသည်။ နောက်ထပ် (၂၅%) ကို ရပ်ရွာလူမှုဖူလုံရေး၊ ကျန်းမာရေးနှင့် အားကစားဆိုင်ရာ ပံ့ပိုးမှုတို့အတွက် လျာထားပြီး (၂၅%) ကို ကျေးရွာရှိ ဘုန်းတော်ကြီးကျောင်းများ၊ ဘာသာရေးဆိုင်ရာ အဆောက်အအုံများနှင့် မြန်မာ့ရိုးရာ ပွဲတော်များသို့ လှူဒါန်းခြင်းနှင့် ဘာသာရေး ပံ့ပိုးမှုတို့အတွက် လျာထားမည်ဖြစ်သည်။ ကျန် (၂၅%) ကို သဘာဝပတ်ဝန်းကျင် ထိခိုက်မှု လျော့ပါးစေရေး၊ စီမံခန့်ခွဲရေးနှင့် စောင့်ကြည့်ရေး အတွက် အသုံးပြုမည်ဖြစ်သည်။

(ခ) အနာဂတ်အလုပ်အကိုင်ဖန်တီးမှုအပေါ် အပြုသဘောဆောင်သော အကျိုးသက်ရောက်မှုရှိစေမည့် အလုပ်အကိုင်အခွင့်အလမ်းများ ပံ့ပိုးပေးမည်ဖြစ်ပါသည်။

ဂ) RVK Myanmar Co. Ltd. သည် အောက်ပါတို့ကို ပြီးမြောက်အောင်မြင်ရန် ရည်မှန်းထားပါသည်။

- စီမံကိန်းဧရိယာအတွင်းရှိ ရပ်ရွာလူထု၏ ကောင်းကျိုးချမ်းသာကို ပံ့ပိုးပေးခြင်းဖြင့် ရေရှည်တည်တံ့သော ချစ်ကြည်ရင်းနှီးသော ဝန်းကျင်ကောင်းတစ်ခု ဖန်တီးခြင်း၊
- ဝန်ထမ်းများအား ၎င်းတို့၏ စိတ်အားထက်သန်မှုအဆင့်များ မြင့်မားနေစေရန်နှင့် လုပ်ငန်းခွင်တွင် ၎င်းတို့၏ ကုန်ထုတ်စွမ်းအားနှင့် စွမ်းဆောင်ရည်များ တိုးမြင့်လာစေရန် ဝန်ထမ်းများ၏ သက်သာချောင်ချိရေး အထောက်အပံ့ပစ္စည်းများကို ပံ့ပိုးပေးခြင်း၊ ဝန်ထမ်းများ၏အသက်မွေးမှုဆိုင်ရာအာမခံချက်ရှိမှုနှင့် လုံခြုံမှုတို့ ခံစားရရှိအောင် ကောင်းမွန်စွာ စီစဉ်ဆောင်ရွက်ထားရှိခြင်း

လုပ်ငန်းတည်နေရာကို ရွေးချယ်ရာတွင် စီးပွားရေးအရ အချက်အချာကျသောအနေအထား၊ စျေးကွက်နှင့် ကုန်သည်များထံ အလွယ်တကူဆက်သွယ်ရောက်ရှိနိုင်မှု၊ ခိုင်မာသောသယ်ယူပို့ဆောင်ရေး အခြေခံအဆောက်အအုံများနှင့်အတူ အဓိကကျသောအချက်များကို ထည့်သွင်းစဉ်းစားပါသည်။ ထို့ပြင် လုပ်ငန်းရေရာကိုရွေးချယ်ခြင်းသည် လုပ်ငန်းလည်ပတ်မှုချောမွေ့စေရန်အတွက် မရှိမဖြစ်လိုအပ်သော ခိုင်မာဘေးကင်းရေးအစီအမံများကို အကောင်အထည်ဖော်ရန် သေချာစေသည်။ အဆိုပါ လုပ်ငန်းတည်နေရာသည် ယခင်က မြန်မာ့စီးပွားရေးဦးပိုင်လီမိတက်မှ လုပ်ကိုင်သည့် လုပ်ငန်းတစ်ခုကို အငှားစာချုပ်ဖြင့် လွှဲယူထားခြင်းဖြစ်သည်။ ထို့အပြင် အနီးတစ်ဝိုက်ရှိ လူဦးရေသိပ် သည်းဆနည်းပါးခြင်းသည် လူနေရပ်ကွက်များနှင့် ဖြစ်ပေါ်လာနိုင်သော ပဋိပက္ခများကို လျော့ပါးသက်သာစေပြီး ဆေးဝါးထုတ်လုပ်ခြင်းလုပ်ငန်းအတွက် အလားအလာရှိပြီး ရေရှည်တည်တံ့သော အခြေခံအုတ်မြစ်ကို ထူထောင်ပေးပါသည်။

ရည်ရွယ်ချက်

ဤ EIA ၏ ရည်ရွယ်ချက်မှာ လုပ်ငန်း၏ ပတ်ဝန်းကျင်ဆိုင်ရာကိစ္စရပ်များကို အသေးစိတ် အကဲဖြတ်ရန် ဖြစ်သည်။ EIA သည် လုပ်ငန်း၏ပတ်ဝန်းကျင်အပေါ် သက်ရောက်မှုများကို မီးမောင်းထိုးပြရန် လိုအပ်ပြီး စီမံကိန်း၏ရည်မှန်းချက်များ၊ လိုအပ်ချက်များနှင့် ကန့်သတ်ချက်များကို အများပြည်သူနှင့် စိတ်ဝင်စားသူများကို အသိပေးရန်လည်း လိုအပ်ပါသည်။ ဤ Environmental Impact Assessment သည် လုပ်ငန်း၏ သဘာဝ

ပတ်ဝန်းကျင်ဆိုင်ရာ စွမ်းဆောင်ရည်ကို မြှင့်တင်ရန် အပြုသဘောဆောင်သော အကြံပြုချက်များကိုလည်း ပြုလုပ်ပေးပါသည်။

လေ့လာသည့်ဧရိယာ

ဤစီမံကိန်းအတွက် လေ့လာရေးဧရိယာသည် အဆိုပြုထားသော စီမံကိန်းနေရာ၏ ၂ ကီလိုမီတာ အချင်းဝက် အတွင်း ဧရိယာကို ဝန်းရံရန် အကြမ်းဖျင်းသတ်မှတ်ထားပြီး၊ ၎င်းသည် စီမံကိန်း၏လုပ်ဆောင်မှု၏ အလားအလာရှိသော သဘာဝပတ်ဝန်းကျင်နှင့် လူမှုစီးပွားဆိုင်ရာ သက်ရောက်မှုများကို ဖြေရှင်းရန် လုံလောက်မည်ဖြစ်သည်။ ဤအဝန်းအဝိုင်းအတွင်း အောင်ချမ်းသာ၊ ညည်းသာနှင့် ကံကြီးကုန်းကျေးရွာဟူ၍ အသိုင်းအဝိုင်း ၃ ခုရှိပါသည်။

အခြားရွေးချယ်ရန်နည်းလမ်း

လုပ်ငန်း၏အခြားရွေးချယ်စရာများသည် တည်နေရာအခြားရွေးချယ်စရာများ၊ လုပ်ဆောင်ချက်အခြားရွေးချယ်စရာများ၊ လုပ်ငန်းစဉ် သို့မဟုတ် နည်းပညာဆိုင်ရာ အခြားရွေးချယ်စရာများ သို့မဟုတ် No-Action အခြားရွေးချယ်စရာများအပေါ် အခြေခံထားသည်။

(က) အဆိုပြုထားသော စီမံကိန်းကို တည်ထောင်မှုမရှိခြင်း။ (No-Go Alternative)

(ခ) အဆိုပြုထားသော စီမံကိန်းကို နေရာပြောင်းရွှေ့ခြင်း။ (တည်နေရာရွေးချယ်မှု)

(ဂ) စက်ရုံဒီဇိုင်းနှင့် ကျင့်သုံးမှုများ- အဆိုပြုလုပ်ငန်းကို Good Manufacturing Practice (GMP) ဖြင့်လုပ်ဆောင်နေသော ခေတ်မီ၊ နိုင်ငံတကာစံချိန်စံညွှန်း၊ မြင့်မားသောနည်းပညာဖြင့် တည်ထောင်ခြင်း။

(ဃ) အနာဂတ်အဆင့်မြင့်နည်းပညာများကို ပြောင်းလဲခြင်း။

RVK Myanmar Co., Ltd. သည် အဆင့်မီနည်းပညာများ၊ နိုင်ငံတကာစံချိန်စံညွှန်းမီ ဗီသုကာပုံစံများနှင့် လေဝင်လေထွက်စနစ်များကို စက်မှုလုပ်ငန်းစံနှုန်းများဖြင့် အကောင်အထည်ဖော်ခြင်းခဲ့ပါသည်။ ဤခေတ်မီသော အဆောက်အဦများသည် ကောင်းမွန်သောထုတ်လုပ်မှုဆိုင်ရာအလေ့အကျင့်များ (GMP) နှင့် တင်းကြပ်သောအရည်အသွေးထိန်းချုပ်မှုဆိုင်ရာ လုပ်ထုံးလုပ်နည်းများကို တင်းကျပ်စွာလိုက်နာဆောင်ရွက်ပါသည်။ ဖြစ်နိုင်ချေရှိသော သဘာဝပတ်ဝန်းကျင်ဆိုင်ရာ ထိခိုက်မှုများကို လျှော့ချရန်အတွက် လျော့ပါးရေးအစီအမံများကိုလည်း ကျယ်ကျယ်ပြန့်ပြန့်အကောင်အထည်ဖော်ဆောင်ရွက်သွားမည်ဖြစ်ပါသည်။

ဆက်စပ်ဥပဒေများ

ဆေးဝါးထုတ်ကုန်များထုတ်လုပ်ခြင်းနှင့် ရောင်းဝယ်ဖောက်ကားခြင်းလုပ်ငန်းစီမံကိန်းနှင့်စပ်လျဉ်း၍ ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်းအစီရင်ခံစာကို ဂရင်းအန်ဗာရိုဆားဗစ်(စ်)လီမိတက်မှ တာဝန်ယူရေးဆွဲခဲ့ပါသည်။ လေ့လာမှုကိုဆောင်ရွက်ရာတွင် ပတ်ဝန်းကျင်၊ ပတ်ဝန်းကျင်ထိခိုက်မှု၊ လေ၊ ရေနှင့် မြေဆီလွှာညစ်

ညမ်းမှုကာကွယ်ရေးအတွက် လုပ်ဆောင်ချက်များနှင့် ရပ်ရွာလူထုအပေါ် လူမှုစီးပွား သက်ရောက်မှုစသည့် အချက်များအပေါ် အခြေခံထား ဆောင်ရွက်ပါသည်။

အောက်ဖော်ပြပါဥပဒေနှင့် စည်းမျဉ်းစည်းကမ်းများသည် စီမံကိန်းကို အောင်မြင်စွာ အကောင်အထည်ဖော်ရန်အတွက် ဆက်စပ်သက်ဆိုင်မှုရှိပါသည်။

- ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဥပဒေ (၂၀၁၂)
- ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးနည်းဥပဒေ (၂၀၁၄)
- ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာလုပ်ထုံးလုပ်နည်း (၂၀၁၅)
- အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာအရည်အသွေးထုတ်လွှတ်မှုလမ်းညွှန်ချက်များ (၂၀၁၅)
- ရေအရင်းအမြစ်နှင့်မြစ်ချောင်းများထိန်းသိမ်းရေးဥပဒေ (၂၀၀၆)
- မြေအောက်ရေအက်ဥပဒေ (၁၉၃၀)
- ပြည်သူ့ကျန်းမာရေးဆိုင်ရာဥပဒေ (၁၉၇၂)
- ကူးစက်ရောဂါ ကာကွယ်ထိန်းချုပ်ရေးဥပဒေ (၁၉၉၅)
- အမျိုးသားဆေးဝါးဥပဒေ (၁၉၉၂)
- မြန်မာနိုင်ငံရင်းနှီးမြှုပ်နှံမှုဥပဒေ (၂၀၁၆)
- မြန်မာနိုင်ငံမီးသတ်တပ်ဖွဲ့ဥပဒေ (၂၀၁၅)
- ဘွိုင်လာဥပဒေ (၂၀၁၅)
- အလုပ်သမားအဖွဲ့အစည်းဥပဒေ (၂၀၁၁)
- အလုပ်သမားရေးရာအငြင်းပွားမှုဖြေရှင်းရေးဥပဒေ (၂၀၁၂)
- အလုပ်အကိုင်နှင့်ကျွမ်းကျင်မှုဖွံ့ဖြိုးတိုးတက်ရေးဥပဒေ (၂၀၁၃)

ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းနည်းလမ်းများ

(က) တစ်ဆင့်ခံအထောက်အထားစုဆောင်းခြင်းနှင့်ခွဲခြမ်းစိတ်ဖြာခြင်း

EIA အတွက် ပြည့်စုံသောပတ်ဝန်းကျင်ဆိုင်ရာအချက်အလက်ဘဏ်ကို တည်ထောင်ဖို့ တစ်ဆင့်ခံအထောက်အထားစုဆောင်းခြင်းနှင့် ခွဲခြမ်းစိတ်ဖြာခြင်းတို့ပါဝင်သည့်သုတေတနနည်းလမ်းကို အသုံးပြုပါသည်။ အထောက်အထားအဖြစ်ရယူသောအချက်အလက်ကုန်ကြမ်းများတွင် ပြဋ္ဌာန်းစာအုပ်များ၊ ဆောင်းပါးများ၊ မြေပုံများ၊ အင်တာနက်မှ အချက်အလက်များ၊ ဓာတ်ပုံများ၊ GIS အချက် အလက်များနှင့် ယခင် EIA အစီရင်ခံစာများနှင့် မြို့နယ်အပ်ချုပ်ရေးဦးစီးဌာနမှ ပံ့ပိုးပေးထားသော အထွေထွေအုပ်ချုပ်ရေးအချက်အလက်တို့မှရရှိသော တစ်ဆင့်ခံအထောက်အထားများပါဝင်သည်။

(ခ) လူထုနှင့်တွေ့ဆုံဆွေးနွေးခြင်း

အဆိုပြုစီမံကိန်း၏ အလားအလာရှိသော ဂေဟစနစ်နှင့် လူမှုစီးပွားဆိုင်ရာ သက်ရောက်မှုများကို စေ့စေ့စပ်စပ်နားလည် သဘောပေါက်စေရန် ကျယ်ကျယ်ပြန့်ပြန့်ဆွေးနွေးတိုင်ပင်မှုများပြုလုပ်ခဲ့ပါသည်။ ကျေး

ရွာနှင့် ရပ်ကွက်တာဝန်ရှိပုဂ္ဂိုလ်များ၊ ကျေးလက်ခေါင်းဆောင်များ၊ ဘာသာရေးခေါင်းဆောင်များ ဒေသတွင်းနေထိုင်သူများတက်ကြွစွာ ပါဝင်တွေ့ဆုံဆွေးနွေးခဲ့ပါသည်။ ယင်းလုပ်ငန်းစဉ်သည် ပါဝင်ပတ်သက်သူများ၊ ဒေသခံပြည်သူများအား ကျယ်ကျယ်ပြန့်ပြန့်ပါဝင်ဆောင်ရွက်နိုင်ရန်နှင့် အဆိုပြုလုပ်ငန်းစီမံကိန်းနှင့်ပတ်သက်၍ ၎င်းတို့၏ စိုးရိမ်မှုများကို မှတ်ချက်ပေးရန် သို့မဟုတ် ထုတ်ဖော်ပြောဆိုရန် အခွင့်အလမ်းတစ်ခုဖြစ်ပါ သည်။ ဤအများပြည်သူပူးပေါင်းပါဝင်မှုလုပ်ငန်းစဉ်သည် သက်ရောက်မှုဆန်းစစ်ခြင်း လုပ်ငန်းစဉ်အတွက် အခြေခံဖြစ်ပြီး ဆုံးဖြတ်ချက်ချရာတွင် အရေးကြီးသောအစိတ်အပိုင်းလည်းဖြစ်ပါသည်။

(ဂ) ကွင်းဆင်းလေ့လာဆောင်ရွက်ခြင်း

တစ်ဆင့်ခံအထောက်အထားစုဆောင်းခြင်းနှင့်ခွဲခြမ်းစိတ်ဖြာခြင်းမှ ရရှိလာသောအချက်အလက်များကို အတည်ပြုရန်နှင့် ဖြည့်စွက်ရန်အတွက် အဆိုပါလုပ်ငန်း၏ လုပ်ငန်းလည်ပတ်စဉ်ကာလအတွင်း ရာသီအလိုက်ကွင်းဆင်းလေ့လာမှုများကို လုပ်ဆောင်ခဲ့ပါသည်။ ကွင်းဆင်းလေ့လာဆောင်ရွက်ခြင်းတွင် ဂေဟဗေဒဆိုင်ရာ၊ လူမှုစီးပွားနှင့် ကျန်းမာရေးဆိုင်ရာအစိတ်အပိုင်းများအားလုံး အကျုံးဝင်ပါသည်။

(ဃ) ဓာတ်ခွဲစမ်းသပ်ခြင်း

မြေနမူနာများကို ဂရင်းအန်ဗာရိုဆားဗစ်(စ်)လီမိတက်မှ ကွင်းဆင်းနမူနာကောက်ယူ၍ စိုက်ပျိုးရေးဦးစီးဌာန၊ စိုက်ပျိုးရေးနှင့်ဆည်မြောင်းဝန်ကြီးဌာန၏ မြေအသုံးချမှုဌာနခွဲမှ ဓာတ်ခွဲခန်းတွင် စမ်းသပ်စစ်ဆေးခဲ့ပါသည်။

စီမံကိန်းဧရိယာအတွင်းရှိ လုပ်ငန်းသုံးရေနှင့် အနည်ထိုင်ကုသကန်များမှ မှရရှိသော စွန့်ထုတ်ရေနမူနာများကို ISO Tech Laboratory နှင့် ALARM Ecological Laboratory တို့တွင် စမ်းသပ်စစ်ဆေးခဲ့ပါသည်။

ဂရင်းအန်ဗာရိုး၏ အသံတိုင်းတာသည့်အဖွဲ့သည် လုပ်ငန်းလည်ပတ်မှုကာလအတွင်း ပတ်ဝန်းကျင်ဧရိယာ၏ဆူညံသံအဆင့်ကို ကောက်ယူရန် နေ့အချိန် ညအချိန်ခွဲ၍ စီမံကိန်းနေရာသို့ သွားရောက်တိုင်းတာခဲ့ပါသည်။

အခြေခံဝန်းကျင်လေထုအရည်အသွေးအခြေအနေကိုဆုံးဖြတ်ရန် ALARM Ecological Laboratory အဖွဲ့သည် အဆိုပြုစီမံကိန်းရှိ လေထုအရည်အသွေးကို ၂၄-နာရီ တိုင်းတာခဲ့ပါသည်။

Green Myanmar Co., Ltd. သည် လုပ်ငန်းလည်ပတ်စဉ်ကာလတွင် လက်ရှိပတ်ဝန်းကျင်လေထုအရည်အသွေးကို သိရှိနိုင်စေရန်အဆိုပြုစီမံကိန်းနေရာရှိ ဘွိုင်လာခေါင်းတိုင် ထုတ်လွှတ်မှုကို တိုင်းတာခဲ့ပါသည်။

သဘာဝပတ်ဝန်းကျင်နှင့်လူမှုစီးပွားအခြေအနေ

လေ့လာမှုတွင် ပတ်ဝန်းကျင်နှင့်လူမှုစီးပွားဆိုင်ရာအခြေခံကိန်းဂဏန်းအချက်အလက်များကို ကောက်ယူရန်လိုအပ်ပြီး ထိုအချက်အလက်များကိုအခြေခံ၍ စီမံကိန်း၏လည်ပတ်စဉ် ကာလများတွင် တိုက်ရိုက်နှင့် သွယ်ဝိုက်သက်ရောက်မှုများရှိနိုင်မည့်ဧရိယာ၏ ပတ်ဝန်းကျင်နှင့် လူမှုစီးပွား နောက်ခံအချက်အလက်များကို ဖော်ထုတ်ရန်လိုအပ်သည်။

ပတ်ဝန်းကျင်နှင့် လူမှုစီးပွားဆိုင်ရာတို့နှင့်ပတ်သက်၍ အခြေခံကိန်းဂဏန်းများကို အရင်းအမြစ်သုံးမျိုးခွဲခြားထားပါသည်။

- ရုပ်ပိုင်းဆိုင်ရာဝန်းကျင်

- လူမှု-စီးပွားဆိုင်ရာဝန်းကျင်
- ဇီဝအရင်းအမြစ်ဆိုင်ရာဝန်းကျင်

ရုပ်ပိုင်းဆိုင်ရာဝန်းကျင်

ရေအရင်းအမြစ်သုံးစွဲမှု

RVK Myanmar Co., Ltd သည် ဘွိုင်လာ၊ သန့်စင်ဆေးကြောခြင်း၊ ထုတ်လုပ်မှုလုပ်ငန်းစဉ်၊ ရုံးတွင်းနှင့် မီးဖိုချောင်တို့တွင် အသုံးပြုရန်အတွက် ရေကို ၎င်း၏ကိုယ်ပိုင် မြေအောက်ရေအရင်းအမြစ်နှင့် စည်သာဆည်တို့မှ ရယူအသုံးပြုပါသည်။ ရေသန့်စင်ကုသသည့်စနစ်ကို တပ်ဆင်ထားပါသည်။

ရေအရည်အသွေး

စီမံကိန်းနေရာရှိ စွန့်ထုတ်ရေသန့်စင်သည့်ကန်မှ စွန့်ထုတ်ရေနှင့် ရေသန့်စင်စက်မှရေနမူနာတို့ကို ကောက်ယူခဲ့ပါသည်။ ရေသန့်စင်စက်မှရေသည် ရလဒ်များအရ pH, Total suspended Solids (TSS), Ammonia, BOD, COD, Total Phosphorous, Oil & Grease, Total Nitrogen, Phenol နှင့် Mercury တို့သည် သတ်မှတ်နှုန်းအတွင်း ရှိပါသည်။

လေအရည်အသွေး

၂၀၁၇ ခုနှစ် မေ ၂၅ နှင့် ၂၆ ရက်တို့တွင် စက်ရုံနှင့် မီးစက်ရုံအနီးတွင် လုပ်ငန်းလည်ပတ်မှုကာလ အတွင်း လေအရည်အသွေးကို တိုင်းတာခဲ့ပါသည်။ နိုက်ထရိုဂျင်ဒိုင်အောက်ဆိုဒ် (NO_2) အဆင့် ၂၂.၉၂ µg/m3 နှင့် ဖုန်မှုန့် $PM_{2.5}$ အဆင့် ၃၃.၀၂ µg/m3 ရှိသောကြောင့် ကန့်သတ်ချက်များကို ကျော်လွန်နေကြောင်း လေ့လာတွေ့ရှိခဲ့ပါသည်။ သို့သော် ဖုန်မှုန့် PM_{10} သည် ပုံမှန်အဆင့်တွင်ရှိနေပါသည်။ ဆာလဖာဒိုင်အောက်ဆိုင် (SO_2) သည် ၃၈၅.၈၃ µg/m3 ဖြစ်သောကြောင့် စံသတ်မှတ်ချက်အတွင်းရှိ နေပါသည်။ အမိုးနီးယား (NO_3)၊ ကာဗွန်ဒိုင်အောက်ဆိုက် (CO_2)၊ ကာဗွန်မိုနောက်ဆိုဒ် (CO)၊ ဟိုက်ဒရိုကာဗွန်၊ မီသိန်း၊ အနုမြူဖြာထွက်ခြင်းနှင့် VOC ကဲ့သို့သော အခြားညစ်ညမ်းမှုတ်ဌေများသည် ပုံမှန်အတိုင်းအတာအတွင်း၌တည်ရှိနေပါသည်။

ဘွိုင်လာရုံအနီးရှိ နိုက်ထရိုဂျင်နှင့် $PM_{2.5}$ မြင့်မားမှုသည် furnance oil နှင့် ဆီအတွင်းပါဝင်သော ဆာလဖာတို့ အပြည့်အဝမလောင်ကျွမ်းမှုတို့ကြောင့် မှတ်ဌေထုတ်လွှတ်မှုကို တိုးလာစေသည်။ ဘွိုင်လာပြုပြင်ထိန်းသိမ်းမှု အားနည်းခြင်းသည်လည်း ညစ်ညမ်းမှုအဆင့်ကို ပိုမိုမြင့်မားစေနိုင်ပါသည်။

၂၀၂၃ ဒီဇင်ဘာ ၁၇ နှင့် ၁၈ ရက်များတွင် ဘွိုင်လာရုံနှင့် ထုတ်လုပ်မှုဧရိယာအနီးတို့တွင် လေအရည်အသွေးကို ထပ်မံတိုင်းတာခဲ့ပြီး NO_2, PM_{10}, $PM_{2.5}$, SO_2 နှင့် အိုဇုန်းတို့သည် သတ်မှတ်စံနှုန်းအတွင်းရှိနေပါသည်။ VOC သည်လည်း သတ်မှတ်စံနှုန်းအတွင်းရှိနေပြီး ကျေနပ်လောက်သောလေအရည်အသွေးအခြေအနေများကို ညွှန်ပြနေသည်ကို တွေ့ရပါသည်။

ကြိတ်ခွဲသည့်အခန်းဧရိယာတွင် တိုင်းတာခဲ့သော NO_2, PM_{10}, $PM_{2.5}$, SO_2, NH_3, CO_2, Co, ဟိုက်ဒရိုကာဗွန်၊ မီသိန်း၊ အနုမြူဖြာထွက်ခြင်းနှင့် VOC အပါအဝင် တိုင်းတာချက်များအားလုံးသည် သတ်မှတ်စံနှုန်းအတွင်းရှိသည်ကို တွေ့ရသည်။

ဓာတ်ငွေ့ထုတ်လွှတ်မှု

လုပ်ငန်းလည်ပတ်မှုကာလတွင် စက်ရုံ၏လက်ရှိပတ်ဝန်းကျင်အခြေအနေများကို အကဲဖြတ်ရန် ဘွိုင်လာမှဓာတ်ငွေ့ထုတ်လွှတ်မှုကို အကဲဖြတ်ခဲ့ပါသည်။ Green Myanmar Environmental Services Co., Ltd. သည် အချိန်တိုအတွင်း (၁ နာရီ) ဘွိုင်လာခေါင်းတိုင်မှထုတ်လွှတ်မှုကို စောင့်ကြည့်ရန် Kane 988 Combustion Analyzer ကို အသုံးပြု၍ ရွေးချယ်ထားသောနေရာတွင် တိုင်းတာမှုများပြုလုပ်ခဲ့ပါသည်။ ရလဒ်များအရ NO_2 နှင့် SO_2 အဆင့်များသည် Small Combustion Facilities အတွက် သတ်မှတ်ထားသော အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာအရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များထက် မကျော်လွန်ကြောင်း တွေ့ရှိရပါသည်။

ဆူညံသံအဆင့်

စက်ရုံ၏လုပ်ငန်းလည်ပတ်မှုကာလအတွင်း စီမံကိန်းနေရာတွင် GM1356 ဒစ်ဂျစ်တယ်အသံမီတာကို အသုံးပြု၍ ဆူညံသံနမူနာများကို ၂၄ နာရီကြာကို ၂ ကြိမ်ရယူခဲ့ပါသည်။ ထို့ပြင် စက်ရုံအတွင်းရှိ Mixing room နှင့် Granulation room တို့တွင် ၁ နာရီကြာ ဆူညံသံနမူနာများကို ကောက်ယူခဲ့ပါသည်။

ထုတ်လုပ်မှုဧရိယာရှိ လေဝင်လေထွက်အစိတ်အပိုင်းအနီးတွင် ကောက်ယူခဲ့သော ကနဦးကောက်ယူမှုတွင်နေ့ဘက်ဆူညံအဆင့်သည် 56.6 dBA နှင့် ညအချိန်ဆူညံအဆင့် 58.1 dB အသီးသီးရှိပါသည်။ ဘွိုင်လာရုံအနီးရှိ ကောက်ယူမှုတွင် နေ့ဘက်ဆူညံသံအဆင့် 53.3 dBA နှင့် 49.1 dBA အဆင့်ရှိကြောင်းတွေ့ရပါသည်။

ဤရလဒ်များသည် စက်မှုလုပ်ငန်းနှင့် စီးပွားရေးလုပ်ငန်းနယ်မြေများတွင် နေဘက်ရော ညဘက်ပါ 70 dBA ထက်မကျော်လွန်သင့်ကြောင်း သတ်မှတ်ထားသည့် NEQG ၏ လမ်းညွှန်ချက်အတွင်း ဝင်သည်ကို တွေ့ရပါသည်။ ထို့ပြင် လုပ်ငန်းခွင်ဧရိယာရှိဆူညံသံအဆင့်များသည် အလုပ်သမားများအား လုပ်ငန်းခွင်ဆူညံသံများ၏ ဒဏ်ကိုခံရခြင်းမှ ကာကွယ်ရန်ရည်ရွယ်သော 85 dBA အတွင်းရှိသောကြောင့် NIOSH လမ်းညွှန်ချက်နှင့် ကိုက်ညီကြောင်းတွေ့ရပါသည်။

စွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှု

(က) ဘေးအန္တရာယ်ရှိ စွန့်ပစ်ပစ္စည်း

ဆေးဝါးထုတ်လုပ်မှုသည် သဘာဝပတ်ဝန်းကျင်နှင့် ကျန်းမာရေးကို အန္တရာယ်ဖြစ်စေသော အမျိုးမျိုးသော ဘေးထွက်ပစ္စည်းများနှင့် စွန့်ပစ်ပစ္စည်းများကို စုစည်းကာ အန္တရာယ်ရှိသော စွန့်ပစ်ပစ္စည်းများကို ထုတ်ပေးပါသည်။ ၎င်းတို့တွင် ဓာတုအကြွင်းအကျန်များ၊ သက်တမ်းလွန် သို့မဟုတ် ငြင်းပယ်ထားသော ဆေးဝါးများ၊ ညစ်ညမ်းသော ပစ္စည်းများနှင့် ထုပ်ပိုးပစ္စည်းများပါဝင်သည်။ ဆေးဝါးထုတ်လုပ်ခြင်း၏ သဘောသဘာဝကြောင့် စွန့်ပစ်ပစ္စည်းများတွင် အန္တရာယ်ဖြစ်စေနိုင်သော အရာများ ပါဝင်လေ့ရှိသည်။ ဤအန္တရာယ်ရှိသော အမှိုက်များကို စနစ်တကျစွန့်ပစ်ခြင်းနှင့် စီမံခန့်ခွဲခြင်းသည် ပတ်ဝန်းကျင်ညစ်ညမ်းမှုကို ကာကွယ်ရန်နှင့် ပြည်သူ့ကျန်းမာရေးကို ကာကွယ်ရန်အရေးကြီးပါသည်။ တင်းကြပ်သောစည်းမျဉ်းများနှင့်အညီ ဆေးဝါးထုတ်လုပ်ရေးစက်ရုံများအတွင်း ဘေးကင်းစွာစွန့်ပစ်ခြင်းဆိုင်ရာ အလေ့အကျင့်များကို အကောင်အထည်ဖော်ခြင်းသည် ပတ်ဝန်းကျင်ဆိုင်ရာ ထိခိုက်မှုကို လျော့ပါးစေရန်နှင့် စက်မှုလုပ်ငန်းတွင် တာဝန်ရှိသော စွန့်ပစ်ပစ္စည်းများ စီမံခန့်ခွဲမှုကို သေချာစေရန်အတွက် မရှိမဖြစ် လိုအပ်ပါသည်။

(ခ) စွန့်ပစ်အစိုင်အခဲ

ဆေးဝါးထုတ်လုပ်ရေးစက်ရုံရှိ စွန့်ပစ်အစိုင်အခဲပစ္စည်းများ၏အရင်းအမြစ်များမှာ ထုတ်ပိုးခြင်းလုပ်ငန်းစဉ်မှ ထွက်ရှိလာသော ထုတ်ပိုးပစ္စည်းများမှ ထုတ်ကုန်စွန့်ပစ်ပစ္စည်ဖြစ်သော ဖန်ထည်စများ၊ ဓာတ်ခွဲခန်းထွက် စွန့်ပစ္စည်းများအထိ အမျိုးမျိုးရှိပါသည်။ ပလတ်စတစ်နှင့် စက္ကူကဲ့သို့သော ထုပ်ပိုးပစ္စည်းများကို ပြန်လည်အသုံးပြုရန်အတွက် ခွဲခြားထားသော်လည်း ၎င်း၏သက်တမ်းကုန်သွားသောဖန်ထည်များကိုမူ စွန့်ပစ်ပါသည်။ အစိုင်အခဲစွန့်ပစ်ပစ္စည်းများ၏သိသာသောရင်းမြစ်ဖြစ်သည့် ထုတ်ကုန်စွန့်ပစ်ပစ္စည်းများကို WHO လမ်းညွှန်ချက်များနှင့်အညီ beta-lactam ထုတ်ကုန်များအတွက် ဓာတုကုသမှုများ၊ ပဋိဇီဝဆေးများအတွက် မီးရှို့ခြင်းများအပါအဝင် ဆေးဝါးအမျိုးမျိုးကို လမ်းညွှန်ချက်နှင့်အညီ ကုသစွန့်ပစ်ပါသည်။ ဇီဝစွန့်ပစ်ပစ္စည်းများကို စွန့်ပစ်ခြင်းမပြုမီ ရောဂါပိုးမွှားများမပေါက်ဖွားနိုင်အောင် autoclaving သို့မဟုတ် ဓာတုပိုးသတ်ခြင်းကဲ့သို့သောနည်းလမ်းများကို အသုံးပြု၍ စွန့်ပစ်ပါသည်။

ဓာတ်ခွဲခန်းထွက် တိရစ္ဆာန်စွန့်ပစ်ပစ္စည်းများကို ပုံမှန်အားဖြင့် သင့်လျော်သော သိုလှောင်မှုဆိုင်ရာလုပ်ထုံးလုပ်နည်းများဖြင့် မီးရှို့ခြင်းဖြင့် ဝန်ထမ်းများဘေးကင်းရေးနှင့် ပတ်ဝန်းကျင်ဆိုင်ရာ ဘေးကင်းရေးအတွက် ဂရုတစိုက် ကိုင်ကွယ်စီမံပါသည်။ စက်ရုံထွက်စွန့်ပစ်ပစ္စည်များကို စည်ပင်သာယာရေးကော်မတီနှင့်ညှိနှိုင်းဆောင်ရွက်ကာ စည်းမျဉ်းများနှင့် တာဝန်သိ စွန့်ပစ်အမှိုက်စီမံခန့်ခွဲမှုအလေ့အထများကို လေးစားလိုက်နာပြီး လမ်းညွှန်မှုအတိုင်းဆောင်ရွက်ပါသည်။

လူမှု-စီးပွားဆိုင်ရာဝန်းကျင်

လူမှုစီးပွားရေးဆိုင်ရာအချက်အလက်များကို မြို့နယ်အုပ်ချုပ်ရေးမှူးရုံးမှရရှိပါသည်။ ပြင်ဦးလွင်မြို့နယ်၏လူဦးရေစုစုပေါင်းမှာ (၁၇၈,၆၇၇) ဦးခန့်ရှိပြီး အိမ်ခြေပေါင်း (၃၂,၈၈၇၅) နှင့် အိမ်ထောင်စုပေါင်း (၃၃,၆၁၂) ခန့်ရှိပါသည်။ အများစုမှာ ဗုဒ္ဓဘာသာဝင်များဖြစ်ပြီး အခြားဘာသာဝင်များနှင့်အတူတကွ သာတူညီမျှပေါင်း စည်းနေထိုင်ကြပါသည်။

ပြင်ဦးလွင်မြို့နယ်တွင် ရတနာပုံတက္ကသိုလ်ရှိပါသည်။ ပညာရေးအဆင့်သည် မြန်မာနိုင်ငံစံနှုန်းအရ အတော်လေးကောင်းမွန်သော ညွှန်ပြချက်ဖြစ်ပါသည်။

ပြင်ဦးလွင်မြို့နယ်၏စီးပွားရေးသည် လယ်ယာကဏ္ဍနှင့် ဝန်ဆောင်မှုတို့အပေါ်အခြေခံထားပြီး မျှတစွာဖွံ့ဖြိုးတက်နေပါသည်။ ပြင်ဦးလွင်မြို့သည် ရန်ကုန်-မန္တလေး-လားရှိုးလမ်းမကြီးပေါ်တွင်တည်ရှိပြီး အလွယ်တကူသွားလာနိုင်ပါသည်။ ပြင်ဦးလွင်မြို့၏အဓိကထွက်ကုန်များမှာ နေကြာ၊ မက်မန်း၊ စတော်ဘယ်ရီ၊ ဆွယ်တာတို့ဖြစ်ပြီး မန္တလေးနှင့် ရန်ကုန်တိုင်းဒေသကြီးတို့ထံ အဓိကရောင်းချပါသည်။ စပါး၊ ပဲ၊ နှမ်း၊ နေကြာ၊ ကုလားပဲစိမ်း၊ ပဲစင်းငုံ၊ ဝါနှင့် ပြောင်းစသည့် အဓိကသီးနှံများကို ပြင်ဦးလွင်မြို့နယ်၌ စိုက်ပျိုးလျက်ရှိပါသည်။

ပြင်ဦးလွင်မြို့နယ်ရှိကျန်းမာရေးဝန်ဆောင်မှုများသည် အစိုးရ၏အစီအမံဖြင့် လုံလောက်သော ကျန်းမာရေးအဆောက်အအုံများနှင့် ဝန်ဆောင်မှုများကြောင့် ကျန်းမာရေးဝန်ဆောင်မှုအခြေအနေမှာ ကောင်းမွန်ပါသည်။

ယဉ်ကျေးမှုဆိုင်ရာအမွေအနှစ်

သက်ဆိုင်ရာမြို့နယ်အုပ်ချုပ်ရေး၏ အချက်အလက်များအရ စီမံကိန်းဧရိယာအတွင်း EIA နှင့် သက်ဆိုင်သည့် ယဉ်ကျေးမှုအမွေအနှစ်နေရာနှင့်စပ်လျဉ်း၍ လေ့လာဆန်းစစ်မည့် ဧရိယာ (၁) ကီလိုမီတာအချင်းဝက်အတွင်းတွင် ယဉ်ကျေးမှုဆိုင်ရာရှေးဟောင်း အမွေအနှစ်အဆောက်အအုံများ မရှိပါ။

ဇီဝအရင်းအမြစ်ဆိုင်ရာဝန်းကျင်

စက်ရုံဧရိယာသည် သစ်တောထူထပ်မှုမရှိသလို သဘာဝသစ်ပင်များ၊ မြက်ရိုင်းအနည်ငယ်သာရှိပြီး နှစ်ရှည်ပင်ဥယျာဉ်ခြံများနှင့် အထင်ကရအဆောက်အအုံများမရှိသော်လည်း စိုက်ပျိုးမြေနှင့် စက်ရုံတောင်ဘက်တွင် ရွာတစ်ရွာ၊ အနောက်ဘက်တွင် အနီးစခန်းလေဆိပ်၊ စက်ရုံနှင့် မန္တလေး-လားရှိုး ကားလမ်းမကြား မြောက်ဘက်တွင် ဆေးသုတေသနဌာနတို့ရှိပါသည်။ စီမံကိန်းဧရိယာအတွက် မြို့နယ်အုပ်ချုပ်ရေးဆိုင်ရာအချက်အလက်တို့ဖြင့်ကိုးကားဖော်ပြထားသော ဇီဝရုပ်ပတ်ဝန်းကျင်ဆိုင်ရာတစ်ဆင့်ခံအထောက်အထားများကို အစီရင်ခံစာတွင် ဖော်ပြထားပါသည်။

အများပြည်သူနှင့်တိုင်ပင်ဆွေးနွေးခြင်းနှင့် သတင်းအချက်အလက်များထုတ်ဖော်တင်ပြခြင်း

RVK Myanmar Co., Ltd. မှ အဖွဲ့ဝင်သုံးဦးပါဝင်သော အများပြည်သူသဘောထားရယူခြင်း အခမ်းအနားကို ၂၀၁၇ ခုနှစ် ဧပြီလ ၅ ရက်နေ့တွင်ပြုလုပ်ခဲ့ပြီး Green Enviro Survey Team မှ အဖွဲ့ဝင် ၃ ဦးနှင့် RVK Myanmar Co., Ltd. မှ အဖွဲ့ဝင်သုံးဦး စုစုပေါင်း ၆ ဦးနှင့် ကံကြီးကုန်းကျေးရွာ ၁၆ ရပ်ကွက်မှ တာဝန်ရှိသူများ၊ ညံညင်းသာကျေးရွာ ဒေသံပြည်သူများ၊ အောင်ချမ်းသာကျေးရွာမှ ဒေသခံပြည်သူများ စုစုပေါင်း ၁၂ ဦး တက်ရောက်ခဲ့ပါသည်။

သက်ရောက်မှုဖော်ထုတ်ခြင်းဇယား

ပတ်ဝန်းကျင်ဆိုင်ရာ အတိုင်းအတာ များ	အကြောင်းအချက်	လုပ်ငန်းလည်ပတ်စဉ် ကာလ	လုပ်ငန်းဖျက် သိမ်းကာလ
လေအရည်အသွေး	ဘွိုင်လာ၏ မပြည့်စုံသော လောင်ကျွမ်းမှုကြောင့် ထွက်လာသည့် မီးခိုးများ	✓	-
	စက်ရုံလည်ပတ်မှုမှ ထွက်ရှိသည့် ဖုန်မှုန့်နှင့် အမှုန်အမွှားများ	✓	✓
	လုပ်ငန်းသုံးယာဉ်များသွားလာမှုမှ ထွက်ရှိသော ဖုန်မှုန့်များနှင့် အိတ်ဇောဓာတ်ငွေ့များ	✓	✓
အသံဆူညံမှု	အရေးပေါ် မီးစက်များမှထွက်သောဆူညံမှု	-	✓

	စက်ရုံလုပ်ငန်းလည်ပတ်စဉ် ထွက်ရှိသောဆူညံမှု	✓	-
ရေအရည်အသွေး	မိုးရာသီတွင် စွန့်ပစ်ရေများမှ အနည်အနှစ်ပို့ချမှု	-	✓
	ဓာတ်ခွဲခန်းမှစွန့်ပစ်ရေ	✓	-
	စက်ရုံလုပ်ငန်းလည်ပတ်စဉ် ထွက်ရှိသောစွန့်ပစ်ရေ	✓	-
မြေအနေအထား ပြောင်းလဲခြင်း	မြေယာရှင်းလင်းခြင်းကြောင့် မြေအနေအထားပြောင်းလဲခြင်း	-	-
မြေညစ်ညမ်းခြင်း	စက်ရုံသုံးယာဉ်များ၊ အရေးပေါ် မီးစက်၊ ဘွိုင်လာနှင့် သိုလှောင်ရာနေရာတို့မှ ဒီဇယ်နှင့် ဓာတ်ဆီများ မတော်တဆယိုဖိတ်မှု	✓	✓
ဇီဝမျိုးကွဲများ	မြေယာရှင်းလင်းခြင်းကြောင့် ဇီဝအရင်းအမြစ်များ ထိခိုက်ခြင်း	-	-
လုပ်ငန်းခွင် ကျန်းမာရေးနှင့် လုံခြုံဘေးကင်းရေး	မ,ယူခြင်း၊ သယ်ဆောင်ခြင်း၊ ထပ်ကျော့လုပ်ဆောင်ခြင်း၊ အလုပ်ကြောင့် ကိုယ်ဟန်နေထား ထိခိုက်ခြင်းကဲ့သို့သော ရုပ်ပိုင်းဆိုင်ရာ အန္တရာယ်နှင့် လုပ်ငန်းခွင် ထိခိုက်မှုများ	✓	✓

ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်းနည်းလမ်းများ

ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ရာတွင် ဆောင်ရွက်သည့်လုပ်ငန်းများ၏ ထိခိုက်မှုပမာဏ၊ အချိန်ကာလ၊ နေရာအခြေအနေနှင့် ကြိမ်နှုန်းတို့ကိုအခြေခံပြီး စီမံကိန်း၏ကာလများဖြစ်သည့် တည်ဆောက်ရေးကာလ၊ လုပ်ငန်းလည်ပတ်သည့်ကာလနှင့် လုပ်ငန်းပိတ်သိမ်းသည့်ကာလတို့အတွက် ဆန်းစစ်ပါသည်။ အဆိုပါ ဆန်းစစ်ခြင်းတွင် အရည်အသွေးဆိုင်ရာသုတေသနနည်းလမ်းကိုအခြေခံပြီး သက်ရောက်မှုတစ်ခုစီ၏ အတိုင်းအတာကို အမျိုးအစား (၄) မျိုးဖြင့် သတ်မှတ်ထားပါသည်။

အခြေခံစံ	အုပ်စုအမျိုးအစား	အမှတ်
ပမာဏ	သိသာထင်ရှားခြင်းမရှိ	၁

	အနည်းငယ်နှင့်ပတ်ဝန်းကျင် ထိခိုက်မှုမရှိ	၂
	အလယ်အလတ်နှင့်ပတ်ဝန်းကျင်ပြောင်းလဲမှုအနည်းငယ်ရှိ	၃
	အများအပြားနှင့်ပတ်ဝန်းကျင်ပြောင်းလဲမှုအနည်းငယ်ရှိ	၄
	အလွန်မြင့်နှင့်ပတ်ဝန်းကျင်အနေအထားပြောင်းလဲမှုရှိ	၅
ထိခိုက်မှု အကျယ်အဝန်းပမာဏ	စိမ်ကိန်းဧရိယာအတွင်း	၁
	၂ ကီလိုမီတာအတွင်းရှိဘေးပတ်ဝန်းကျင်ဧရိယာ	၂
	၂ - ၅၀ ကီလိုမီတာအတွင်းရှိဧရိယာ	၃
	၅၀ - ၂၀၀ ကီလိုမီတာအတွင်းရှိဒေသတွင်းဧရိယာ	၄
	နိုင်ငံတွင်းဧရိယာ	၅
အချိန်ကာလ	အလွန်တိုတောင်းသော သက်တမ်း - ဆောက်လုပ်ရေးကာလ (၀-၁ နှစ်)	၁
	ကာလတို (၂-၅ နှစ်)၊	၂
	အလယ်အလတ်သက်တမ်း (၆-၁၅ နှစ်)	၃
	လုပ်ငန်းလည်ပတ်စဉ်ကာလတစ်ခုလုံး	၄
	လုပ်ငန်းပိတ်သိမ်းစဉ်ကာလထိ	၅
ဖြစ်တန်စွမ်း	ဖြစ်တန်စွမ်းမရှိ (ဖြစ်တန်စွမ်းမရှိသလောက်နည်းနည်းပါးသည်။)	၁

	ဖြစ်တန်စွမ်းမရှိ (သက်ရောက်မှုဖြစ်နိုင်ချေ အလွန်းနည်းပါသည်။)	၂
	ဖြစ်တန်စွမ်းရှိ (သက်ရောက်မှုဖြစ်နိုင်ချေ အလားအလာရှိသည်။)	၃
	ဖြစ်တန်စွမ်းများပြား (သက်ရောက်နိုင်ချေများသည်။)	၄
	ဖြစ်တန်စွမ်းအလွန်များပြား (သက်ရောက်မှုဖြစ်ပေါ်လာမည်။)	၅

ထိခိုက်ခြင်းသိသာထင်ရှားသည့်ပမာဏ

သိသာထင်ရှားသည့်ပမာဏ=(ပမာဏ+အချိန်ကာလ+ထိခိုက်မှုအကျယ်အဝန်းပမာဏ) x ဖြစ်တန်စွမ်း

သိသာထင်ရှားသည့်ပမာဏ=ထိခိုက်မှုအကျယ်အဝန်းပမာဏ၊ အချိန်ကာနှင့် ပမာဏတို့ကို ပေါင်းပြီး ဖြစ်တန်စွမ်းဖြင့်မြှောက်သည်။ ထို့နောက် ရရှိလာသောတန်ဖိုးကို အောက်ပါအမျိုးအစားများတွင် အမျိုးအစားခွဲ သည်။

ထိခိုက်ခြင်းသိသာထင်ရှားသည့်ပမာဏ	ထိခိုက်ခြင်းသိသာထင်ရှားသည့်သက်ရောက်မှု
> ၆၀	အလွန်များ
၄၅-၅၉	များ
၃၀-၄၄	အလယ်အလတ်
၁၅-၂၉	နည်း
< ၁၅	အလွန်နည်း

သိသာထင်ရှားသည့်သက်ရောက်မှုများ

စီမံကိန်း၏ကာလများဖြစ်သည့် လုပ်ငန်းလည်ပတ်သည့်ကာလနှင့် လုပ်ငန်းပိတ်သိမ်းသည့် ကာလတို့တွင် သိသာထင်ရှားသည့်သက်ရောက်မှုများနှင့်စပ်လျဉ်း၍ လုပ်ငန်းလည်ပတ်သည့်ကာလတွင် သိသာထင်ရှားသည့်သက်ရောက်မှု (၁၂) ခုနှင့် လုပ်ငန်းပိတ်သိမ်းသည့်ကာလတွင် သိသာထင်ရှားသည့် သက်ရောက်မှု (၄) ခု တွေ့ရှိရပါသည်။

လုပ်ငန်းအဆင့်	ထိခိုက်ခြင်း သိသာထင်ရှားသည့်သက်ရောက်မှု		
	နည်း	အလယ်အလတ်	များ
လည်ပတ်စဉ်ကာလ	၂၂	၁၂	x

ဝိတ်သိမ်းစဉ်ကာလ	၁၂	၄	x

လုပ်ငန်းအဆင့်	အလားအလာရှိသော သက်ရောက်မှု		သိသာထင်ရှားသော သက်ရောက်မှု	သိသာထင်ရှားသော သက်ရောက်မှုကို လျော့ပါးသက်သာစေနိုင်မှု
လည်ပတ်စဉ်ကာလ	လေထုညစ်ညမ်းမှု	၂	အလယ်အလတ်	နည်း
	ရေအသုံးပြုမှု	၁	အလယ်အလတ်	နည်း
	ရေထုညစ်ညမ်းမှု	၃	အလယ်အလတ်	နည်း
	ဘေးအန္တရာယ်ရှိ စွန့်ပစ်ပစ္စည်း	၃	အလယ်အလတ်	နည်း
	အစိုင်အခဲစွန့်ပစ်ပစ္စည်း	၁	အလယ်အလတ်	နည်း
	လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေးကင်းလုံခြုံရေး	၂	အလယ်အလတ်	နည်း
ဝိတ်သိမ်းစဉ်ကာလ	လေထုညစ်ညမ်းမှု	၁	အလယ်အလတ်	နည်း
	မြေဆီလွှာညစ်ညမ်းမှုနှင့် ရေထုညစ်ညမ်းမှု	၁	အလယ်အလတ်	နည်း
	အများပြည်သူကျန်းမာရေး ထိခိုက်ခြင်း	၂	အလယ်အလတ်	နည်း

ပတ်ဝန်းကျင်သက်ရောက်မှုများနှင့်ဝင်းတို့၏အရေးပါမှု၊ အနှစ်ချုပ်

ဆေးဝါးထုတ်လုပ်သည့်စက်ရုံ၏ သိသာထင်ရှားသော သဘာဝပတ်ဝန်းကျင်ဆိုင်ရာ အကျိုးသက်ရောက်မှုတွင် အဓိကအကြောင်းရင်းများစွာ ပါဝင်ပါသည်။

လေထုအရည်အသွေးထိခိုက်မှု - ရောစပ်ခြင်း၊ ကြိတ်ခွဲခြင်းနှင့် ထုပ်ပိုးခြင်း၊ ဖြည့်ထည့်ခြင်းစသည့် ထုတ်လုပ်မှုလုပ်ငန်းစဉ်အတွင်း၊ လေထဲသို့ ဖုန်မှုန့်အမှုန်အမွှားများ ထွက်ရှိခြင်းသည် စက်ရုံအတွင်းရှိ လေထုအရည်အသွေးအပေါ် အလယ်အလတ်အကျိုးသက်ရောက်မှုရှိစေနိုင်ပါသည်။

ရေသုံးစွဲမှုအကျိုးသက်ရောက်မှု - ထုတ်လုပ်မှုလုပ်ငန်းစဉ်များ၊ ရုံးတွင်းအထွေထွေသုံးရေ၊ ဝန်ထမ်းအိမ်ရာများမှအထွေထွေသုံးရေ၊ မီးဖိုချောင်သုံးရေနှင့် အိမ်သာသုံးရေအပါအဝင် အမျိုးမျိုးသော ရည်ရွယ်ချက်များအတွက် ရေကိုအသုံးပြုခြင်းသည် မြေပေါ်၊ မြေအောက် ရေအရင်းအမြစ်မှ ထုတ်ယူသုံးစွဲမှုအပေါ် အလယ်အလတ်အကျိုးသက်ရောက်မှုဖြစ်စေနိုင်ပါသည်။

စွန့်ပစ်ရေသက်ရောက်မှု - ထုတ်လုပ်မှုလုပ်ငန်းစဉ်မှ ထွက်ရှိသောလာသော စွန့်ပစ်ရေဆိုးများနှင့် ဆက်စပ်သန့်ရှင်းရေ၊ ဆေးကြောရေများတွင် ပါဝင်သော ကြွင်းကျန်ဆေးဝါးပါဝင်ပစ္စည်းများ (APIs)၊ အော်ဂဲနစ်ပျော်ဝင်ပစ္စည်းများနှင့် ဓာတုဗေဒဆိုင်ရာဘေးထွက်ပစ္စည်းများသည် ရေအရည်အသွေးအပေါ် အလယ်အလတ် အကျိုးသက်ရောက်မှုကို ဖြစ်စေနိုင်ပါသည်။

စွန့်ပစ်အစိုင်အခဲသက်ရောက်မှု - ဆေးဝါးထုတ်လုပ်ရေးလုပ်ငန်းစဉ်မှ ထွက်ရှိသော ထုတ်ကုန်စွန့်ပစ်ပစ္စည်းများ၊ ထုပ်ပိုးပစ္စည်းများ၊ လေစစ်ဇကာများ၊ ဓာတ်ခွဲခန်းစွန့်ပစ်ပစ္စည်းများ၊ အဏုဇီဝစွန့်ပစ်ပစ္စည်း များနှင့် အခြားရုံးသုံးစွန့်ပစ်ပစ္စည်းများစသည့် အမျိုးမျိုးသော စွန့်ပစ်ပစ္စည်းများသည် အန္တရာယ်ရှိသော စွန့်ပစ်ပစ္စည်းများကို ဖြစ်ပေါ်စေပြီး အလယ်အလတ်အကျိုးသက်ရောက်မှုကို ဖြစ်စေပါသည်။

လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေးကင်းရေးသက်ရောက်မှု - စက်ရုံအတွင်းရှိ အလုပ်သမားများသည် ဖုန်မှုန့်များ၊ အန္တရာယ်ရှိသောပစ္စည်းများ၊ ဓာတုပစ္စည်းများ၊ ဇီဝပစ္စည်းများနှင့် ဆူညံသံများ အပါအဝင် လုပ်ငန်းခွင်ဆိုင်ရာ အန္တရာယ်အမျိုးမျိုးနှင့် ထိတွေ့နေရပြီး ၎င်းတို့၏ကျန်းမာရေးနှင့် လုံခြုံမှုကို အလယ်အလတ် အန္တရာယ် ဖြစ်စေနိုင်ပါသည်။

အများပြည်သူကျန်းမာရေးနှင့် ဘေးကင်းရေး သက်ရောက်မှု - လေထုထဲသို့ ညစ်ညမ်းစေသော အခိုးအငွေ့အမှုန်အမွှားများ စွန့်ထုတ်ခြင်းနှင့် စက်ရုံလည်ပတ်မှု၊ ရုံးခန်းများ၊ စားဖိုဆောင်များနှင့် အိမ်သာများမှ စွန့်ပစ်ရေဆိုးထွက်ရှိခြင်းတို့ကြောင့် အများပြည်သူကျန်းမာရေးနှင့် ဘေးကင်းရေးတို့အတွက် အလယ်အလတ် အန္တရာယ်ရှိနိုင်ပါသည်။ ထို့အပြင် အန္တရာယ်ရှိသောစွန့်ပစ်ပစ္စည်း စွန့်ထုတ်မှုသည် ဤအန္တရာယ်ကို ပိုမိုဖြစ်ပေါ်စေနိုင်ပါသည်။

ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်

အဆိုပြုထားသောလျော့ပါးသက်သာစေရေးအစီအမံများကို အကောင်အထည်ဖော်ရန်အတွက် အပျက်သဘောဆောင်သောသက်ရောက်မှုများကို သက်သာစေရန်အတွက် အဆိုပြုထားသော လျော့ပါးသက်သာစေရေးအစီအမံများကို မည်သို့အကောင်အထည်ဖော်မည်ကို ဤအခန်း၌ဖော်ပြထားပါသည်။ စီမံခန့်ခွဲမှုအစီအစဉ်များ၊ လျော့ပါးသက်သာစေရေးအစီအစဉ်များ၊ စောင့်ကြပ်ကြည့်ရှုရေးအစီအစဉ်နှင့် နောက်ဆက်တွဲလုပ်ဆောင်မှုများအတွက် အဖွဲ့အစည်းဆိုင်ရာ တာဝန်နှင့်ဝတ္တရားများကို အဆိုပြုထားပါသည်။ ဆေးဝါးထုတ်လုပ်သည့်စက်ရုံ၏ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှုအစီအစဉ်ကို အောက်ပါကဏ္ဍများဖြင့်ဖွဲ့စည်းထားပါသည်။

၁။ အဖွဲ့အစည်းဆိုင်ရာလိုအပ်ချက်များ

၂။ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုဆိုင်ရာရည်ရွယ်ချက်များ

၃။ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုဆိုင်ရာတာဝန်နှင့်ဝတ္တရားများ

၄။ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအကောင်အထည်ဖော်ရန်အတွက်လျာထားငွေရေးဆွဲခြင်း

၅။ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်

၆။ ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုမည့်အစီအစဉ်

အဖွဲ့အစည်းဆိုင်ရာလိုအပ်ချက်

ဆေးဝါးစက်ရုံစီမံကိန်းကို RVK Myanmar Co., Ltd. မှ စီမံခန့်ခွဲမည်ဖြစ်သည်။ စီမံကိန်းဆောင်ရွက်သူ ကုမ္ပဏီသည် သဘာဝပတ်ဝန်းကျင်၊ ကျန်းမာရေးနှင့် ဘေးကင်းရေးဆိုင်ရာ ပြဿနာ များကို ကိုင်တွယ်ရန် EHS အရာရှိနှင့် လက်ထောက်များကို ခန့်အပ်ရပါမည်။ EHS အရာရှိသည် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (EMP) နှင့် စောင့်ကြပ်ကြည့်ရှုရေးအစီအစဉ်ကို အကောင်အထည်ဖော်ရန် နှင့် စောင့်ကြည်ရန်တာဝန်ရှိသည့်အပြင် ကန်ထရိုက်တာများ၊ ဒေသဆိုင်ရာအာဏာပိုင်များနှင့် အနီးအနားရှိ လူမှုအသိုင်းအဝိုင်းများနှင့်လည်း ညှိနှိုင်း ဆောင်ရွက်ရန်တာဝန်ရှိပါသည်။ EHS အဖွဲ့သည် ဖြစ်နိုင်ချေရှိသော သက်ရောက်မှုများ၊ ပြင်ဆင်မှုများနှင့် ပြုပြင်မွမ်းမံမှုများအား လုံးခြုံငုံမိစေဖို့ EMP ပုံမှန်ပြန်လည်သုံးသပ်မှု များကိုလည်း ပြုလုပ်ရပါမည်။

ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်၏ရည်ရွယ်ချက်များ

ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်၏ရည်ရွယ်ချက်များမှာ

၁။ စီမံကိန်းသက်တမ်း၏အဆင့်နှစ်ဆင့်ဖြစ်သော လည်ပတ်ခြင်းကာလနှင့် ပိတ်သိမ်းခြင်းကာလများ တွင် EMP ကိုအကောင်အထည်ဖော်ရန် အဆိုပြုသူအတွက် ကိုးကားရန်နှင့် ကတိကဝတ်တို့ ဖြစ်သည်။

၂။ သယံဇာတနှင့်ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာနလက်အောက်ရှိ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦး စီးဌာန၏ လိုအပ်ချက်များကို ဖြည့်ဆည်းပေးရန်ဖြစ်သည်။

၃။ စီမံကိန်း၏လူမှုရေးဆိုင်ရာလုပ်ဆောင်မှုများနှင့် ပတ်ဝန်းကျင်ဆိုင်ရာစောင့်ကြပ်ကြည့်ရှုခြင်းတို့ကို ဆောင်ရွက်ရာတွင် လမ်းညွှန်ချက်ဖြင့် ကိုးကားအသုံးပြုရန်ဖြစ်သည်။

၄။ ပတ်ဝန်းကျင်အပေါ် အပျက်သဘောဆောင်သောသက်ရောက်မှုများကို လျော့ပါးသက်သာစေရန် အသေးစိတ်မူဘောင်တစ်ခုပေးပြီး စီမံကိန်းကို မှန်ကန်စွာအကောင်အထည်ဖော်နိုင်ရေးအတွက် စီမံ ခန့်ခွဲရေးဆိုင်ရာ လုပ်ဆောင်ချက်များကို လက်ခံကျင့်သုံးရန်ဖြစ်သည်။

ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်၏တာဝန်များ

RVK Myanmar Co., Ltd. သည် စက်ရုံတည်ထောင်မှုအတွက် ပတ်ဝန်းကျင်ဆိုင်ရာ လျော့ပါးသက် သာစေရေးနှင့် စီမံခန့်ခွဲမှုအစီအစဉ်ကို ဖွံ့ဖြိုးလာရန်၊ အကောင်အထည်ဖော်ရန်၊ လိုက်နာရန် တာဝန်ရှိပါသည်။ ၎င်းတွင် အစီအစဉ်ရေးဆွဲခြင်း၊ ပတ်ဝန်းကျင်ဆိုင်ရာစည်းမျဉ်းများနှင့် လိုက်လျောညီထွေရှိစေခြင်း၊ ဖော်ပြထား သောအစီအမံများကို အကောင်အထည်ဖော်ခြင်း၊ ပတ်ဝန်းကျင်ဆိုင်ရာ စွမ်းဆောင် ရည်ကို စောင့်ကြည့်ခြင်းနှင့် အလေ့အကျင့်များကို စဉ်ဆက်မပြတ်တိုးတက်စေခြင်းတို့ပါဝင်ပါသည်။ ဤတာဝန်များကိုကျေပွန်ခြင်းဖြင့် ကုမ္ပဏီသည် တာဝန်သိသောပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုနှင့် ရေရှည်တည်တံ့သောလုပ်ငန်းဆောင်တာများအတွက် ၎င်း၏ ကတိကဝတ်ကို ထုတ်ဖော်ပြသရာရောက်ပါသည်။

RVK Myanmar Co., Ltd. သည် အောက်ပါလုပ်ဆောင်ချက်များကို အကောင်အထည်ဖော်ခြင်းဖြင့် ပတ်ဝန်းကျင်ထိခိုက်မှုလျော့ပါးသက်သာစေရေးနှင့် စီမံခန့်ခွဲမှုအစီအစဉ်ကို ထိထိ ရောက်ရောက် အကောင် အထည်ဖော်ရန် ကတိပြုပါသည်။

၁။ **ထိပ်တန်းစီမံခန့်ခွဲမှု** - ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်ကို အကောင်အထည်ဖော်ရာတွင် ကုမ္ပဏီ၏ ထိပ် တန်းစီမံခန့်ခွဲမှုသည် ခေါင်းဆောင်မှုနှင့် လမ်းညွှန်မှုပေးဆောင်ရန် တာဝန်ရှိမည်ဖြစ်ပါသည်။

၂။ **ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအဖွဲ့** - ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်ကို အကောင်အထည်ဖော်ရန်၊ ကြီးကြပ်ကွပ်ကဲရန်နှင့် ညှိနှိုင်းဆောင်ရွက်ရန်အတွက် သီးခြားပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအဖွဲ့ကို ဖွဲ့စည်းမည်ဖြစ်ပါသည်။ ဤအဖွဲ့တွင် HSE အရာရှိများ၊ မန်နေဂျာ၊ HSE လက်ထောက်များ သို့မဟုတ် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုတွင် ကျွမ်းကျင်မှုရှိသော ဝန်ထမ်းများပါဝင်မည်ဖြစ်ပါသည်။

၃။ **ဌာနဆိုင်ရာကိုယ်စားလှယ်များ** - ကုမ္ပဏီသည် သက်ဆိုင်ရာနယ်ပယ်များအတွင်း ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်ကို အကောင်အထည်ဖော်ရန် တာဝန်ရှိသောဌာနတစ်ခုစီမှ ကိုယ်စားလှယ်များအား တာဝန် ပေးအပ်မည်ဖြစ်ပါသည်။

၄။ **ဝန်ထမ်းများပါဝင်မှု** - ကုမ္ပဏီသည် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်ကို အကောင်အထည်ဖော်ရာတွင် ဝန်ထမ်းများအားလုံးတက်ကြွစွာ ချိတ်ဆက်ဆောင်ရွက်မည်ဖြစ်ပါသည်။

၅။ **စောင့်ကြည့်လေ့လာခြင်းနှင့် အစီရင်ခံခြင်း** - သတ်မှတ်ထားသောဝန်ထမ်းများသည် ဒေတာစုဆောင်းခြင်း၊ စောင့်ကြည့်စစ်ဆေးခြင်းနှင့် ပတ်ဝန်းကျင်စွမ်းဆောင်ညွှန်းကိန်းများအစီရင်ခံစာများကို ပြင်ဆင်မည်ဖြစ်ပါသည်။

၆။ **လိုက်နာမှုနှင့် စစ်ဆေးခြင်း** - တစ်ဦးချင်း သို့မဟုတ် အဖွဲ့များသည် ပတ်ဝန်းကျင်ဆိုင်ရာ စည်းမျဉ်းစည်းကမ်းများနှင့် လိုက်လျောညီထွေရှိစေရန် လိုအပ်ချက်များကိုစောင့်ကြည့်ပြီး ဌာနတွင်းအစီရင်ခံခြင်းများလုပ်ဆောင်မည်ဖြစ်ပါသည်။

၇။ **စဉ်ဆက်မပြတ် တိုးတက်မှု** - ကုမ္ပဏီသည် ဝန်ထမ်းများအား ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်ကို ပုံမှန်ဆန်းစစ် ရာတွင်တက်ကြွစွာပါဝင်လာရေး၊ ဆန်းသစ်ပြောင်းလဲမည့်အခွင့်အလမ်းများဖော်ဆောင်နိုင်ရေးနှင့် ယူဆအကြံပြု ချက်များပေးနိုင်စေရန်အာပေးခြင်းဖြင့် စဉ်ဆက်မပြတ်တိုးတက်မှုအလေ့အထကို ပျိုးထောင်မြှင့်တင်မည်ဖြစ်သည်။

ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်အကောင်အထည်ဖော်ရန်အတွက်လျာထားငွေ

RVK Myanmar Co., Ltd. သည် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်အတွက် လျာထားငွေသည် CSR နှင့်ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုလုပ်ငန်းများကိုအကောင်အထည်ဖော်ရာတွင် အမြတ်ဝင်ငွေ၏ ၃ ရာခိုင်နှုန်းခန့်ကို အသုံးချရန် မူဝါဒကို ချမှတ်ထားသည်။ ပတ်ဝန်းကျင်ဆိုင်ရာစီမံခန့်ခွဲမှု လုပ်ငန်းများတွင် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုကော်မတီ၏ကုန်ကျစရိတ်များ၊ စက်ရုံဝင်းအတွင်းရှိ EMP ပါလုပ်ငန်းများကို ဂရုတစိုက်ဆောင်ရွက်ရန် တာဝန်ရှိသည့်စက်ရုံဝန်ထမ်းလည်းဖြစ်နိုင်သော၊ ခန့်အပ်ထားသည့် EHS အရာရှိနှင့် လက်ထောင်အရာရှိတို့ပါဝင်သည်။ CSR မှခွဲဝေရရှိထားသောရန်ပုံငွေ၏ ၂၅ ရာခိုင်နှုန်းကို ပတ်ဝန်းကျင်ထိခိုက်မှုစောင့်ကြည့်ခြင်း၊ လျော့ပါးသက်သာစေရေးနှင့် စီမံခန့်ခွဲမှုတို့အတွက် အသုံးပြုမည်ဖြစ်ပါသည်။

ပတ်ဝန်းကျင်ဆိုင်ရာစောင့်ကြပ်ကြည့်ရှုမှုအစီအစဉ်

လက်ရှိပတ်ဝန်းကျင်တွင် ပတ်ဝန်းကျင်နှင့် လူမှုရေးဆိုင်ရာ သက်ရောက်မှုများကိုစောင့်ကြည့်လေ့လာခြင်းသည် လျော့ပါးသက်သာစေရေးအစီအမံများ၏ထိရောက်မှုကို အကဲဖြတ်ရာတွင် တည်ဆဲစည်းမျဉ်းစည်းကမ်းများကို လိုက်နာရန်အရေးကြီးပါသည်။ လုပ်ငန်းလည်ပတ်စဉ်ကာလနှင့် ပိတ်သိမ်းစဉ်ကာလတို့အတွင်း အဆိုပြုထားသောအနုတ်လက္ခဏာသက်ရောက်မှုများ လျော့ပါးသက်သာစေရေးအစီအမံများအပြင်

အပြုသဘောဆောင်သော သက်ရောက်မှုများအတွက် မြှင့်တင်ဆောင်ရွက်မှုများကိုပါ အကောင်အထည်ဖော်နိုင်စေရန်အတွက် ဆောင်ရွက်သွားမည်ဖြစ်ပါသည်။

စောင့်ကြပ်ကြည့်ရှုရန်အတွက်သတ်မှတ်ချက်များ

စောင့်ကြပ်ကြည့်ရှုခြင်းဆိုင်ရာသတ်မှတ်ချက်များကို ရွေးချယ်ရာတွင် စီမံကိန်း၏ လည်ပတ်ခြင်းကာလနှင့် ပိတ်သိမ်းခြင်းကာလများနှင့် ဆက်စပ်နေသော သက်ရောက်မှုများကို သတ်မှတ်ခြင်းအပေါ်တွင် အခြေခံပါသည်။ လျော့ပါးသက်သာစေရေး အစီအမံများ အကောင်အထည်ဖော်မှုကို ထိထိရောက်ရောက် အကဲဖြတ်နိုင်ရန်နှင့် စီမံကိန်း၏ အလုံးစုံသောပတ်ဝန်းကျင်ဆိုင်ရာ စွမ်းဆောင်ရည်ကို အကဲဖြတ်နိုင်ရန် သတ်မှတ်ချက်များကို ရွေးချယ်ထားခြင်းဖြစ်ပါသည်။ အောက်တွင်ဖော်ပြထားသည့်အတိုင်း မတူညီသောအဆင့်များတွင် စောင့်ကြပ်ကြည့်ရှုခြင်းလုပ်ငန်းများကို ဆောင်ရွက်သွားမည်ဖြစ်ပါသည်။

လည်ပတ်စဉ်ကာလ-

စီမံကိန်းလည်ပတ်ခြင်းကြောင့် ဖြစ်ပေါ်လာသည့် ဆိုးကျိုးများကို သိရှိနိုင်ရန်အတွက် စောင့်ကြပ်ကြည့်ရှုလေ့လာရန်။ ညစ်ညမ်းစေသောထုတ်လွှတ်မှုများဖြစ်သည့် လေထုအရည်အသွေး၊ ရေအသုံးပြုမှုနှင့် ရေအရည်အသွေးတို့ကို စိစစ်အကဲဖြတ်ရန်၊ ဆူညံသံအဆင့်များကို စောင့်ကြည့်ခြင်း၊ ဓာတုနှင့် အန္တရာယ်ရှိသောအရာများ စနစ်တကျကိုင်တွယ်စွန့်ပစ်ခြင်းနှင့် စက်ရုံထွက်စွန့်ပစ်ပစ္စည်းစွန့်ပစ်ခြင်း၊ လုပ်ငန်းခွင်ကျန်းမာရေးနှင့်ဘေးကင်းရေးအချက်များကို အကဲဖြတ်ခြင်း၊ ပတ်ဝန်းကျင်ဆိုင်ရာ စည်းမျဉ်းစည်းကမ်းများနှင့်အညီ စိစစ်ခြင်းကဲ့သို့သောဖြစ်နိုင်ချေရှိသောသက်ရောက်မှုများကိုဆုံးဖြတ်ရန် သတ်မှတ်ချက်များစွာကို စောင့်ကြည့်သွားမည်ဖြစ်သည်။

ပိတ်သိမ်းစဉ်ကာလ-

ပိတ်သိမ်းခြင်းသည် လုပ်ငန်းတည်ဆောက်စဉ်အဆင့်အတိုင်း တူညီသောသက်ရောက်မှုရှိမည်ဟု ယူဆရပြီး တည်ဆောက်စဉ်ကာလနှင့် ယေဘုယျအားဖြင့် တူညီသည်ဟုသတ်မှတ်ထားပါသည်။

နိဂုံးချုပ်

စက်မှုလုပ်ငန်း လုပ်ငန်းစဉ်များနှင့် ဆက်စပ်လေ့ရှိသော သဘာဝပတ်ဝန်းကျင်ဆိုင်ရာ ထည့်သွင်းစဉ်းစားမှုများနှင့်အညီ၊ ဆေးဝါးထုတ်လုပ်သည့်စက်ရုံမှ ဆောင်ရွက်သောလုပ်ငန်းများသည် လေထုညစ် ညမ်းမှု၊ အသံဆူညံမှု၊ ရေထုညစ်ညမ်းမှုနှင့် စွန့်ပစ်ပစ္စည်းညစ်ညမ်းမှုကဲ့သို့သော ပတ်ဝန်းကျင်ဆိုင်ရာစိန်ခေါ်မှုများစွာပါရှိသည်။

ဖြစ်နိုင်ချေရှိသော ပတ်ဝန်းကျင်ဆိုင်ရာထိခိုက်အကဲဖြတ်ခြင်းလုပ်ငန်းစဉ်ကို Green Enviro Services Ltd. မှ ဆောင်ရွက်ခဲ့ပါသည်။ ထုတ်ဖော်တင်ပြထားသည့် အလားအလာရှိသော သက်ရောက်မှုများအားလုံးသည် ကုန်ထုတ်လုပ်မှုစက်ရုံနှင့်ဆက်စပ်နေသော ယေဘုယျသက်ရောက်မှုများဖြစ်ပြီး ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်ကို သင့်လျော်စွာ အကောင်အထည်ဖော်ခြင်းနှင့် စက်ရုံအတွင်းနှင့် အနီးတစ်ဝိုက်တွင် ကောင်းမွန်သောပတ်ဝန်းကျင်ကို ထိန်းသိမ်းခြင်းဖြင့် လျော့ပါးသက်သွားနိုင်ပါသည်။

အဆိုပြုစီမံကိန်းသည် သစ်ပင်ပန်းမန်များ၊ တိရစ္ဆာန်များနှင့် ဂေဟစနစ်တန်ဖိုးများအပါအဝင် ကုန်းမြေဂေဟဗေဒကို သိသိသာသာသက်ရောက်မှုရှိမည်ဟု မဟုတ်ပါ။ စီမံကိန်းသည် တည်ထောင်ပြီးသောလုပ်ငန်းဇုန်ရိယာအတွင်းတွင် တည်ရှိပြီး မြန်မာ့စီးပွားရေး ဦးပိုင်လီမိတက်မှ ယခင်ကအသုံးပြုခဲ့သော လက်ရှိစက်ရုံ

အဆောက်အအုံများနှင့် အခြေခံအဆောက်အအုံများကို ငှားရမ်းဆောင်ရွက်မည်ဖြစ်ပါသည်။ ထို့ကြောင့် စက်ရုံနေရာတွင်ရှိနိုင်သည့် သဘာဝပေါက်ပင်နှင့် ဒေသရင်းတိရစ္ဆာန်များမှာလည်း စက်ရုံတည်ဆောက်စဉ်ကတည်းက ရှင်းလင်းခဲ့ပြီးဖြစ်ပါသည်။ ရလဒ်အနေဖြင့်၊ အနီးတစ်ဝိုက်ရှိ ကုန်းမြေဂေဟဗေဒဆိုင်ရာ သိသိသာသာ ပြောင်းလဲမှု သို့မဟုတ် အနှောင့်အယှက်ဖြစ်စေမှုများ နည်းပါးမည်ဖြစ်ပါသည်။

လေ့လာတွေ့ရှိချက်များအရ RVK Myanmar Co., Ltd. သည် ရပ်ရွာလူထုနှင့် ထိတွေ့ဆက်ဆံမှုကို ဦးစားပေးလုပ်ဆောင်ရန်နှင့် စီမံကိန်း၏ အဆင့်အားလုံးတွင် သဘာဝပတ်ဝန်းကျင်ဆိုင်ရာ စည်းမျဉ်းများကို တင်းတင်းကျပ်ကျပ် လိုက်နာရန် အရေးကြီးပါသည်။ စိုးရိမ်ပူပန်မှုများကို တက်ကြွစွာဖြေရှင်းပြီး သဘာဝပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်တွင် ဖော်ပြထားသောလျော့ပါးသက်သာစေမည့်နည်းလမ်းများကို စေ့စေ့စပ်စပ်အကောင်အထည်ဖော်ခြင်းဖြင့် ကုမ္ပဏီသည် သဘာဝပတ်ဝန်းကျင်ဆိုင်ရာ ထိခိုက်မှုများကို သိသိသာသာလျော့ချနိုင်မည့်အပြင် မန္တလေးတိုင်းဒေသကြီးအတွင်း လူမှုစီးပွားဖွံ့ဖြိုးတိုးတက်ရေးကို ဖော်ဆောင်နိုင်မည်ဖြစ်သည်။

အကြံပြုချက်များ

RVK Myanmar Co., Ltd. သည် ၎င်း၏ ဆေးဝါးထုတ်လုပ်သည့်စက်ရုံနှင့် ဆက်စပ်နေသော သဘာဝပတ်ဝန်းကျင်ဆိုင်ရာ ထိခိုက်မှုများကို စီမံခန့်ခွဲရန် တက်ကြွသော ချဉ်းကပ်မှုကို ဖော်ဆောင်ပါသည်။ ပြည်ပရှိလုပ်ငန်းဆောင်ရွက်မှုများမှ ကျယ်ပြန့်သော အတွေ့အကြုံများကို အသုံးချခြင်းဖြင့် ကုမ္ပဏီသည် ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုအစီအစဉ် (EMP) ကို ထိထိရောက်ရောက် အကောင်အထည်ဖော်ခြင်းဖြင့် သက်ရောက်မှုအဆင့်များကို အလယ်အလတ်မှ လျော့ပါးသက်သာသည်အထိရရှိရန် ကတိပြုပါသည်။ ဤကတိကဝတ်ကို လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေးကင်းရေးဆိုင်ရာ၊ အရည်အသွေးစီမံခန့်ခွဲမှုနှင့် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုဆိုင်ရာ ISO လက်မှတ်များအပါအဝင် တင်းကျပ်သော အရည်အသွေးနှင့် စီမံခန့်ခွဲမှုစနစ်များကို လက်ခံကျင့်သုံးခြင်းဖြင့် သေချာစေပါသည်။ ထို့အပြင် ကုမ္ပဏီသည် ၎င်း၏ကိုယ်ပိုင်ပတ်ဝန်းကျင်ဆိုင်ရာမူဝါဒကို ရေးဆွဲထားပြီး အဖွဲ့အစည်းဆိုင်ရာဖွဲ့စည်းပုံများ၊ တာဝန်များနှင့် လုပ်ထုံးလုပ်နည်းများကို အကြမ်းဖျင်းဖော်ပြထားပါသည်။ သဘာဝပတ်ဝန်းကျင်ဆိုင်ရာ စိုးရိမ်ပူပန်မှုများကို ကြီးကြပ်ဆောင်ရွက်ရန်အတွက် Environmental Health and Safety အဖွဲ့ကို ဖွဲ့စည်းထားပါသည်။

စီမံကိန်း၏ပတ်ဝန်းကျင်စံနှုန်းများကို ပိုမိုကောင်းမွန်တိုးတက်စေရန် လေ့လာမှုအဖွဲ့သည် ဆောင်ရွက်ရမည့်အချက်အချို့ကို အကြံပြုထားပါသည်။ ၎င်းတို့တွင် EMP ကို တင်းတင်းကျပ်ကျပ် အကောင်အထည်ဖော်ရန်၊ အတွေ့အကြုံရှိ ပတ်ဝန်းကျင်ကျန်းမာရေးနှင့် ဘေးကင်းရေး ဝန်ထမ်းများအား စောင့်ကြည့်စစ်ဆေးရေး အရာရှိများအဖြစ် ခန့်အပ်ခြင်း၊ နှစ်စဉ် ပတ်ဝန်းကျင်စစ်ဆေးခြင်းအတွက် ပြည့်စုံသော မှတ်တမ်းများ ထိန်းသိမ်းခြင်း၊ အန္တရာယ်ရှိသော စွန့်ပစ်ပစ္စည်းများ စနစ်တကျစွန့်ပစ်ခြင်းနှင့် ရေဆိုးအရည်အသွေး ပုံမှန်စောင့်ကြည့်ခြင်းတို့ ပါဝင်ပါသည်။ ထုတ်ဖော်တင်ပြထားသော သက်ရောက်မှုများရှိသော်လည်း၊ နောက်ဆက်တွဲလေ့လာမှုများ၊ လျော့ပါးသက်သာရေးနှင့် အကြံပြုချက်များကို ထိထိရောက်ရောက် အကောင်အထည်ဖော်ပြီး စောင့်ကြည့်ကြည့်ရှုခြင်းဖြင့် လုပ်ငန်းစီမံကိန်းကို အကောင်အထည်ဖော်ဆောင်ရွက်နိုင်မည်ဖြစ်ပါသည်။ စီမံကိန်း၏အောင်မြင်မှုနှင့် ရေရှည်တည်တံ့မှုအတွက် မြန်မာနိုင်ငံ၏ သဘာဝပတ်ဝန်းကျင်ဥပဒေနှင့် စည်းမျဉ်းများကို တင်းတင်း ကျပ်ကျပ်လိုက်နာရန် အရေးကြီးပါသည်။

Executive Summary

The RVK Myanmar Co., Ltd. is of the intention to make a business operation of the pharmaceutical products manufacturing in Myanmar, in accordance with the existing laws in Myanmar. It will get a long-term lease of the Myanmar Pharmaceutical Factory (MPF) in Pyin Oo Lwin, from the Myanmar Economic Holdings Ltd. (MEHL). The RVK Myanmar Co., Ltd. itself is a Joint Venture Company, based on the Foreign Investment Law of the Republic of the Union of Myanmar, of the RVK Myanmar Co. Ltd. incorporated in Myanmar, and RV Group (S) Pte ltd incorporated in Singapore, with Share ratio of Daw May Thu Win – 1.5%, Mr. Rajesh Kumar – 8% and RV Group (s) pte ltd – 90.5%. The RVK Myanmar Co., Ltd. has agreed to pay the Royalty Fees which is less than three percent of the profit to the Myanmar Economic Holdings Ltd., after five years of production with Myanmar Pharmaceutical Factory (POL) labels.

The project site of Myanmar Pharmaceutical Factory is situated at 21°56'43.59"N and 96°24'22.74"E, in the Kan Gyi Kone Village Tract, near Pyin Oo Lwin, 54.5 km from Mandalay City and total elevation is 3,538 ft. (1,078 m) above sea level surrounded by Eastern Range of pollution free Mountain area. This can be easily accessed from the Mandalay-Lashio Road and no direct access to the Railway transport.

Total investment is 5 million USD (10,080.29 million MMK for local use and 4,329,628.80 USD for machineries and raw materials to be imported) to be contributed by three shareholders, which has already obtained the Certificate of Incorporation (Company Registration Certificate) No. 107502769 (177 FC/2015-2016), corporate under the Myanmar Companies Act.

Operational procedures at a pharmaceutical manufacturing facility involve adherence to intricate and highly sensitive protocols, emphasizing the essential need for accuracy. The raw materials once received and checked, need to be immediately in the proper storage with controlled temperature. The types and categories of pharmaceuticals produced in RVK factory are Tablets, Capsule, Oral Liquid, Oral Powder, Betalactam Oral, Betalactam Injection, Small Volume Parentral Solution, Large Volume Parentral Solution, Ophthalmic.

The production process of a pharmaceutical manufacturing factory involves several types of process and each type of production process is as follows:

Antibiotic Power for Injection Production Process:

It is an injectable powder that can be used after reconstitution with WFI. These injectable powders are Coephalosporin group Third generator products that require special care in handling. The medicine must be sealed and sterilized and received by unpacking. The injectable powders are opened only under Laminar Air Flow in purity level Grade A/B (or 100 class (or ISO level 5)) and inserted into the powder filling machine. Under the cleanest conditions, the vials are accurately filled according to the specified weight. Even below this level of cleaning, the rubber insert immediately closes and the aluminum flip off cap closes. Clean room level (100 class) is done, then transported by conveyor to room with clean room level (10000) and visual inspection is done. The injection powder bottles that pass the test are sent to the automatic labeling machine and the production number; date of manufacture; Expiration dates should be printed and labeled. After that, the packaging steps are followed. In that pharmaceutical manufacturing process, everything has to be done simultaneously in a sterile environment. Vial bottles and lids containing injection powder are also used for

injection, washed with injection-grade water, and disinfected. It must be used after pyrogen removal.

Capsule Manufacturing Process:

Retrieve the designated quantity of active ingredients and accessories required for capsule production from the raw material warehouse. Conduct sieving to achieve the prescribed powder size. Accurately weight each ingredient. For capsule filling, blend the active substance and excipients to ensure a uniform mixture. Quality control is implemented throughout production to uphold compliance with specified standards. Load the resulting powder into capsules. Prior to and during this process, conduct quality control assessments to verify that the medicine's weight and other specifications meet the standards. Additionally, submit samples to the quality inspection department for evaluation. Inspect for any filling and capsule defects. Examine and fill the inspected capsules into the container or blister pack, and proceed with labeling. Subsequently, forward the product to the quality inspection department. Conclude the final batching as per specified quantities. Transport the received finished goods to the finished goods warehouse.

Large volume parenteral solution production process:

The medicinal ingredients required for the production of large volume parenteral solutions are obtained from the raw material warehouse. The amounts are weighed according to the specifications, and the pharmaceutical formulation is carried out following the prescribed method. The water used in the formulation undergoes step-by-step purification according to the production method. The distilled water is pyrogen-free, ensuring its purity for use as an injection-grade water bottle. Formulated solutions are bottled under sterilized conditions. The solution bottles are made of LDPE-type plastic, adhering to medical-grade standards. Clean bottles are washed with injection-grade water. Filled bottles are sealed with rubber inserts and flip-off aluminum caps, even under sterilized conditions. The rubber inserts used are materials that come into direct contact with the medicine and are sterilized. The terminal sterilization of filled solution bottles includes visual inspection of particle content, labeling, production license, production number, and date of manufacture. Expiration dates are printed, and then the bottles are hermetically sealed in a PP plastic bag. To address any potential weaknesses, the bottles are kept in temporary storage for at least two weeks. While no leakage of the LDPE container bottle production Sem line is found during the plastic bottle-making process, potential weaknesses may be identified after filling the medicine, sterilization, and pressure testing. After at least two weeks of such temporary storage, the finished product must be transferred to the finished product storage facility, ensuring it meets specifications outlined in medical literature.

Small Volume Parenteral Solution Production Process:

The active pharmaceutical ingredients required for intravenous solution production are sourced from the raw material warehouse. The quantities are weighed according to specifications, and the pharmaceutical formulation is conducted following the prescribed method. The water used in the formulation undergoes step-by-step purification according to the production method. The distilled water is pyrogen-free, ensuring its purity for use as an injection-grade water bottle. The injection bottles designated for the medicine formulation and injection liquid undergo cleaning and sterilization following standard operating procedures (SOP). Pyrogen removal is conducted. The solution is filled into the medicine bottles under

sterilized conditions and simultaneously sealed with fire. Following the filling and sealing of injection bottles, terminal sterilization is performed for the drugs used. Sterilized injection bottles undergo external inspection for defects and particles using a lighting system. The date of manufacture of inspected vials, along with the expiration date, drug name, manufacturing license number, and produced batch, are stamped. Subsequently, the vials are placed in quarantine storage. After receiving the Certificate of Analysis (COA) from the quality inspection department, they undergo secondary packing. Labels, checked and accepted according to the packaging SOP, are affixed. The finished goods are then transferred to the finished goods warehouse.

Liquid for External Use Production Process:

The raw materials required for the production of the liquid (external use) are weighed upon receipt from the storage facility. The pharmaceutical formulation is prepared following standard operating procedures (SOP) and executed according to the prescribed method. The resulting liquid is then sent to the quality inspection department for evaluation. Following the completion of quality inspection, the liquid is filled, and the lid is securely closed. Manufacturing serial numbers are appropriately applied to received labels. The date of manufacture and expiration dates are printed and correctly affixed to the bottles. Subsequently, final packing is carried out according to the assigned serial number. The received finished products are systematically transferred to the finished product warehouse.

Ophthalmic Ointment Production Process

To initiate the production of ointment, active Pharmaceutical Ingredients and related materials are retrieved from the raw material warehouse in accordance with the specified quantity. The fundamental materials involved in formulating ophthalmic ointment are weighed according to the specified amount. After mixing according to the prescribed method, the mixture is filtered. The basic materials for the formulation of ophthalmic ointment, requiring sterilization, undergo the sterilization process. Active pharmaceutical ingredients are precisely weighed to ensure accurate formulation and dosage consistency in the production process. Proper mixing of the active pharmaceutical ingredients and sterilized materials is carried out, followed by grinding and final mixing. Samples of the medicine are sent to the quality control department for quality assurance. Tubes designated for ointment addition undergo washing, drying, and sterilization. Ointments are filled into sterilized tubes. Inspection of the manufactured ointment tubes and packaging must be conducted. Post-packaging, temporary storage is necessary to assess whether vulnerabilities have occurred. The finished goods are then transferred to the finished goods warehouse.

Oral Powder Production Process

The active pharmaceutical ingredients required for oral powder production are obtained from the warehouse in specified quantities. Medicinal raw materials extracted are dried for a specified duration using a drying device at a designated temperature. The dried pharmaceutical raw materials undergo sieving to achieve the required powder size. The resulting powders are weighed to meet the specified quantities outlined in the manufacturing method. To ensure even powder mixing, a powder mixer is employed at the specified time. Subsequently, it is sent to the quality inspection department to assess compliance with standards. Powder filling and capping are executed using machines, adhering to the specified weight of the powder. The product is then sent to the quality inspection department. Verify

and correct the quantity of labels received in the packaging department; production batch and expiration date printing are conducted and verified at the quality control department. The powder is filled, and the packages are inspected for defects. The medicine powder packets, having been checked and labeled, are placed into the respective carton boxes according to the assigned number. The finished products are transferred to the finished product warehouse.

Oral Liquid Production Process:

The active ingredients and related materials required for producing the oral liquid are extracted from the pharmaceutical raw material warehouse in specified quantities. Each ingredient is individually weighed. The initial step involves mixing the syrup, and after the mixing process, samples are dispatched to the quality inspection department. Subsequently, second-step vitamins are integrated. In the final stage, the syrup and vitamin liquids are thoroughly mixed to achieve a uniform consistency. Particles are then eliminated using a filtration method, and samples are sent to the Quality Control Medical Center for inspection. The quantity of bottles and lids intended for medicine filling undergoes verification and acceptance. Washing and drying processes are conducted. Subsequently, the bottles and caps are forwarded to the filling station. Filling the syrup and capping are performed using specified equipment. Post-filling, the bottles undergo inspection for defects. Labels with production batch, date of manufacture, and expiration dates printed on them are affixed. The final products are then packed according to predetermined quantities. The received finished goods are systematically transferred to the finished goods warehouse.

Tablet Production Process

The active pharmaceutical ingredients and related materials required for tablet production are extracted from the raw material warehouse in specified quantities. Filtration is performed to achieve the specified powder size. Each ingredient undergoes careful weighing. To create a solid powder, the powders are initially mixed. The necessary amount of binder is added to the powders, and a powder solidifying machine is used to solidify the powder. The resulting solid powder is then dried at a specified temperature. After drying, the obtained solid powder is filtered to achieve the specified uniform size. In the presence of larger particles, regrinding is conducted. Subsequently, a sample is sent to the quality inspection department. The obtained powder blend and additional materials used to aid in tableting are mixed to the specified consistency. Quality inspection is conducted during the production of the drug powder obtained after mixing. Tableting is carried out using a tablet machine according to specific weight and size. Ensuring compliance with established standards before and during the tableting process, quality control is implemented throughout production. Additionally, the quality inspection department takes samples for pill quality testing. The received pills undergo inspection for defects. The inspected pills are further verified. Samples are sent to the quality inspection department. Tablet coating continues. Tablets undergo coating and are once again checked for defects. Filling the tablets is followed by the labeling phase, which includes marking the production batch, date of manufacture, and expiration dates on the containers. Tablets not filled in bottles are placed in blister packs and then packaged in boxes. The received medicine boxes are further packaged in carton boxes at the final level. The received finished goods are then transferred to the finished goods warehouse.

The pharmaceutical products, packaged appropriately, will be transported from the factory via trucks to various destinations across Myanmar.

The implementation of the project will result in a number of benefits to the country:

a) RVK Myanmar Co. Ltd. will subscribe for corporate social responsibility (CSR) (3%) from the profit. The company intends to support (25%) of the subscribed money to rural development such as road maintenance, educational support for village schools, and village libraries. Another (25%) will be budgeted for community welfare, health, and sports support and (25%) for donations and religious support to the village's monasteries, religious facilities, and Myanmar traditional festivals. The rest (25%) will be used for environmental impact mitigation, management, and monitoring.

b) Will provide employment opportunities that will have a positive impact on future job creation.

c) RVK Myanmar Co. Ltd. also aims to accomplish

- Creation of a sustainable, friendly neighbourhood by supporting the welfare of the community in the project area as per the village committee and authority
- Employee welfare facilities are provided to the employees to keep their motivation levels high and to increase their productivity and efficiency at work. Employee benefits are arranged well for all the staff to feel safe and secure in their work and livelihood.

The project's location has been carefully chosen, taking into account various factors critical to its success. These factors include its strategic geographical positioning within an economic hub, facilitating convenient access to markets and suppliers, supported by a well-developed transportation infrastructure. Moreover, the selection of the site ensures the implementation of robust safety measures essential for smooth business operations. It's noteworthy that the site has previously housed a business operated by MEHL and has been acquired through a lease agreement. Additionally, the lower population density in the vicinity mitigates potential conflicts with residential areas, thereby establishing a promising and sustainable foundation for the pharmaceutical production venture.

Objective

The objective of this EIA is to carry out a detailed evaluation of the environmental issues of the project. The EIA has to highlight the implications of the project to the environment and also to inform the public and interested parties the project objectives, needs and constraints. This Environmental Impact Assessment also makes constructive suggestions on improving the environmental performance of the project.

Scope of the Project

The study area for this project is roughly defined to encompass the area within a 2-kilometer radius of the proposed project site, which will be large enough to address the potential environmental and socio-economic impacts of the project's operation. Within this radius, there are three communities, namely Aung Chan Tha, Nyan Nyin Tha and Kan Gyi Kone village.

Project Alternative

The project alternatives are based on location alternatives, activity alternatives, process or technology alternatives, or No-Action alternatives.

i. No establishment of the proposed project (No-Go Alternative)

ii. Relocation of the proposed project. (Site Selection)

iii. Factory design and practices: Establish the proposed project of a Modernized, International Standard, High Technology, operating with Good Manufacturing Practice (GMP).

iv. Switching to the further updated Technology.

The RVK Myanmar Co., Ltd. has strategically embraced the third alternative, embarking on a recent project aimed at establishing advance technology, internationally standardized architectural designs and ventilation systems implemented through industry-standard methods. These cutting-edge facilities operate in strict adherence to Good Manufacturing Practices (GMP) and stringent quality control protocols. A comprehensive set of mitigation measures will also be implemented to minimize any potential adverse environmental impacts.

Policy, Legal, and Institutional Framework

The Environmental Impact Assessment for the Manufacturing and marketing of Pharmaceutical Products was conducted by Green Enviro Services Ltd. The recent study was based on the followings; Environment, Environmental impact, Environment performance for the Prevention of air, water and soil pollution, and Socio-economic Impact on the community.

The following Laws and Regulations of Myanmar are found to be relevant for the successful implementation of the project.

- The Environmental Conservation Law, 2012
- The Environmental Conservation Rules, 2014
- Environmental Impact Assessment Procedure, 2015
- National Environmental Quality (Emission) Guideline, 2015
- The Conservation of Water Resources and Rivers Law, 2006
- Underground Water Act, 1930
- Public Health Law, 1972
- Prevention and control of communicable Disease Law, 1995
- The National Drug Law (1992)
- Myanmar Investment Law, 2016
- Myanmar Fire Services Law, 2015
- Boiler Law, 2015
- Labour Organization Law, 2011
- The Settlement of Labor Disputes Law, 2012
- Employment and Skill Development Law, 2013

Methodology and Approach

Desktop Research

For the Environmental Impact Assessment (EIA), extensive desk research was conducted to establish a comprehensive environmental information database. This involved sourcing information from various reliable materials including textbooks, articles, maps, online resources, photographs, GIS datasets, past EIA reports, and secondary data obtained from the General Administration Data provided by the Township Administration Department.

Consultation with Stakeholders

To ensure a thorough understanding of the potential ecological and socio-economic impacts of the proposed project, extensive public consultations were held. Local village and ward authorities, religious leaders, village councils, and members of the local communities were actively engaged. This inclusive approach allowed for a wide range of perspectives to be considered, empowering the local community to contribute their comments and express any concerns they may have regarding the project. This participatory process is integral to the impact assessment, providing valuable insights that inform decision-making.

Field Research

Two-seasoned fieldwork activities carry on during operation periods to verify and complement information gathered from desktop studies. The fieldwork covered all relevant components of the ecological, socio-economic, and health components of the environment.

Laboratory Analysis

The Geo-technical survey is conducted by Green Enviro Services Ltd., during which soil samples collected in the field are analyzed in the laboratory by the Land Use Division of the Department of Agriculture, Ministry of Agriculture and Irrigation.

Water samples collected from portable water sources and wastewater samples from treatment ponds are gathered and analyzed in the laboratory by ISO TECH Laboratory and ALARM Ecological Laboratory.

The Green Enviro Noise Survey Team is tasked with visiting the Proposed Project Sites to conduct environmental noise readings during both day and night periods to assess the noise level of the surrounding area during the operational phase.

The ALARM Ecological Laboratory team measures the air quality at the proposed project sites to establish the existing baseline ambient air quality status within a 24-hour period during two seasons.

Additionally, the team from Green Myanmar Co., Ltd. measures boiler stack emissions at the proposed project site to determine the existing ambient air quality status during the operational phase.

Environmental and Socio-economic Setting of an area

In the study, it is necessary to establish baseline information on the environmental and socio-economic setting of an area, which could receive direct and indirect impacts during the project's operation.

The environment and socio-economics related to the baseline information are typically divided into three resources:

- Physical Environment
- Socio-economic Environment
- Biological Environment

Physical Environment

Water Supply

RVK Myanmar Co., Ltd. uses its own source of underground water and sitha dam for the operation use of boiler, cleaning and sanitizing, production process, and for domestic and kitchen use. The water treatment system is installed.

Water quality

Baseline data on the quality of portable water from the water treatment plant and wastewater from the wastewater treatment plant at the project site were collected. The analysis indicates that the portable water generally meets acceptable standards, with all parameters such as pH, Total Suspended Solids (TSS), Ammonia, BOD, COD, Total Phosphorous, Oil & Grease, Total Nitrogen, Phenol, and Mercury falling within normal ranges according to specified standards.

Air Quality

Air quality assessments were conducted during the operational phases near the generator house and factory on May 25 and 26, 2017. Elevated levels of nitrogen dioxide (NO2) at 228.92 µg/m3 and particulate matter PM2.5 at 33.02 µg/m3 were observed, surpassing recommended limits, while particulate matter PM10 remained within normal levels at 42.64 µg/m3. Sulphur dioxide (SO2) was within acceptable limits at 385.83 µg/m3. Other pollutants such as ammonia (NH3), carbon dioxide (CO2), carbon monoxide (CO), hydrocarbons, methane, atomic radiation, and volatile organic carbon (VOC) were all within normal ranges.

The elevated levels of nitrogen and PM2.5 near the boiler house can be attributed to factors like incomplete combustion of furnace oil and sulfur content in the fuel, leading to increased emissions. Poor boiler maintenance can also contribute to higher pollutant levels.

During a subsequent air quality test near the boiler house and production area on December 17 and 18, 2023, all parameters including NO2, PM10, PM2.5, SO2, and ozone were within their respective guideline limits. The measurement for volatile organic carbon (VOC) also fell within the acceptable range, indicating satisfactory air quality conditions.

In the grinding room operation area, air quality measurements showed generally low pollutant levels, with all parameters including NO2, PM10, PM2.5, SO2, NH3, CO2, CO, hydrocarbons, methane, atomic radiation, and VOC within normal ranges.

Gas Emission from the Boiler

To evaluate the existing environmental conditions of the factory, gas emissions from the boiler were measured by Green Myanmar Environmental Services Co., Ltd. at the selected site using the Kane 988 Combustion Analyzer to monitor stack emissions from furnace for a short-time interval sample (1 hour). According to the result, the NO_2 and SO_2 do not exceed the Nation Environmental Quality (Emission) Guidelines for Small Combustion Facilities.

Noise Level

Noise monitoring was conducted at the project site using the GM1356 Digital Sound Level Meter. Sampling was done over 24 hours during the operational phase and repeated twice. Additionally, 1-hour noise readings were taken in specific areas such as the mixing and granulation room inside the factory.

Initial testing, conducted near ventilation units in the production area, revealed daytime noise levels of 56.6 dBA and nighttime levels of 58.1 dBA. Subsequent testing near the boiler house showed daytime levels of 53.3 dBA and nighttime levels of 49.1 dBA.

These readings are below the NEQG guideline for industrial and commercial areas, which recommends a maximum of 70 dBA for both day and night periods. Furthermore, the noise levels in the operation area align with NIOSH guidelines, falling within the 85-decibel range aimed at protecting workers from occupational noise exposure.

Waste Management

Hazardous Waste

Pharmaceutical manufacturing generates hazardous waste, encompassing various byproducts and discarded materials that pose environmental and health risks. These include chemical residues, expired or rejected pharmaceuticals, contaminated equipment, and packaging materials. Due to the nature of pharmaceutical production, the waste often contains potentially harmful substances. Proper disposal and management of this hazardous waste are critical to prevent environmental pollution and protect public health. Compliance with stringent regulations and the implementation of safe disposal practices within pharmaceutical manufacturing facilities are essential to mitigate the environmental impact and ensure responsible waste management in the industry.

Solid Waste

The sources of waste in a pharmaceutical manufacturing facility are diverse, ranging from packaging materials and glassware to product waste and laboratory waste. Packaging materials, such as plastic and paper, are segregated for recycling, while glassware that has reached the end of its usable life is discarded. Product waste, a significant source of solid waste, undergoes disposal according to WHO guidelines, with various pharmaceuticals treated accordingly, including incineration for antibiotics and chemical treatment for beta-lactam products. Biological waste is managed through methods like autoclaving or chemical disinfection to render pathogens inactive before disposal.

Laboratory animal waste is carefully handled to minimize environmental risks and ensure worker safety, typically through incineration with proper storage protocols. Disposal of waste from the factory is conducted in coordination with the City Development Committee, following their guidance to ensure compliance with regulations and responsible waste management practices.

Socio-Economic Environment

Demographic aspect data is taken from the Township Administration and Village Administration. The total population of Pyin Oo Lwin Township is 178,677, with 32887houses in 33612 households. In Pyin Oo Lwin Township, most people are Buddhists in majority and

other religions in minorities thrive together in good harmony, participating in each other's religious affairs together.

In the Pyin Oo Lwin Township, there is only one university, namely Yadanarpone at Pyin Sar. The education level is a fairly good indicator as per Myanmar Standard.

The economy of Pyin Oo Lwin Township is based on the agriculture sector and Services providing which is fairly developed. Pyin Oo Lwin is located on Yangon – Mandalay – Lashio Main Road and easily access. The main products of Pyin Oo Lwin Township are Sunflower, Damson, Strawberry, and Sweater which are mainly sell to Mandalay and Yangon Region. Major crops such as paddy, bean, sesame, sunflower, green gram, pigeon bean, cotton and corn are cultivated in Pyin Oo Lwin Township.

The Health Services in Pyin Oo Lwin Township are fairly good, as there are sufficient numbers of health service facilities organized by the Government.

Cultural Heritage

According to the information provided by the Township Administration concerning cultural heritage site, there is no cultural heritage sites in the project area that is relevant to the EIA of this project and will be considered within a 1 km radius of the project site.

Biological Environment

The factory area is not densely forested but scanty with very few natural trees, wild grass and devoid of perennial orchards and well-established institutions or buildings but agriculture land and one village in the South of the factory, Anee Sa Khan Airport in the West and Department Medical Research in the North between the factory and the Mandalay-Lashio Highway. However, the secondary data on the biophysical environment referenced by Township Administrative Data for the project area are described in the report.

Public Consultation Process

The public consultation was done in 5 April, 2017 with a team of six members consisting of three members from RVK Myanmar Co., Ltd. three members from Green Enviro Survey Team, and the local authorities of Kan Gyi Kone village (Ward (16)), Nyan Nyin Tha village and Aung Chan Tha village and local people, a total of 12 nos. of attendees participated.

Potential Environmental Impact

Environmental Parameters	Issues	Operation Phase	Decommissioning Phase
Air pollution	Smoke emissions due to incomplete combustion of the boiler	✔	✔
	Dust and particulate matter from factory operation	✔	-
	Fugitive dust and exhaust gas emissions from the movement of vehicles	✔	✔
Noise Pollution	Noise from Emergency Generators	-	✔
	Noise from factory operation	✔	-
Water pollution	Discharge of suspended sediments in discharge	-	✔

	waters during the rainy season		
	Waste water from Lab	✔	-
	Waste water from factory operation	✔	-
Land Conversion	Major topographical and land cover changes due to the clearing of existing vegetation and buildings	-	-
Soil Contamination	accidental spillage of diesel and petrol from vehicles and from the emergency generator, boiler, and storage area	✔	✔
Biodiversity	Vegetation clearing will have an impact on terrestrial biodiversity resources.	-	-
Occupational Health and Safety	Physical hazards such as lifting, carrying, repetitive work, and work posture injuries	✔	✔

Impact Assessment Methodology and Approach

The assessment of each impact is based on consideration of the magnitude, duration, spatiality and frequency of activities that are going to be carried out during the three phases of the project. The assessment is qualitative, and the significance of each impact is classified into 4 categories overall.

Criteria	Class	Score
Magnitude (M)	Insignificant	1
	Low	2
	Moderate	3
	High	4
	Very high	5
Extent (E)	Site	1
	Surrounding area within 2km from the project area	2
	Local between 2km to 50km	3
	Regional between 50km to 200km	4
	Provincial: impact of provincial significance	5
Duration (D)	Very short term: during construction (0-1 years)	1
	Short-term (2-5 years)	2
	Medium-term (6-15 yeas)	3
	Life of operation	4
	Post Closure	5
Probability (P)	Very improbable	1
	Improbable (very low likelihood that the impact will occur).	2
	Medium Probable (distinct possibility that the impact will occur).	3

	Highly Probable (most likely that the impact will occur).	4
	Definite (the impact will occur).	5

Significance assessment

Significance= (extent + duration + magnitude) x probability

Significance is determined by considering the impact's extent, duration, magnitude, and probability of occurrence. The final value is categorized into the following categories:

Score	Category
>60	Very high
45-59	High
30-44	Moderate
15-29	Low
< 15	Very low

Significant Impact

Concerning significant impacts during the Operation Phase and Decommissioning phases of the Pharmaceutical Manufacturing project, there were 12 significant impacts during the operation phase and 4 significant impacts during the decommissioning phase.

Project Phase	Impact Significance		
	Low	Moderate	High
Operation Phase	22	12	-
Decommissioning Phase	12	4	-

Project Phase	Potential Impact		Impact Significance	Impact Significance with Mitigation
Operation	Air Pollution	2	Moderate	Low
	Water Consumption	1	Moderate	Low
	Water Pollution	3	Moderate	Low
	Hazardous Waste	3	Moderate	Low
	Solid Waste	1	Moderate	Low
	Occupational Health and Safety	2	Moderate	Low
Decommissioning Phase	Air pollution	1	Moderate	Low
	Soil Contamination and water pollution	1	Moderate	Low
	Community Health and Safety	2	Moderate	Low

Environmental Impacts and Their Significance: A Summary

The significant environmental impact of the pharmaceutical production factory involves several key issues.

Air Quality Impact: During production activities such as mixing, granulation, and packaging, as well as filling processes, the release of dust particles into the air presents a moderate impact on air quality within the facility.

Water Consumption Impact: The utilization of water for diverse purposes including production processes, general office use, domestic activities, canteen operations, and toilet facilities contributes to a moderate impact on both ground and surface water consumption.

Wastewater Effluents Impact: Discharged wastewater originating from the production process and associated cleaning and sanitation activities contains residual active pharmaceutical ingredients (APIs), organic solvents, and chemical byproducts, thereby leading to a moderate impact on water quality.

Solid Waste Impact: The disposal of various types of solid waste generated during pharmaceutical manufacturing operations, such as product waste, packaging materials, filters, laboratory waste, microbiological waste, and other office waste, results in the generation of hazardous and production waste, thereby causing a moderate impact.

Occupational Health and Safety Impact: Workers within the facility are exposed to various occupational hazards including dust, hazardous materials, chemicals, biological agents, and noise, posing a moderate risk to their health and safety.

Community Health and Safety Impact: The release of pollutants into the air and the discharge of wastewater from factory operations, office facilities, canteens, and toilets present a moderate risk to community health and safety. Additionally, the generation of hazardous waste further contributes to this risk.

Environmental Management Plan

The chapter describes the modalities provided in the project for the implementation of the proposed mitigation measures to mitigate its negative impacts. It proposes the institutional responsibilities for the implementation of the management plans, the mitigation plans, the monitoring plan, and follow up activities. The Environmental Management Plan of the pharmaceutical factory is organized into the following sections:

1. Institutional Requirements
2. Objectives of the Environmental Management Plan
3. Responsibilities of the EMP
4. Planning Budget for the Environmental Management Plan
5. Environmental Management Plan
6. Environmental Monitoring Plan

Institutional Requirements

The development of the pharmaceutical factory project will be managed by RVK Myanmar Co., Ltd. The project developer should appoint the Environmental, Health and Safety (EHS) Coordinator and Assistants for Environmental, Health and Safety (EHS) issues throughout the lifespan of the project. The EHS Coordinator is responsible for the implementation and monitoring of the Environmental Management Plan (EMP) and Monitoring Plan as well as coordination with contractors, local authorities, and the nearby communities. The EHS Team also makes regular reviews of the EMP to cover all potential impacts, amendments, and modifications.

Objectives of the Environmental Management Plan

The objectives of the Environmental Management Plan are:

i. As a reference and commitment for the proponent to implement the EMP for two phases of the project life cycle, operation, and decommission phases of the project

ii. It will fulfill the needs of the Environmental Conservation Department of the Ministry of Natural Resources and Environmental Conservation (MONREC).

iii. Serve as a guiding document for the monitoring of environmental and social activities of the project

iv. Provide a detailed framework to mitigate negative impacts on the environment and management actions to be adopted for proper implementation of the project.

Responsibilities of the EMP

RVK Myanmar Co., Ltd. has the responsibility to develop, implement, and adhere to an environmental mitigation and management plan for its factory establishment. This includes designing the plan, ensuring compliance with environmental regulations, implementing the outlined measures, monitoring environmental performance, and continuously improving practices. By fulfilling these responsibilities, the company demonstrates its commitment to responsible environmental management and sustainable operations.

RVK Myanmar Co., Ltd. is committed to effectively implementing the environmental mitigation and management plan by undertaking the following actions:

1. **Top Management**: The company's top management will take responsibility for providing leadership and guidance in the implementation of the management plan.
2. **Environmental Management Team**: A dedicated environmental management team will be formed to oversee and coordinate the implementation of the management plan. This team will consist of the EHS coordinator, managers, the EHS assistant, or designated employees who possess the necessary expertise in environmental management.
3. **Departmental Representatives**: The company will assign representatives from each department who will be responsible for implementing the management plan within their respective areas.
4. **Employee Engagement**: The company will actively engage all employees in the implementation of the management plan.

5. **Monitoring and Reporting**: Designated personnel will collect data, conduct inspections, and prepare reports on environmental performance indicators.
6. **Compliance and Audit**: Individuals or teams will monitor regulatory requirements and conduct internal audits to ensure compliance with environmental regulations.
7. **Continuous Improvement**: The company will foster a culture of continuous improvement by encouraging employees to provide suggestions for improvement, identify opportunities for innovation, and actively participate in regular reviews of the management plan.

Planning Budget for the Environmental Management Plan

The RVK Myanmar Co., Ltd. has set up a policy of utilizing about 3% of the profit income on implementing the CSR and environment-related management works, including the expenses of the Environment Management Committee and/or the appointed EHS coordinator and assistant, who could also be one of the factory staff with responsibility to take care of the EMP activities in the factory compound. 25% of the allocated funds from CSR will be used for environmental impact monitoring, mitigation, and management.

Environmental Monitoring Plan

Monitoring the environmental and social impacts in the receiving environment is important in evaluating the effectiveness of the Mitigation Plan so as to comply with the existing regulatory measures. During the operation and decommissioning phases, monitoring will be undertaken to ensure the proposed mitigation measures for negative impacts as well as enhancement measures for positive impacts are implemented.

Monitoring Parameters

The selection of monitoring parameters is based on identifying the impacts associated with the operation, and decommissioning phases of the project. These parameters are chosen to effectively assess the implementation of mitigation measures and evaluate the overall environmental performance of the project. Monitoring activities will be conducted at different stages of the project, as outlined below:

Operation Phase: To determine the impacts that might arise from the operation of the factory. Several parameters will be monitored to determine potential impacts, such as emissions of pollutants to assess air quality and water usage and quality; monitoring noise levels; chemical and hazardous substances to ensure proper handling and disposal of factory waste; assessing occupational health and safety factors; and verifying compliance with environmental regulations.

Decommissioning Phase: Decommissioning is assumed to have the same impact as the construction phase and may entail parameters similar to those in the construction phase.

Conclusion

In line with the environmental considerations commonly associated with industrial processes, the activities conducted by the pharmaceutical manufacturing factory inherently contribute to several key environmental challenges, such as Air pollution, Water consumption, Water pollution, and Waste pollution.

The Potential Environmental Impact Assessment process was carried out by Green Enviro Services Ltd. All the potential threats identified are generic threats associated with Manufacturing factory and can be mitigated with the proper implementation of the Environmental Management Plan and by maintaining a high-quality environment within and around the facility.

The proposed project is not expected to significantly impact terrestrial ecology, including flora, fauna, and ecosystem values. This anticipation arises from the fact that the project will be situated within an already established business area, inheriting existing factory buildings and infrastructure previously utilized by MEHL. Consequently, any flora or fauna biotopes that may have existed on the site have likely been cleared or disturbed during previous business operations. As a result, the project's footprint on the surrounding terrestrial ecology is expected to be minimal, with no significant alterations or disruptions anticipated.

In light of these findings, it is imperative for RVK Myanmar Co., Ltd. to prioritize community engagement and strict adherence to environmental regulations throughout all phases of the project. By proactively addressing concerns and diligently implementing proposed mitigations outlined in the Environmental Management Plans, the company can significantly minimize adverse environmental impacts while simultaneously fostering socio-economic development within the Mandalay Region.

Recommendation

RVK Myanmar Co., Ltd. demonstrates a proactive approach towards managing environmental impacts associated with its pharmaceutical manufacturing factory. Leveraging its extensive experience from operations abroad, the company is committed to achieving medium to low impact levels through effective implementation of the Environmental Management Plan (EMP). This commitment is underpinned by the adoption of rigorous quality and management systems, including ISO certifications for Occupational Health and Safety, Quality Management, and Environmental Management. Additionally, the company has developed its own Environmental policy, outlining organizational structures, responsibilities, and procedures. To oversee environmental concerns, an Environmental Health and Safety team has been established.

To further enhance its environmental standards, the study team recommends several improvements. These include ensuring rigorous implementation of the EMP, appointing experienced Environmental Health and Safety personnel as Monitoring Officers, maintaining comprehensive records for annual environmental audits, arranging proper disposal of hazardous waste, and regular monitoring of wastewater quality. Despite the identified impacts, none are considered significant enough to halt operations, provided that follow-up studies, mitigations, and recommendations are diligently implemented and monitored. Ultimately, strict adherence to Myanmar's environmental laws and regulations is essential for the project's success and sustainability.

CHAPTER 1 – INTRODUCTION

1.1 Background of Proposed Project

According to the Myanmar Environmental Conservation Law, 2012, it requires that the proponents of every development project in the country submit either an Initial Environmental Examination (IEE) or an Environmental Impact Assessment (EIA) to MONREC. Therefore, the investor submitted a proposal for the said investment to the Myanmar Investment Commission (MIC). MIC asked for the environmental approval and comments of the Ministry of the Natural Resources and Environmental Conservation (MONREC) on the proposed project and had approved the proposal for investment in the **Manufacturing and marketing of Pharmaceutical Products** under the name of RVK Myanmar Co., Ltd.

The RVK Myanmar Co., Ltd. is of the intention to make a business operation of the pharmaceutical products manufacturing in Myanmar, in accordance with the existing laws in Myanmar. It will get a long-term lease of the Myanmar Pharmaceutical Factory (MPF) in Pyin Oo Lwin, from the Myanmar Economic Holdings Ltd. (MEHL). The RVK Myanmar Co., Ltd. itself is a Joint Venture Company, based on the Foreign Investment Law of the Republic of the Union of Myanmar, of the RVK Myanmar Co. Ltd. incorporated in Myanmar, and RV Group (S) Pte ltd incorporated in Singapore, with Share ratio of Daw May Thu Win – 1.5%, Mr. Rajesh Kumar – 8% and RV Group (s) pte ltd – 90.5%. The RVK Myanmar Co., Ltd. has agreed to pay the Royalty Fees which is less than three percent of the profit to the Myanmar Economic Holdings Ltd., after five years of production with Myanmar Pharmaceutical Factory (POL) labels. The size of the proposed factory area is 26.4 acres within the compound of Myanmar Economic Holdings Ltd. (MEHL). The leased land consists of 26.4 acres for the factory area, and an additional 10.83 acres for the administrative area. The proposed development area is situated south of Kan Gyi Kone Village Tract, approximately 3-4 miles away.

Total investment is 5 million USD (10,080.29 million MMK for local use and 4,329,628.80 USD for machineries and raw materials to be imported) to be contributed by three shareholder companies, which has already obtained the Certificate of Incorporation (Company Registration Certificate) No. 107502769 (177 FC/2015-2016), corporate under the Myanmar Companies Act. The business activities submitted to DICA are;

1. Consulting for medical equipment business
2. The market survey for medical equipment business
3. The manufacturing and marketing of pharmaceutical production business.

The location of the Myanmar Pharmaceutical Factory is on Block No. 662-Ka (N 14 to N 47), Block No. 655 (N 1 to N 10), Kan Gyi Kone village tract, Mandalay-Lashio Road, Pyin Oo Lwin Township, Mandalay Region, Myanmar. The project site of Myanmar Pharmaceutical Factory is situated at Kan Gyi Kone Village Tract, near Pyin Oo Lwin, 54.5 km from Mandalay City and total elevation is 3,538 ft. (1,078 m) above sea level surrounded by Eastern Range of pollution free Mountain area. This can be easily accessed from the Mandalay-Lashio Road and no direct access to the Railway transport. Water for use in the factory is primarily from Sithar Dam and also from underground water source in dry seasons, from its own tube wells. Water treatment system for medical use is applied.

Operation procedures at a pharmaceutical manufacture factory are simple with regards to following strictly to the complex and very sensitive, accuracy much needed procedures. The raw materials once received and checked, need to be immediately in the proper storage with controlled temperature. The types and categories of pharmaceuticals produced in RVK factory are;

- Tablets
- Capsule
- Oral Liquid
- Oral Powder
- Betalactam Oral
- Betalactam Injection
- Small Volume Parentral Solution
- Large Volume Parentral Solution
- Ophthalmic

All the raw materials, if in powder form, will have to be mixed accordingly to the formulae for the categories mentioned above, either powder and powder, powder dissolved to form solution, solution and solution, powder and solution mixture etc. Then the mixtures or compounds be formed into tablets, capsules, injections, ointment etc., bottled or filled into specific containers, assay and quality control, laboratory and biological testing, packed, labelled and distributed if QC passed.

The pharmaceutical production will gradually increase over a 10-year period, followed by further expansions in subsequent phases up to year 30. Raw materials and equipment will be imported for manufacturing. Initially, products will be geared towards army use and domestic sales. Local sales will comprise 100% of both existing and new products from Year 1 to Year 5, but this will shift to 80% local sales and 20% export for existing products, and 90% local sales and 10% export for new products from Year 6 to Year 30. Capacity upgrades are planned across various product categories, including tablets, capsules, sachets, liquids, ophthalmic products, injections, and parenteral solutions.

According to categorization of economic activities for assessment purposes (which is described in Annex A of EIA Procedures), 'Pharmaceuticals and Biotechnology Manufacturing Plants which is more than 50 Tons is categorized as EIA projects as shown in Table (1).

Table 1. Categorization of Economic Activities for Assessment Purposes

No.	Type of Economic Activity	Criteria for IEE Type Economic Activities	Criteria for EIA Type Economic Activities
Chemical Manufacturing			
72.	Pharmaceuticals and Biotechnology Manufacturing Plants	< 50 t/a	≥ 50 t/a

Source: Environmental Impact Assessment Procedure, 2015

As per the comments of MONREC, the said project requires an EIA to meet the environmental assessment requirements of Myanmar Environmental Conservation Law. Therefore, RVK Myanmar Co., Ltd. commissioned Green Enviro Services Ltd for EIA report study.

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E-mail Address:	hninmyat@rvkmyanmar.com
Head Office Address:	Room No. 1101, Level 11, Office 3 Time City Office Tower. Kyundaw Street (Between Narnattaw Street and Hanthawaddy Street). Ward (7), Kamayut Township, Yangon.
Certificate of Incorporation:	No. 107502769 (177 FC/2015-2016)
Type of Investment:	MIC invested company, FDI
Type of Business:	Manufacturing and marketing of Pharmaceutical Products
System of Sales:	100% Local Sale for Year 1 to Year 5 80% local sales and 20% export for Year 6 to Year 30
Location of Business:	Block No. 662-Ka (N 14 to N 47), Block No. 655 (N 1 to N 10), Kan Gyi Kone village tract, Mandalay-Lashio Road, Pyin Oo Lwin Township, Mandalay Region, Myanmar
Total Investment:	USD 5 million
Certificate	GMP (Good Manfacturing Practice) ISO 9001:2015, ISO 45001:2018, ISO 14001:2015, ISO 17025:2017

1.2 Objective

The objective of this EIA is to carry out a detailed evaluation of the environmental issues of the project. The EIA has to highlight the implications of the project to the environment and also to inform the public and interested parties the project objectives, needs and constraints. This Environmental Impact Assessment also makes constructive suggestions on improving the environmental performance of the project.

The proposed management and mitigation measures, the environmental and social commitments that are supposed to be undertaken by the respective production managers and a framework for implementation of this management plan are for protection of the environment and sustainability of the project and the industry.

1.3 Methodology and Approach

In compliance with the Environmental Conservation Law (2012), Environmental Conservation Rules (2014) and EIA Procedure (2015), the Proponent will be required to carry out and prepare an EIA-EMP to address environmental, social and economic issues and concerns associated with proposed development.

The EIA-EMP study was undertaken in a holistic approach encompassing all different aspects of the EIA process. The methodologies adopted for conducting this EIA are as follows:

Desk Research

Desk research was used to establish an environmental information database for the EIA. Consulted materials include textbooks, articles, maps, internet, photographs, GIS datasets, and past EIA/IEE/EMP reports and baseline report of the area conducted between 2017 and 2019.

Public Consultation

Experts in relevant fields, Local Authorities, Religious Leaders, Village Council, local communities have been consulted for their opinions on issues relating to the potential ecological and socio-economic impacts of the proposed project. This provided an opportunity for stakeholders and the public at large to engage in the process and to make comments or express their concerns regarding the proposed project development. This public participation process component is fundamental to the impact assessment process and is an important informant to decision-making. An EIA, will be developed that will address environmental management statements for all the phases of the project.

Field Research

Fieldwork activities have been carried prior the operation period to verify and complement information gathered from desk studies. The fieldwork covered all relevant components of ecological, socio-economic and health components of the environments.

Laboratory Analysis

The Geo-technical survey is conducted by Green Enviro Services Ltd., during which soil samples collected in the field are analyzed in the laboratory by the Land Use Division of the Department of Agriculture, Ministry of Agriculture and Irrigation.

Water samples collected from portable water sources and wastewater samples from treatment ponds are gathered and analyzed in the laboratory by ISO TECH Laboratory and ALARM Ecological Laboratory.

The Green Enviro Noise Survey Team is tasked with visiting the Proposed Project Sites to conduct environmental noise readings during both day and night periods to assess the noise level of the surrounding area during the operational phase.

The ALARM Ecological Laboratory team measures the air quality at the proposed project sites to establish the existing baseline ambient air quality status within a 24-hour period during two seasons.

Additionally, the team from Green Myanmar Co., Ltd. measures boiler stack emissions at the proposed project site to determine the existing ambient air quality status during the operational phase.

1.4 Scope of the Study

The purpose of the EIA is to provide information on the nature and extent of potential environmental and social impact arising from the construction and operation of the propose project and relative activities taking place concurrently and to establish the EMP which covers best practice measures to minimize offsite environmental impacts from the operation of new or expanding project. Many of these measures are also beneficial to safety and welfare of a community and employees.

MIC recommends conducting an Environmental Impact Assessment (EIA) for the proposed pharmaceutical factory to evaluate and address any environmental consequences. As part of the project, an Environmental Management Plan (EMP) must be submitted, outlining measures to minimize environmental impact. The EMP will guide practices to reduce pollution, manage waste, conserve resources, and protect biodiversity. By following these guidelines, the project aims to meet regulations and ensure sustainable and responsible operations. This Report contains (8) sections including this introductory section:

1) Introduction;
2) Policy, Legal and Institutional Framework;
3) Description of the proposed project;
4) Description of the surrounding environmental and social condition;
5) Identification and assessment of potential environmental impacts and mitigation measures
6) Public consultation and Disclosure;
7) Environmental Management Plan;
8) Conclusion and Recommendation;

The EIA study firstly established baseline environmental setting within 2 km of the project area, including existing conditions of air quality, water quality, noise level condition, weather and local climate, waste disposing system and socio-economic conditions. The field studies were carried out by Green Enviro Services Ltd. having experiences in conducting environmental assessments for various types of projects in Myanmar. The survey team of Green Enviro Services Ltd. conducted field survey, assessment activities, and prepared the report.

Green Enviro Noise Survey Team was instructed to visit the proposed project site to perform a reconnaissance study and baseline environmental data were also collected from possible sources using the appropriate measuring devices. Data interpretation and analysis were made based on those collected data for the present and potential future conditions. Suitable measures were proposed for the impacts to be mitigated to reduce to acceptable ones.

Public Consultation Meeting was conducted on 5.4.2017 and it included verbal disclosure of the project activities and discussion with local authories, and local communities in the project area, and staff of the project management.

1.5 Identification of EIA Study Team

The Project Proponent RVK Myanmar Co., Ltd. has appointed Green Enviro Services Ltd. as a registered Third-Party Assessment Team to carry out the Environmental Impact Assessment

(EIA). Besides the consultants and team members of Green Enviro Services Ltd., the following are assigned for the Environmental Impact Assessment (EIA).

Name of Organization:	Green Enviro Services Ltd.
Registration No:	0021
Contact Person:	Daw Phyu Sin Maung
Contact Number:	95 9 5096601
E-mail Address:	greenenviroservices14@gmail.com phyusinmaung@gmail.com
Head Office Address:	No. 85, 1st Floor, Malar Myaing (3) Street, (16) Ward, Hlaing Township, Yangon Region, Myanmar.

Table 2. List of Consultants and survey team for EIA

Sr. No	Name	Designation	Field Experience	Responsibility
1.	Daw Phyu Sin Maung B.A (English), MDevS TCR No. 0058	Team Leader	With a decade of experience in socio-economic impact research, risk assessment, and supply chain analysis, she has actively contributed to projects with organizations such as FAO, UNDP, Save the Children, OIE, and IDE. Her professional expertise encompasses research in Environmental and Social Impact Assessment, Risk Assessment, Supply Chain Analysis, Management, and Sustainable Development.	• Overseeing the management and coordination of the IEE process, including gathering relevant data • Reviewing and assessing the potential, risk, and impact on environmental and social • Analyzing socio-economy data • Developing a comprehensive work plan • Ensuring accurate and relevant data is compiled and analyzed to assess potential environmental impacts • Ensuring compliance with environmental regulations and guidelines • Taking the lead in organizing and facilitating public consultations • Coordinating and communicating effectively with stakeholders to address concerns and integrate feedback • Developing mitigation strategies and risk management plans to minimize environmental impacts
2.	Dr. Myat Kyaw Bachelor of Veterinary Science (BVS)	Senior Livestock Consultant	With over 40 years of experience in the Livestock Department (LBVD) and Food & Agriculture Organization (FAO), the individual has	• Collecting and analyzing data on the project's potential effects • Engaging with stakeholders and industry representatives • Contributing to the preparation of the report

			expertise in laboratory testing and livestock facilities, as well as implementing biosecurity measures and conducting risk assessments. Formerly the Deputy Director General at the Ministry of Livestock and Fisheries (MoLF), he has worked as a Senior Consultant in rural livelihood and economic development at Agribusiness and Rural Development Consultants (ARDC).	• Advising on data processing and laboratory testing. • Reviewing and assessing the laboratory results • Identifying, analyzing, and evaluating potential risks and hazards associated with the project • Assessing the potential risks of chemical exposure, occupational health and safety, and hazardous waste
3.	U Htein Linn Bachelor of Agricultural Science	Environmental Consultant	Specializing in Environmental Studies, Prevention and Control of Air Pollution, and Assessment, Management, and Monitoring, with expertise in EIA reporting for environmental pollution control.	• Conducting assessments and surveys to understand the environmental conditions of a project area • Assessing potential impacts on the environment and identifying sensitive habitats or species • Assessing air and noise pollution associated with a project • Advising on environmental management plans and strategies for compliance. • Designing and implementing environmental monitoring programs to assess project performance
4.	U Naing Linn Oo Bachelor of Agricultural Science, MDevS	Social Consultant	Specializing in Social Assessment, GIS Mapping, Meeting Facilitation, Stakeholder Engagement, Agriculture, Land Use, and Soil Conservation. Notably, worked as a Social Development and Safeguard Specialist for the Korea Rural Community Corporation (KRC) on	• Collaborating with national agencies to ensure compliance with social regulations • Organizing workshops, seminars, and trainings on social aspects of the project • Managing and maintaining accurate and confidential social data • Collaborating with stakeholders to develop monitoring frameworks for social performance evaluation • Conducting fieldwork and surveys to collect socio-economic data and community concerns.

			the Irrigation System Modernization Unit 2 (ISMU 2) in an ADB-assisted Irrigated Agriculture Inclusive Development Project (IAIDP). Also served as a Part-time Consultant for the Yangon City Development Committee (YCDC) on a World Bank-assisted South East Asia Disaster Risk Management (SEA DRM) Project for Myanmar. Additionally, worked as a GIS Service Provider for topographic surveys.	• Compiling and organizing collected data for analysis and reporting • Utilizing GIS tools to produce maps for social planning and decision-making
5.	U Hlaing Htun Naing B.A (Economy), Dip in Mechanical	Consultant (Technical Engineer)	Specializing in field experience related to air quality, odor, sound, and vibration. Proficient in calculating, identifying, and analyzing air and odor dispersion, along with conducting risk assessments for boilers and generators.	• Conducting sound and vibration measurements using specialized equipment and techniques • Calculating, analyzing, and interpreting measurement data using theory and formulas • Designing noise control measures to minimize noise emissions and impacts • Designing air and odor control measures to minimize emissions and impacts • Contributing to the report by assessing potential environmental impacts and conducting risk assessments • Providing recommendations for mitigation measures and developing monitoring plans to ensure compliance with regulatory requirements
6.	Dr. Myint Thein Bachelor of Veterinary Science (BVS)	Livestock Consultant	With over 40 years of experience, he specializes in livestock facilities, husbandry, reproduction, biosecurity measures, and risk assessment. Having served at the	• Conducting risk assessments to identify potential hazards and risks • Developing risk mitigation strategies and recommending appropriate control measures • Assisting in the development and implementation of contingency

			University of Veterinary Science, Livestock Breeding, and Veterinary Department, he retired as the Director General of the Directorate of Livestock and Fisheries	plans to address emergencies or disease outbreaks
7.	Dr. Aye Aye Than M. Sc. (Microbiology), Ph. D (Parasitology) TCR No. 0060	Biodiversity Consultant	Specializing in Bioterrestrial Diversity, particularly Fauna, she has conducted livelihood, soil & water conservation activities, and environmental impact studies across various regions, including Shan State, Delta, and Yangon. Additionally, she has expertise in taxonomic studies of arthropods, snakes, bats, pests, and parasites related to rice plants and fish. Her professional experience encompasses ecology and habitats, biological monitoring, field surveys, data analysis, and technical report writing.	• Conducts surveys to assess animal species presence and distribution. • Identify and classify species of fauna. • Contribute to the report by assessing and analyzing the potential impacts of development projects on fauna.
8.	Daw Moe Pyar Han B. Sc. (Botany), M. Sc. (Botany) TCR No. 0061	Biodiversity Consultant	Specializing in Bioterrestrial Diversity, particularly Flora, she is a retired lecturer from the Botany Departments of Yangon and Mandalay Arts & Science Universities, Dagon University, Dawei, and Yenangyaung Colleges. Her	Conducts flora surveys, identifies and classifies plant species, assesses habitats, analyzes threats, and develops conservation strategies.

			professional expertise involves the determination of bio-terrestrial biotopes, field surveys, data analysis, and technical report writing.	
9.	Daw Myat Myat Kyaw B.A (Law), LLB, LLM, DAPsy, Diploma of social work.	Legal Consultant	Specializing in policy, legal, and institutional frameworks, she brings 36 years of experience in the legal field. Having retired as the director of the Office of the Attorney General, her expertise spans various aspects of legal practice and governance.	• Analyzing existing policies and regulations relevant to the project. • Advising on the legal requirements for conducting an Environmental Assessment. • Assisting in the preparation of the report and, ensuring compliance with relevant environmental regulations
10.	Daw Nang Hseng Lao Noon B. Agri. Sc, Post Dip in Biotech, M.S. Biotech	Agricultural and Biotechnological Consultant	Contributed agricultural technology expertise in the agri-business field, conducting practical demonstrations for farmers on yield index data collection, proper use of natural fertilizers, and chemical pesticides. Shared insights on bio-fertilizer production and application, along with practical farming techniques. Engaged in a biogas extraction and utilization project, demonstrating the use of biogas energy for electric lighting.	• Conducting field surveys and collecting soil samples • Analyzing and assessing the results • Contributing to the report by assessing and analyzing the potential impacts of soil and land use
11.	U Sa Aung Thet Oo B.Sc. (Hons) (Biochemistry), M.Sc (Biochemistry)	Technical Engineer	Specializing in air quality, with extensive experience in environmental and chemical laboratory work.	• Conducting air quality measurements using specialized instruments and techniques • Identifying sources of air pollution and assessing their contribution to overall air quality degradation

				• Assessing the potential impacts of projects on air quality as part of reports
12.	U Kyaw Thu Sein B.Sc. (Chemistry)	Technical Engineer	Specializing in water quality, with extensive experience in environmental and chemical laboratory work.	• Conducting water quality measurements and sampling using specialized equipment and techniques • Assessing physical, chemical, and biological parameters of water • Identifying sources of water pollution and evaluating their impact on water quality
13.	U Myo Min B.A(Economy)	Surveyor	Emphasizing data collection	Conducting on-site surveys, collecting accurate data through measurements and observations, interviewing relevant individuals, documenting findings, collaborating with team members, and ensuring compliance with safety standards
14.	U Kyaw Myo Wai B.Sc. (Mathematic)	Surveyor	Emphasizing data collection	Conducting on-site surveys, collecting data, interviewing relevant individuals, capturing photographs, and maintaining accurate records

CHAPTER 2 – POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

Government of Myanmar has adopted various Laws, regulations and guidelines to ensure the integration of development and conservation of environment. This section provides a brief summary of relevant national environmental legislations established by the Ministry of Natural Resources and Environmental Conservation and overview of current local and international environmental and social policies including related international or regional convention for the proposed project.

2.1 Existing Laws, Rules and Regulations, Notifications related to the project

The fundamental laws and regulations related to the environmental and social considerations in Myanmar are shown in Table (3).

Table 3. Relevant Law and Regulations

No.	Name of Law	Section/ paragraph	Action in accordance with the relevant law.
1.	Environmental Conservation Law (2012)	7(d), 14, 15, 24, 32	The RVK follows environmental quality standards prescribed by the ECD for environmental quality, treats, controls and disposes the wastes in environmentally sound methods to avoid environmental pollution, will get inspection from the concerned departments, follow the guidance and take penalty if any offence still exists.
2.	Environmental Conservation Rule (2014)	69 (a & b)	The RVK managed the disposal of hazardous waste or hazardous substances so as not to affect the public or damage the ecosystem and the natural environment,
3.	Environmental Impact Assessment Procedure (2015)	102 to 110, 113, 115, 117	Will bear full legal and financial responsibility for all of its own actions and omissions in carrying out the Project; implement and comply to all rules and regulations; timely notify potential Adverse Impacts, if any; self-monitoring of the Project and activities and submit reports as in a schedule in EMP; make publicly available in 10 days; shall grant full access to the Ministry for monitoring, inspection, an emergency etc.
4.	National Environmental Quality (Emission) Guideline (2015)	All	Follows the guidelines for air emissions, waste water, odor, effluents, will correct and maintain to the level in the guidelines.
5.	Conservation of Water Resources and River Law 2006	8	The RVK will follow the Conservation of Water Resources and River Law
6.	Conservation of Water Resources and River Rule 2013	8 (d, e, f)	The RVK will follow the Conservation of Water Resources and River Law
7.	The Ethnic Rights Protection Law (2015)	5,22,24	The resident national/ethnic people to be fully aware of the project and able to cooperate.

8.	Myanmar Investment Law (2016)	50 (d), 51,65,	Already appointed citizens at all levels, including as senior manager, technical and operational expert, and advisor; done capacity building, arranged as entitlements and rights in the labor laws and rules, minimum wages, salary, leave, holiday, overtime fee, damages, compensation, social welfare, etc. The investors tried to follow all of the rules and regulations of the host country including the insurance.
9.	Myanmar Investment Rule (2017)	202,206,212	RVK invested in compliance with conditions and applicable laws, appointed the employee with necessary documents and taken the relevant types of Insurance at the Government's Myanmar Insurance Enterprise
10.	The Myanmar Fire Brigade Law (2015)	25 (a) & (b)	The Fire-fighting demonstration and training was already done by the fire Services Department at factory and Fire team was established in the farms with full fire-fighting equipment.
11.	The Private Industrial Enterprise Law (1990)	4, 13 (b, e, f, g), 15 (a, b)	Registered under this law; abide by the terms and conditions of Registration, submit to inspection and approval of any change in the Enterprise and also in appointing foreign experts and technicians.
12.	Public Health Law (1972)	3, 5	RVK follows all the instructions under related particular to protect public health.
13.	The National Drug Law (1992)	7, 8, 9,10, 15 (a, b), 16, 17 (a, b)	The company will adhere to the regulations outlined by the Board of Authority for pharmaceutical manufacturing and distribution. This includes registering relevant drugs and obtaining licenses for manufacturing, storing, distributing, and selling pharmaceutical raw materials or registered drugs. Furthermore, the company will strictly follow any orders, directives, and conditions issued by the Board of Authority regarding the quality assurance, labeling, and advertising of pharmaceutical products.
14.	Prevention and Control of Communicable Diseases Law (1995)	3 (a),4,8,9, 11	RVK will follows all the instructions under related particular to protect communicable disease.
15.	The Control of Smoking and Consumption of Tobacco Product Law (2006)	9	RVK factory has separated the non-smoking area and smoking area for all the workers and staff in the compound.
16.	Boiler law. (2015)	5, 6, 7, 15, 14 (a & b), 18,20, 21, 24, 31, 38	The company follows all the issues with the boiler, starting with permission, registration, installation, certification, operation, pressure testing, quality control, inspection, accidents, systematic repair, etc. It has a boiler certificate

			and is regularly inspected by the Government Boiler Department. Certificate N0. 5.
17.	Labour Organization Law (2011)	17 to 22	RVK acknowledges the Rights and Responsibilities of the Labor Organization on drawing up constitution and rules, to appoint, to settle with employers for the rights of workers, to settle the disputes, complaints of workers on rights and interests in labor law; to participate, assist, carry out or holding meetings, strike or collective activities if in accord with regulation, directives or by-laws.
18.	The Settlement of Labour Dispute Law (2012)	38, 39, 40, 51	RVK understands and follow the prohibitions of failure to negotiate and coordinate the complaint, or to alter the conditions that affect the interest of workers, during the investigation by Arbitration body or tribunal and let the workers know that no lock-out or strikes without accepting, arbitration etc.; and also, that RVK shall be liable for full compensation if reduce the production meant to reduce workers' benefits.
19.	Employment and Skill Development Law (2013)	5, 14, 15	RVK appoints its workers abiding by the mentioned sections in law within 30 days and included the facts as mentioned; Training programs conducted for orientation, upgrading and on job training programs.
20.	The Minimum Wage Law (2013)	12, 13, 18	RVK as the employer follows the law and wages are paid by the rules and inspection is allowed.
21.	The Payment of Wages Act (2016)	3,4,5, (7 to 13), 14	The Social welfare allowances, contribution and the meals etc. provided in a way; follows what to deduct and what not to, and the overtime wage.
22.	Leave and Holidays Act (1951)	All	Under the Leave and Holidays Act (1951), RVK will be granted paid public holidays as announced by the Government in the Myanmar Gazette and will abide the law.
23	The Social Security Law (2012)	All	RVK will abide the Social Security Law to enjoy more security in social life and health care of workers.
24.	The Factory Act (1951)	All	The work place of RVK follows the Work place act, besides the modernized and upgraded, international standard factory as a work place.
25.	The Workmen Compensation Act (1923)	All	RVK will abide the Workman Compensation act to their workman of compensation for injury by accident.
26.	The Export and Import Law (2012)	7	Not to violate the conditions contained in the license.
27.	Law on Standardization (2014)	25 (c), 26	Must have conformity with mandatory standard and penalties to violate

28.	Underground Water Act (1930)	3, 6,	RVK obtained the grant to tube well
29.	Myanmar Engineering Council Law (2013)	34, 37	To follow the rules in the registration certificate and prohibition and penalties concerning with the member engineers.
30.	The Prevention of Danger of Hazardous Chemical and Related Substance Law (2013)	All	The company followed up on the Laws and Regulations enacted for chemical usage and got approval for using the chemical according to the law.

Table 4. Major International Agreements and Treaties that the Myanmar Government has

	International Agreements and Treaties	Date Ratified
1	Ramsar Convention (Convention on Wetlands of International Importance, Especially as Waterfowl Habitat), 1971	2005
2	Convention on International Trade in Endangered Species of Wild Fauna and Flora, Washington, D.C., 1973; and this convention as amended in Bonn, Germany, 1979.	1997
3	London Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, London, 1990	1993
4	United Nations Framework Convention on Climate Change (UNFCCC), New York, 1992	1994
5	Convention on Biological Diversity, Rio de Janeiro, 1992	1994
6	Basel Convention, 1989	2015

Source: The Republic of the Union of Myanmar, National Biodiversity Strategy and Action Plan (2011), Website of the Basel Convention (http://www.basel.int/Countries/StatusofRatifications/PartiesSignatories/tabid/4499/Default.aspx) (As of March 2016)

The proposed project of RVK Myanmar Co., Ltd. is Manufacturing and marketing of Pharmaceutical Products in the Kan Gyi Kone village tract, Pyin Oo Lwin Township, Mandalay Region and follows the guidance of various Law, Rules and Regulations, and Notifications.

2.2 Commitments of Proponents

RVK Myanmar Co., Ltd. are committed to protection the environment by applying sound environmental arrangement practices that minimize environmental.

- Comply with environmental laws and regulations.
- Procure the necessary resources to support and implement the company's environmental policy;
- To continual improvement in environmental performance by developing environmental indicators, monitoring and auditing performance, and implementing corrective actions where needed;
- Report externally on environmental performance and encourage dialogue with employees, local communities, and other stakeholders to promote environmental awareness;

- Include environmental performance criteria in decisions on promotions and salary increases;
- Reduce, re-use, and recycle resources and implement proper waste management practices;
- Train, motive, and ensure that all employees adhere to environmental protection and pollution prevention policies;
- Incorporate an emergency preparedness and response system into standard operating practices;
- Monitor and report on performance through periodic audits;
- Carry out a fire safety assessment and ensure adequate and appropriate fire safety measures for employees;
- Promote Corporate Social Responsibility (CSR) with 3% of the net profit for regional development such as road maintenance, educational support to schools and library, health and sport support to local communities, and planning for environmental impact monitoring, mitigation, and management;

2.3 Environmental Policy of RVK Myanmar Co., Ltd.

The establishment of the Myanmar Pharmaceutical Factory (MPF) under RVK Myanmar Co., Ltd. will inevitably introduce challenges in managing and preventing environmental pollution. The key concern lies in how the pharmaceutical plant will address the environmental impacts associated with its initial setup and ongoing operations. To effectively manage these challenges, the RVK must implement specific policies and strategies aimed at mitigating the environmental aspects of its operations. This entails the adoption of pollution prevention measures and the integration of clean manufacturing practices across the entire product and process life cycle. By conducting thorough analyses, the RVK can identify opportunities to reduce waste generation and minimize its overall environmental footprint.

Environmental Management Practices

The RVK Myanmar Co., Ltd. will adopt Environmental Management Systems (EMSs) which meet internationally accepted standards such as International Organization for Standardization's (ISO) 14000 series guidelines.

Objectives and Policies

Myanmar Pharmaceutical Factory (MPF) must start recognizing negative environmental impacts from its facilities which can risk the health and safety of their employees, diminish the quality-of-life community in which the plant is located. The factory will form proper objectives and policies for safeguarding the health and safety of employees, public and protecting the environments in which the plant operates. This will be the top priorities of the plant.

Management Responsibility

Protective environment in a plant is not only a corporate social responsibility but also a powerful means of reducing costs, increasing efficiency and enhancing competitiveness. In order to carry out environmental policies and achieve objectives, responsibility for environmental management must be clearly assigned within the pharmaceutical plant. The

Myanmar Pharmaceutical Factory (MPF), will establish its own health, safety and environmental policies covering the key principles established at the corporate level and will maintain appropriate arrangements to facilities and monitor effective implementation. Also, it will provide information, instructions, training and supervision for all staff people so that they can carry out their duties in all environmentally responsible manners.

Safety and environmental engineering groups within the plant will work with manufacturing executives to improve process safety, waste management, pollution control and environmental stewardship. It will ensure that new equipment and buildings comply with all environmental regulations during installations and operations.

Plan and Program to Prevent Pollution

To achieve pollution prevention goals the following points will be considered

- Developing integrated EMS programs.
- Adopting pollution prevention and clean manufacturing practices.
- Eliminating hazardous emissions and wastes.
- Conserving energy, water and other natural resources.
- Investing in facilities and machines that reduce the environmental impacts of their operation.

The Myanmar Pharmaceutical Factory (MPF) will provide effective occupational health and hygiene programs, develop and maintain appropriate emergency response procedures and contingency plans by educating management, employees, customers, suppliers and the surrounding community. It will ensure that effective management of environmental aspects of the plant's operation can lead to cost savings.

Product Life Cycle (PLC) Review

The Myanmar Pharmaceutical Factory (MPF) aims to use the PLC Review which is an approach to eco-efficiency in designing products that meet the highest standards of excellence with regard to quality, cost and EMS performance. During PLC reviews, it can identify and reduce negative EMS impacts at each stage of products life from designing, manufacturing, packaging, distribution, marketing, customer use and final disposal.

Materials Reduction and Recycling (Waste Management)

The Myanmar Pharmaceutical Factory (MPF) will undertake challenges in the widespread adoption of packing reduction, materials substitute, waste recycling and reuse in their operations. By minimizing packaging, using recyclable materials and reducing the toxicity of raw materials the plant can decrease the overall impacts of products including use and consumption by consumers. The plant will establish waste minimization goals and report its progress to Management annually or as per the requirements.

Energy and Water Conservation

With concern for regulatory compliance, cost savings and environmental protection, the MPF plant will try to reduce energy and water use and to value other natural resources more carefully.

Measuring, Auditing and Review

Enhancing environmental performance in the Myanmar Pharmaceutical Factory (MPF) requires proactive environmental policies, assignment of managerial responsibility and implementation of Environmental Management Systems (EMS). This will depend on the capacity to measure results, audit performance and reviewing results at all levels to achieve continuous improvement.

By adoption all the above-mentioned points, the Myanmar Pharmaceutical Factory (MPF) of RVK Myanmar Co., Ltd. will manage environmental issues. It is expected that by using these environmental management measures, the factory can indicate progress not only in waste reduction and resource conservation, but substantial reduction in hazardous emissions.

2.4 National and International Guidelines

National Guidelines and Internal standard guidelines are referred for Environmental Management Plan of the proposed project.

- Environmental Impact Assessment Procedure (2015), MONREC
- National Environmental Quality (Emission) Guidelines (2015), MONREC
- National Drinking Water Quality Standards, (2014), MOH
- IFC Guidelines for Waste Management Facilities, (2007)
- IFC Guidelines for Water and Sanitation, (2007)
- IFC Guidelines for Community Health and Safety
- IFC Guidelines for Occupational, Health and Safety

2.5 National Environmental Quality (Emissions) Guideline

According to the environmental health and safety guidelines established by International Finance Corporation (IFC), and National Environmental Quality (Emissions) Guidelines, information, major environmental issues in pharmaceutical production include (1) Dust emissions (2) Noise generation, and (3) Solid and liquid waste (4) Fire Hazards.

Table 5. General Air Quality Guideline

Parameters	Guidelines Value	Unit	Averaging Period
Particulate Matter (PM 10)	50	µg/m3	24hrs
Particulate Matter (PM 2.5)	25	µg/m3	24hrs
Nitrogen dioxide (NO2)	200	µg/m3	1hr
Sulfur Dioxide (SO2)	20	µg/m3	24hrs
Ozone (O3)	100	µg/m3	8-hour daily maximum
Volatile Organic Compounds (VOC)	100	mg/Nm3	8hrs

Source: National Environmental Quality (Emission) Guideline

[a] Particulate matter 10 micrometers or less in diameter

Table 6. Air Emission Level (Pharmaceuticals and Biotechnology Manufacturing)

Parameter	Unit	Guideline Value
Active ingredient (each)	Mg/Nm^{3a}	0.15
Ammonia	Mg/Sm^{3b}	30

Arsenic	Mg/Sm^3	0.05
Benzene, Vinyl Chloride	Mg/Nm^3	1
Dichloroethane (each)		
Bromides (as Hyrdrogen Bromide)	Mg/Sm^3	3
Chlorides (as Hydrogen Chloride)	Mg/Sm^3	30
Ethylene oxide	Mg/Sm^3	0.5
Hazardous air pollutants	kg/year	900-1,800[c]
Mutagenic substance	Mg/Sm^3	0.05
Particulate matter PM10[d]	Mg/Nm^3	20
Total class A[c]	Mg/Nm^3	20[f]
Total Class B[g]	Mg/Nm^3	80[h]
Total organic Carbon	Mg/Nm^3	50
Volatile organic compounds	Mg/Nm^3	20-150[i] 50[j]

Source: National Environmental Quality (Emission) Guideline

[a] Milligrams per normal cubic meter at specified at specified temperature and pressure

[b] Milligrams per standard cubic meter at specified temperature and pressure Process-based annual mass limit

[d] Particulate matter 10 micrometers or less in diameter

[e] Class A compounds are those that may cause significant harm to human-to-human health and the environment

[f] Applicable when total Class A compounds exceed 100g/year

[g] Class B compounds are organic compounds of less environmental impact then Class A compounds

[h] Applicable when total Class B compounds, expressed as Toluene, exceed the lower of 5 tons/ year of 2 kg/hour

[i] Facilities with solvent consumption > 50 tons/year

[j] Waste gases from oxidation plants

Table 7. Effluent Levels

Parameter	Unit	Guideline Value
1,2-Diclroroethane	mg/l	0.1
5-day Biochemical Oxygen demand	mg/l	30
Acetates (each)[a]	Mg/l	0.5
Acetonitrile	mg/l	10.2
Active ingredient (each)	mg/l	0.05
Adsorbable organic halogen	mg/l	1
Amines (each)[b]	mg/l	102
Amonia	mg/l	30
Aresnic	mg/l	0.01
Benzene	mg/l	0.02
Cadmium	mg/l	0.1
Chemical Oxygen demend	mg/l	150
Chlorobenzene	mg/l	0.06
Chloroform	mg/l	0.013
Chromium (hexavalent)	mg/l	0.1
Dimethyl sulfoxide	mg/l	37.5
Isobutyraldehyde	mg/l	0.5
Isopropanol	mg/l	1.6
Isopropyl ether	mg/l	2.6

Keones (each)c	mg/l	0.2
Mercury	mg/l	0.01
Methanol / Ethanol (each)	mg/l	4.1
Methyl cellosolve	mg/l	40.6
Methylene Chloride	mg/l	0.3
n- Hepane	mg/l	0.02
n-Hexane	mg/l	0.02
o-Dichlorobenze	mg/l	0.06
Oil and grease	mg/l	10
pH	S.U.[d]	6-9
Phenol	mg/l	0.5
Tetrahydrofuran	mg/l	2.6
Toluene	mg/l	0.02
Total Nitrogen	mg/l	10
Total Phosphorus	mg/l	2
Total suspended solid	mg/l	10
Xylenes	mg/l	0.01

Source: National Environmental Quality (Emission) Guideline

[a] n-Amyl acetate, n-butyl acetate, Ethyl acetate, Isopropyl acetate, Methyl formate

[b] Including Diethylamine and Triethylamine

[c] Including Acetone, Methyl Isobutyl Ketone

[d] Standard unit

Table 8. Noise Level Guideline

Receptor	One Hour L_{Aeq}(dBA)	
	Daytime (07:00-22:00) (10:00-22:00 for Public Holidays)	**Nighttime (22:00-07:00) (22:00-10:00 for Public Holidays)**
Residential, institutional, educational	55	45
Industrial, Commercial	70	70

Source: National Environmental Quality (Emission) Guideline

[a] Equivalent continuous sound level in decibels

Table 9. Boiler Wastewater Discharge Guideline

Parameter	Unit	Guideline Value
Arsenic	mg/l	0.5
Cadmium	mg/l	0.1
Chromium (total)	mg/l	0.5
Copper	mg/l	0.5
Iron	mg/l	1
Lead	mg/l	0.5
Mercury	mg/l	0.005
Oil and grease	mg/l	10
pH	S.U.[a]	6-9
Temperature increase	°C	<3b
Total residual chlorine	mg/l	0.2
Total Suspended Solids	mg/l	50
Zinc	mg/l	1

Source: National Environmental Quality (Emission) Guidelines

Drinking Water Guideline (National Drinking Water Quality Standards Myanmar)

The drinking water quality standard is based on the National Drinking Water Quality Standards Myanmar mandated by the Department of Health that are based on guidelines or criteria that are recommended by international institutes like WHO, US EPA, etc. This standard is based on the guide line 'Myanmar Drinking Water Quality Standards, 2014 published by the Ministry of Health of the Government of Myanmar. Standards and guidelines are established to protect water for designated uses such as drinking, recreation, agricultural irrigation, or protection and maintenance of aquatic life etc.

Table 10. Requirements for physical quality

Parameters	Units of Measurement	Value
Taste	Acceptable/ No objectionable taste	-
Odor	Acceptable/ No objectionable odor	-
Color	TCU (True Color Unit)	15
Turbidity	NTU Nephelometric Turbidity Units	5

Source: National Drinking Water Quality Standards Myanmar

Table 11. Requirements of Chemical Quality (Inorganic Chemical Constituents of Health Significance)

Parameters	Units of Measurement	Value
Antimony	mg/L	0.02
Arsenic	mg/L	0.05
Barium	mg/L	0.7
Boron	mg/L	2.4
Cadmium	mg/L	0.003
Chromium	mg/L	0.05
Cyanide	mg/L	0.07
Fluoride	mg/L	1.5
Lead	mg/L	0.01
Mercury (Total)	mg/L	0.001
Nickel	mg/L	0.07
Nitrate	mg/L	50
Nitrite	mg/L	3
Selenium	mg/L	0.04
Uranium	mg/L	0.03
Copper	mg/L	2
Manganese	mg/L	0.4

Source: National Drinking Water Quality Standards Myanmar

Table 12. Requirements of Chemical Quality (Inorganic Chemical Constituents not of Health Significance)

Parameters	Units of Measurement	Value
Aluminum	mg/L	0.2
Ammonia Nitrogen	mg/L	1.5
Chloride	mg/L	250
Hardness	mg/L as CaCO3	500
Sulphide	mg/L	0.05
Iron	mg/L	1
pH		6.5 to 8.5
Sodium	mg/L	200
Sulphate	mg/L	250
Total Dissolved Solid (TDS)	mg/L	1000
Zinc	mg/L	3
Calcium	mg/L	200
Magnesium	mg/L	150

Source: National Drinking Water Quality Standards Myanmar

The company is fully committed to upholding all relevant environmental laws and regulations. This steadfast commitment includes strict adherence to the National Environmental Quality (Emission) Guideline in order to effectively maintain the quality of the environment. By following both the established legal framework and the guidelines, the company aims to ensure that its operations have a minimal impact on the environment and contribute to the overall preservation of environmental quality.

CHAPTER 3 – DESCRIPTION OF THE PROPOSED PROJECT

This report describes the findings of the Environmental Impact Assessment (EIA) for the **Manufacturing and marketing of Pharmaceutical Products** of RVK Myanmar Co., Ltd. The main objective of this report is to identify the major environmental impacts due to implementation of the project along with the effective measures to mitigate the potential adverse impacts.

The Myanmar Pharmaceutical Factory (MPF) was established in December 2007 by Ministry of Industry (1), and later handed over to MEHL in July 2009. Subsequently, on July 1st, 2015, it was transferred to RVK Myanmar Co., Ltd. under a 30-year contract. The RVK Myanmar Co., Ltd. itself is a Joint Venture Company, based on the Foreign Investment Law of the Republic of the Union of Myanmar, of the RVK Myanmar Co. Ltd. incorporated in Myanmar, and RV Group (S) Pte ltd incorporated in Singapore, with Share ratio of Daw May Thu Win – 1.5%, Mr. Rajesh Kumar – 8% and RV Group (s) pte ltd – 90.5%. The RVK Myanmar Co., Ltd. has agreed to pay the Royalty Fees which is less than three percent of the profit to the Myanmar Economic Holdings Ltd., after five years of production with Myanmar Pharmaceutical Factory (POL) labels.

Business Plan of RVK Myanmar Co., Ltd.

The project site of Myanmar Pharmaceutical Factory is situated at 21°56'43.59"N and 96°24'22.74"E, in the Kan Gyi Kone Village Tract, near Pyin Oo Lwin, 54.5 km from Mandalay City and total elevation is 3,538 ft. (1,078 m) above sea level surrounded by Eastern Range of pollution free Mountain area. This can be easily accessed from the Mandalay-Lashio Road and no direct access to the Railway transport.

The Head Office of RVK Myanmar Co., Ltd. is at Room No. 1101, Level 11, Office 3 Time City Office Tower. Kyundaw Street (Between Narnattaw Street and Hanthawaddy Street). Ward (7), Kamayut Township, Yangon, and the factory is located at Block No. 662-Ka (N 14 to N 47), Block No. 655 (N 1 to N 10), Kan Gyi Kone Village Tract, Mandalay-Lashio Road, Pyin Oo Lwin Township, Mandalay Region, Myanmar. The land leased is 26.4 acres for the manufacturing factory and 10.83 acres for the administration area.

Total investment is 5 million USD (10,080.29 million MMK for local use and 4,329,628.80 USD for machineries and raw materials to be imported) to be contributed by three shareholder companies, which has already obtained the Certificate of Incorporation (Company Registration Certificate) No. 107502769 (177 FC/2015-2016), corporate under the Myanmar Companies Act.

The factory underwent significant upgrades to its manufacturing facilities to ensure the production of high-quality, safe, and efficient pharmaceutical products in compliance with WHO and ASEAN guidelines for Good Pharmaceutical Manufacturing Practices (GMP). Currently, the factory manufactures 70 products across 25 categories under 9 groups of types. The factory distributes its products nationwide aiming to provide the benefits of its quality, efficient, and safe drugs to the entire country. Moreover, the factory seeks collaboration opportunities, including contract manufacturing, and other forms of cooperation, with pharmaceutical firms and manufacturers to foster future development.

3.1 General Information of Proposed Company

Name of Company:	RVK Myanmar Co., Ltd.
Proponant :	Mr. Rajesh Kumar, CEO
Contact Number:	+9559777373237
E-mail Address:	rajeshkumar@rvkmyanmar.com
Contact Person:	Ma Hnin Myat
Contact Number:	+959798733114
E-mail Address:	hninmyat@rvkmyanmar.com
Head Office Address:	Room No. 1101, Level 11, Office 3 Time City Office Tower. Kyundaw Street (Between Narnattaw Street and Hanthawaddy Street). Ward (7), Kamayut Township, Yangon.
Certificate of Incorporation:	No. 107502769, (No. 177 FC/2015-2016)
Type of Investment:	MIC invested company, FDI
Type of Business:	Manufacturing and marketing of Pharmaceutical Products
System of Sales:	100% Local Sale for Year 1 to Year 5 80% local sales and 20% export for Year 6 to Year 30
Location of Business:	Block No. 662-Ka (N 14 to N 47), Block No. 655 (N 1 to N 10), Kan Gyi Kone village tract, Mandalay-Lashio Road, Pyin Oo Lwin Township, Mandalay Region, Myanmar
Total Investment:	USD 5 million

Table 13. Permits that Have Been Obtained

No.	Type of Permit	Number and Issued Date	Granted by	Term of Validity (year)
1.	Company Registration Certificate	107502769 27 May 2015 Previous Registeration Number: 177FC/2015-2016(YGN)	Ministry of National Planning and Economic Development, Directorate of Investment and Company Administration	-
2.	MIC Permit	1165/2017 22 August 2017	Myanmar Investment Commission	50 Years
3.	Certificate of Private Industry	Ma Ta La /kyi/1981, 3.5.2016 30.5.2023 to 31.5.2024	Ministry of Industry	1 year

4.	Certificate of Exporter/Importer Registration	OPTK-00431-2021, 27/5/2020	Ministry of Commerce, Department of Trade	5 years
5.	MCDC License	License No; 0055, 1.4.23 to 31.3.2024 Registeration No: 55/16/2023	Mandalay City Development Committee	1 year
6.	Boiler Permit	(1) Ma Sa – 4711 (2) Ma Sa – 4710 (3) Ma Sa – 4709 (4) Ma Sa – 4708 21.6.2023 to 20.6.2024	Ministry of Industry	1 year
7.	Electricity Safety	EI-MDY-111, 31/1/2023 TO 30/1/2024	Ministry of Industry	1 Year
8.	Generator Permit	05/2022, 17/1/2022 to 16/1/2026	Ministry of Industry	4years
9.	Drug Manufacturer License	R2603PL0046, 12/01/2024	Ministry of Health, Department of Food and Drug Administration (Drug Manufacturer License)	-

Data Source: RVK Myanmar Co Ltd.

(Copies of the above permits are provided in the attachments.)

Table 14. List of shareholders

Sr. No.	Name	Citizen	Passport No	Percentage	Address
1	Daw May Thu Win	Myanmar	11/THATANA (N) 066217	1.5	Room 1-D, Shwe Mya Yar Housing 2, Myanma Gonyi Street, Mingalar Taung Nyunt Township, Yangon, Myanmar.
2	Mr. Rajesh Kumar	Indian	Z 7665022	8	No. (204), No.30, Inya Road, JL Inya Residence, Kamayut Township, Yangon
3	RV Group (S) Pte., Ltd.	Singapore	REG No:201023677C	90.5	1 North Bridge Road, #21-06 High Street, Centre Singapore 179094

Data Source: RVK Myanmar Co Ltd.

Table 15. List of Directors

Sr. No	Name	Citizen	Passport No	Position	Address
1	Daw May Thu Win	Myanmar	11/THATANA (N) 066217	Director	Room 1-D, Shwe Mya Yar Housing 2, Myanma Gonyi Street, Mingalar Taung Nyunt Township, Yangon, Myanmar.
2.	Daw Myat Myat Soe	Myanmar	3/KAKAYA (N) 013987	Director	Staff Housing, MPF (POL)
3.	Daw Sandi Htet Htet Naing	Myanmar	12/MABANA (N) 106265	Director	Staff Housing, MPF (POL)

4.	Mr. Rajesh Kumar Devendra Prasad Singh	Indian	Z 7665022	Director	No. (204), No.30, Inya Road, JL Inya Residence, Kamayut Township, Yangon
5.	Mr. Rajiv Kumar Sharma	Indian	Z 4813992	Director	House No.435, Sector 45 A, Chandigarh, PIN: 160047
6.	Ms. Ranjana Sharma	Indian	Z 4835819	Director	House No.435, Sector 45 A, Chandigarh, PIN: 160047

Data Source: RVK Myanmar Co Ltd.

3.1.1 Project Implementation Schedule

Pre-Construction Phase: Preparation for project proposal and land acquisition of Pharmacuetical factory were started on 5 August 2015.

Construction Phase: The operations of the factory began upon the initiation of the lease contract, as RVK (the Lessee) would utilize the existing factory buildings of MPF (POL) leased from Myanmar Economic Holding Ltd. (the Lessor). The project team from the company assumed essential roles in overseeing operational aspects, ensuring seamless functionality within the existing infrastructure. Close collaboration among all stakeholders facilitated the smooth execution of operations in accordance with the established schedule.

Operation Phase: The running machineries are already included in the lease contract from the Myanmar Pharmaceutical Factory. Some necessary machineries installation was conducted on October 2016 and commercial running started on 4 Sept 2017. The RVK Myanmar Co., Ltd. has set up an initial 30-year plan for production of pharmaceutical products. The size of the study area is 26.4 acres for the manufacturing factory and 10.83 acres for the administration.

Operation procedures at a pharmaceutical manufacture factory are simple with regards to following strictly to the complex and very sensitive, accuracy much needed procedures. The raw materials once received and checked, need to be immediately in the proper storage with controlled temperature. Currently, the MPF manufactures 70 products across 25 categories under 9 groups of types.

The production facility encompasses various pharmaceutical products with respective capacities. For oral solid dosage forms, including tablets and capsules, the current capacity stands at 40 million units per month, expected to increase to 60 million units per month after upgrading. Oral solid beta lactam formulations, also in tablet and capsule forms, currently produce 2-3 million units monthly, with an anticipated rise to 4 million units per month post-upgrade. Oral powder, dispensed in sachets, presently achieves a production range of 1,000,000-1,200,000 sachets monthly, projected to reach 1.5 million sachets per month following enhancements. Oral liquids, bottled at 100 ML each, are manufactured at a current rate of 70,000 bottles per month, set to elevate to 90,000 bottles per month after renovations. Ophthalmic products, packaged in tubes, currently yield 48,000 tubes monthly, with a forecasted increase to 60,000 tubes per month. Powder for injections, vials containing medication, currently output 33,612 vials monthly, projected to elevate to 39,612 vials per month post-upgrade. Large volume parenteral solutions, bottled in plastic containers, are currently produced at a rate of 72,000 bottles monthly, set to expand to 200,000 bottles per month. Finally, small volume parenteral solutions, dispensed in ampoules, currently reach a

capacity of 200,000 ampoules per month, expected to rise to 350,000 ampoules per month upon completion of upgrades.

Processing Technology

All the raw materials, if in powder form, will have to be mixed accordingly to the formulae for the categories mentioned above, either powder and powder, powder dissolved to form solution, solution and solution, powder and solution mixture etc. Then the mixtures or compounds be formed into tablets, capsules, injections, ointment etc., bottled or filled into specific containers, assay and quality control, laboratory and biological testing, packed, labelled and distributed if QC passed.

Distribution

The pharmaceutical products, packaged appropriately, will be transported from the factory via trucks to various destinations across Myanmar.

Decommissioning phase: The decommissioning of the RVK pharmaceutical factory is unlikely as it is secured by a 30-year land lease agreement, with the possibility of two additional ten-year extensions. As long as the production remains economically viable and pharmaceuticals remain a necessity in the country, the factory is likely to continue operations.

Table 16. Schedule of Project Activities of Proposed Company

Types of Activities		Time Schedule
1.	Preparation	5 August 2015
2.	Land Acquisition	5 August 2015
3.	Factory Renovation	October 2016
4.	Machine Installation	October 2016
5.	Commercial production	4 September 2017

Data Source: RVK Myanmar Co Ltd.

3.2 Organizational Structure

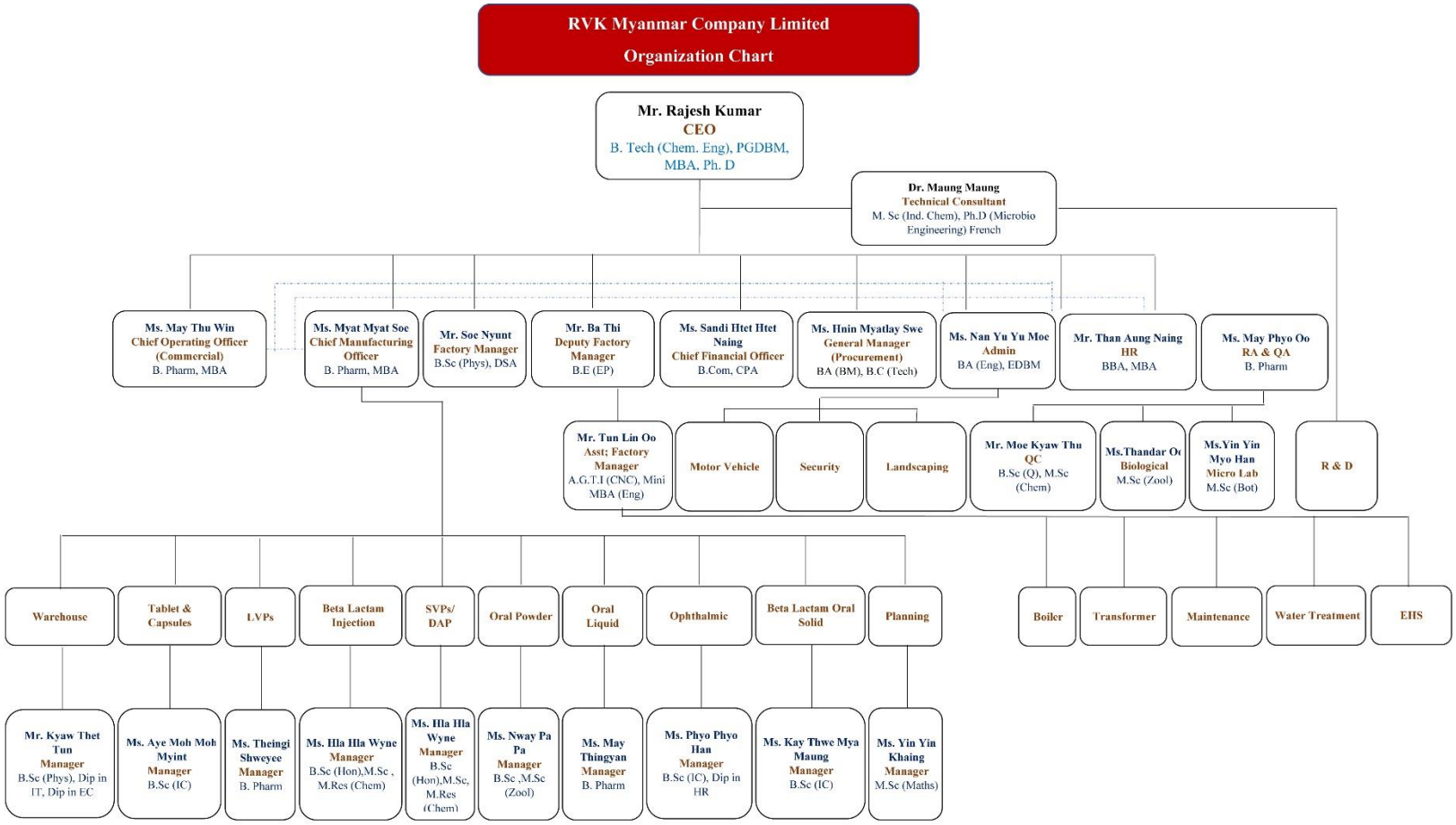

Figure 1. Organizational Chart of Proposed Company

3.3 Site Location

The project site of the Myanmar Pharmaceutical Factory is located at coordinates 21°56'43.59"N and 96°24'22.74"E, within Block No. 662-Ka (N 14 to N 47), Block No. 655 (N 1 to N 10), in the Kan Gyi Kone village tract along the Mandalay-Lashio Road, Pyin Oo Lwin Township, Mandalay Region, Myanmar. It is situated approximately 54.5 km from Mandalay City, with a total elevation of 3,538 ft. (1,078 m) above sea level. The leased land spans 26.4 acres for the manufacturing factory compound and an additional 10.83 acres for administrative purposes.

Figure 2. Location of Pharmaceutical Factory

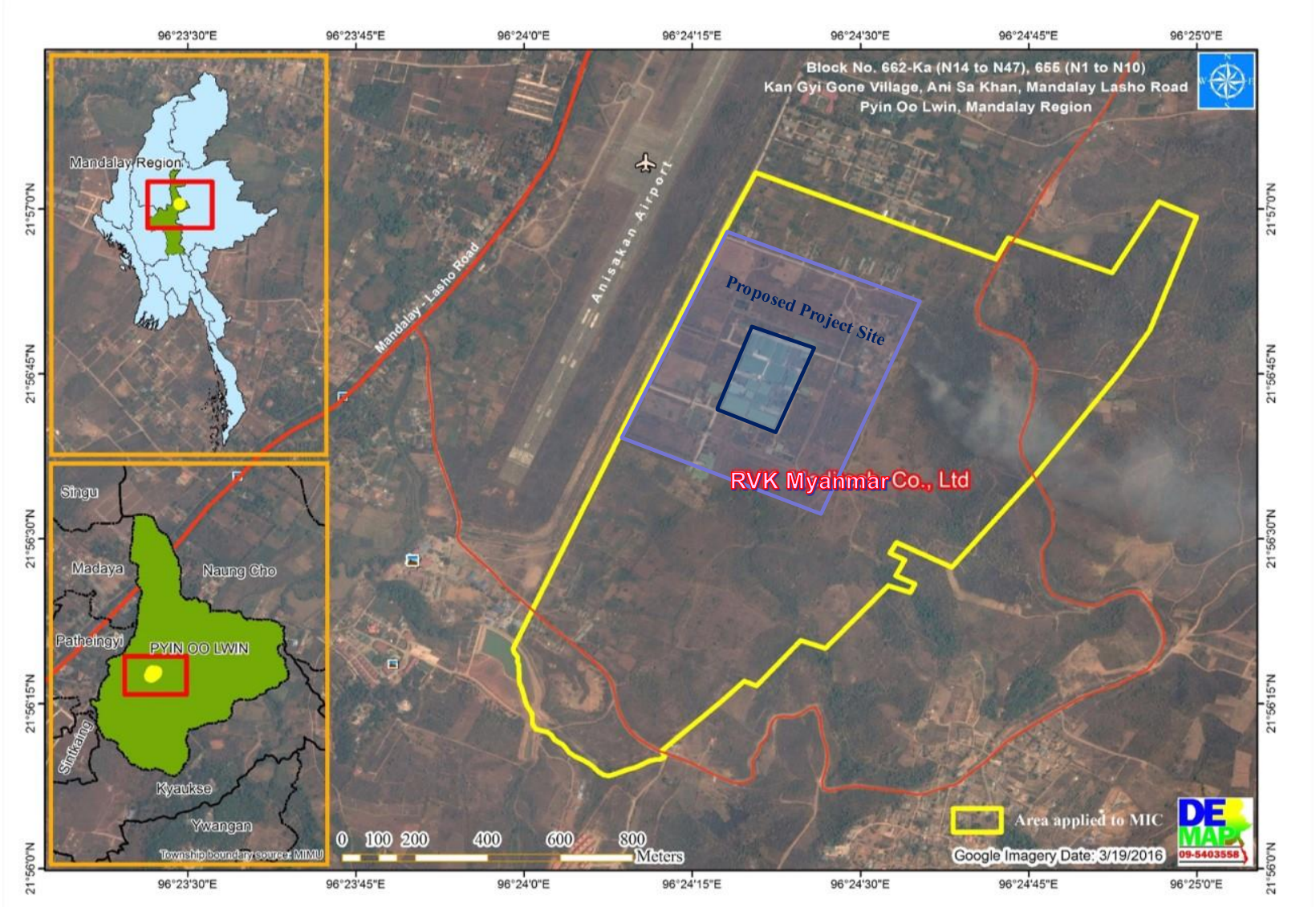

Figure 3. Site Area of RVK Pharmaceutical Factory

Figure 4. Location Map of RVK Phatmaceutical Factory

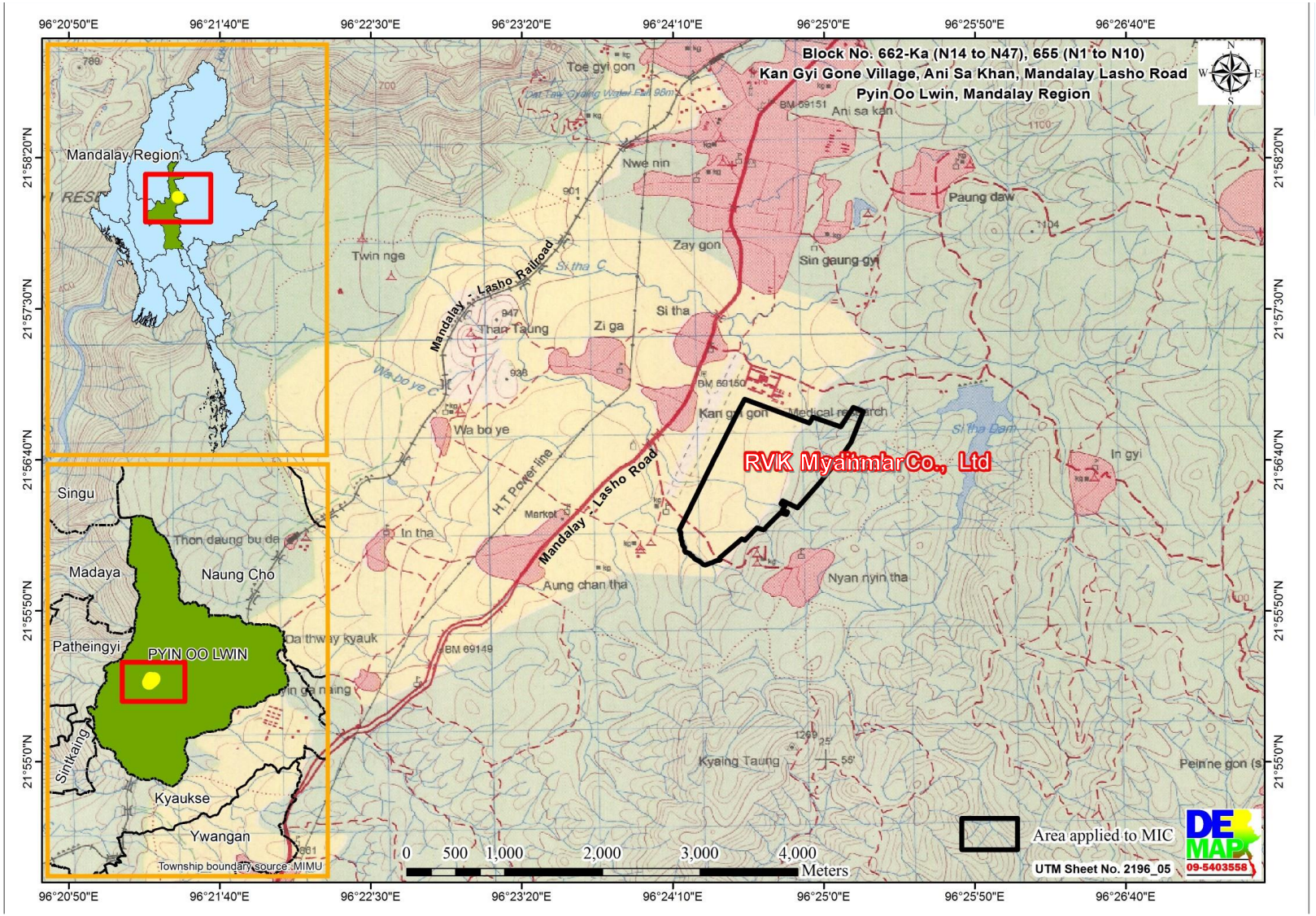

Figure 5. Overview Map of RVK Pharmaceutical Factory

3.4 Land Use

The location of the Pharmaceutical Factory of RVK Myanmar Co., Ltd. is on in the Kan Gyi Kone village tract along the Mandalay-Lashio Road, Pyin Oo Lwin Township, Mandalay Region, Myanmar.

Land Use		
Location	Block No. 662-Ka (N 14 to N 47), Block No. 655 (N 1 to N 10), in the Kan Gyi Kone village tract along the Mandalay-Lashio Road, Pyin Oo Lwin Township, Mandalay Region, Myanmar.	
Type of Land	Project Land by MEHL	
Area	26.4 acres (factory compound) 10.83 acres (administrative purpose)	
Arrangement	Lease basis	
	Annual rent	USD 615,000/ year (2.5% (USD 15375) increase every year)

Table 17. Land use of factory

Sr. No.	Description	Area
1.	Factory Area	26.4 Acres
2.	Admin Area	10.83 Acres
3.	Warehouse	53,200 Sq.ft
4.	Utility	12,600 Sq.ft
5.	Transformer Yard	4,000 Sq.ft

Data Source: RVK Myanmar Co Ltd

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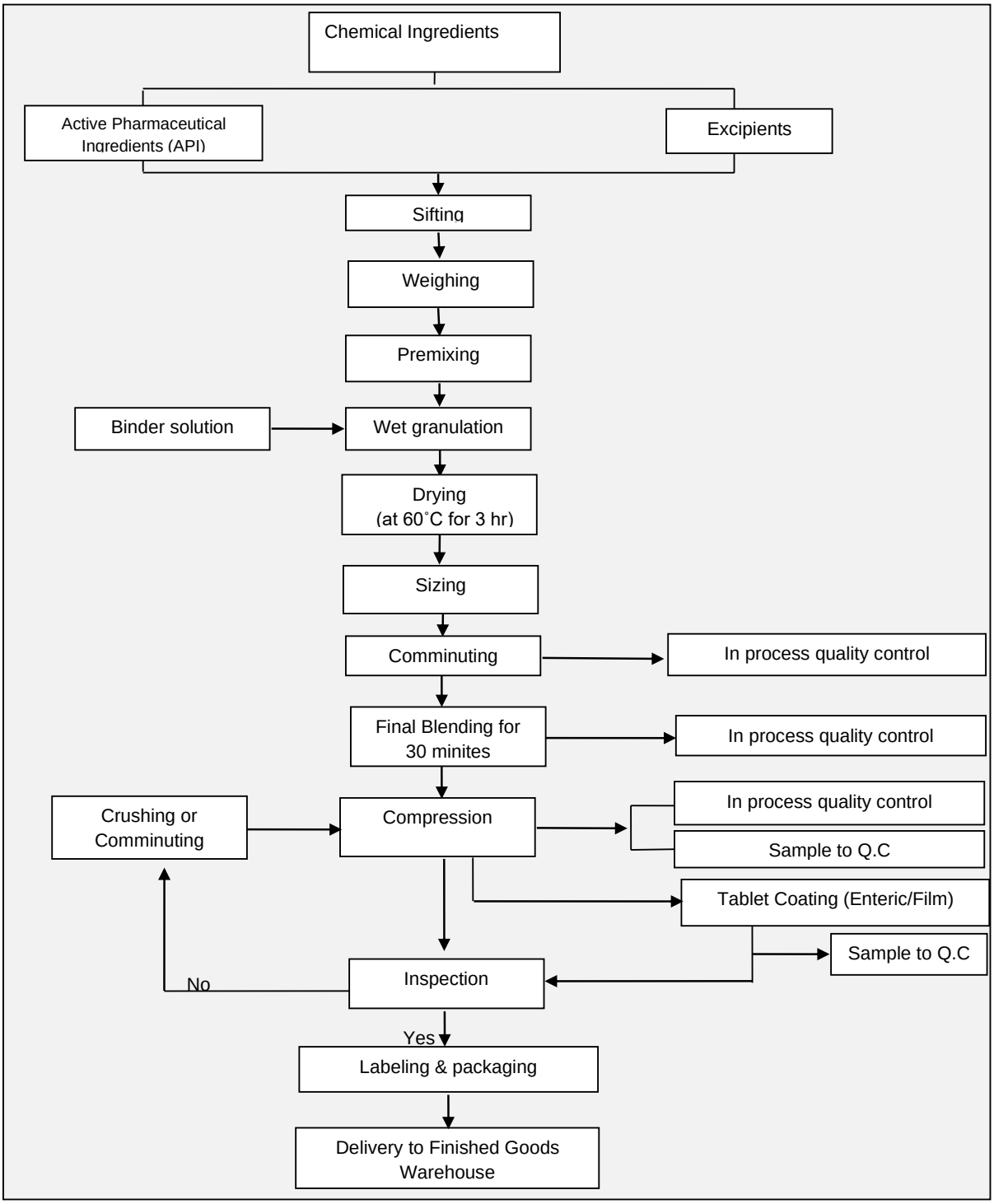
Figure 6. Layout Plan of proposed factory

Figure 7. Building Layout of factory

3.5 Production Process

1. Process Flow Chart of Tablet Production



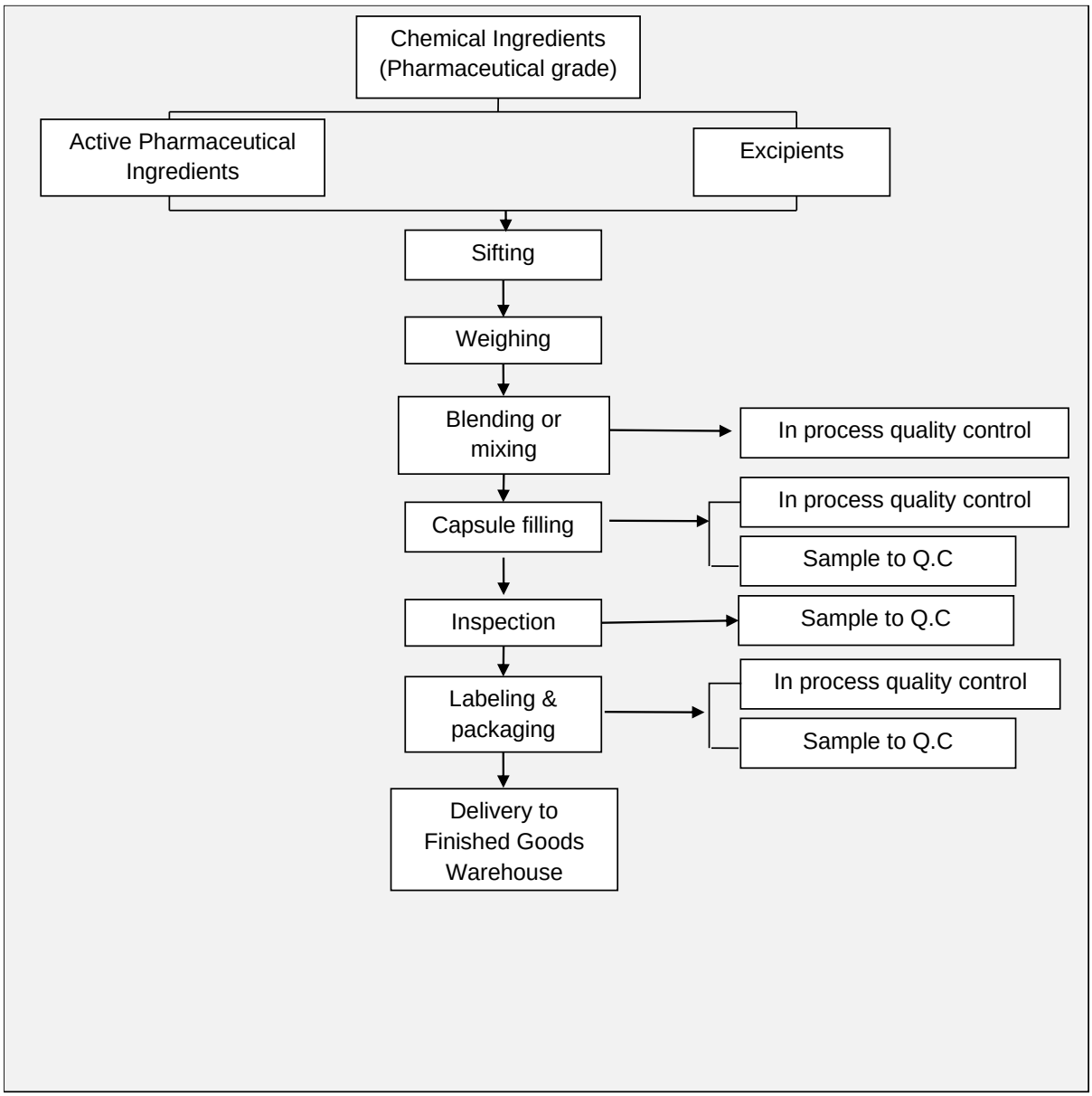
Tablet Production Process

The Tablet Production Process is a meticulously designed sequence dedicated to manufacturing pharmaceutical tablets. It begins with the reception of Chemical Ingredients, including Active Pharmaceutical Ingredients (API) and Excipients. The raw materials undergo sifting for uniform particle size, precise weighing, and premixing to form a consistent blend. Wet granulation with a Binder Solution enhances cohesion, followed by drying and sizing for particle refinement. Comminuting and final blending ensure quality through in-process control, leading to the compression stage, shaping the blend into tablets that meet stringent quality standards.

Crucial stages involve Crushing or Comminuting and Compression, both undergoing rigorous in-process quality control checks. Samples are sent to Quality Control (Q.C) for further analysis. Tablet Coating, specifically with an Enteric Film, is an additional step, contributing to specific release properties or protection. After tablet coating, samples are sent to Q.C.

Following the Compression stage, tablets undergo Inspection. If any issues arise (No), Crushing or Comminuting is performed again before progressing to Compression. Positive inspection results (Yes) lead to the Labeling & Packaging stage, where tablets are labeled and carefully packaged for delivery to the Finished Goods Warehouse.

2. Process Flow Chart of Capsule Production



Capsule Production Process

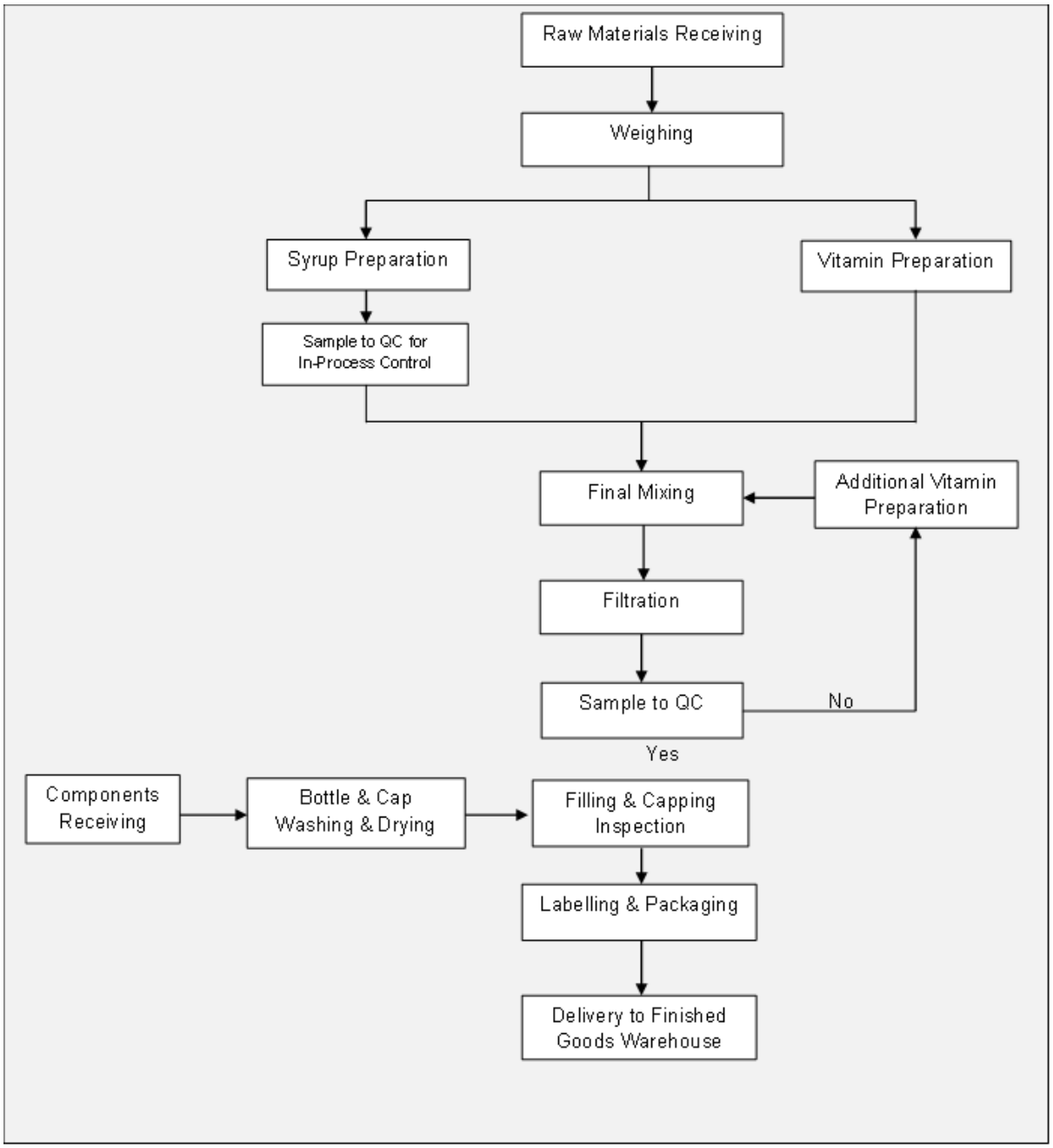
The Capsule Production Process constitutes a meticulously orchestrated sequence of steps designed to ensure the quality, accuracy, and integrity of pharmaceutical capsules. Commencing with the acquisition of pharmaceutical-grade chemical ingredients, inclusive of both Active Pharmaceutical Ingredients (APIs) and Excipients, this process employs stringent measures to sift these ingredients and eliminate impurities or undesirable particles. Following the sifting stage, the materials proceed to the weighing phase, where precise measurements are undertaken to ensure the accurate formulation of the capsule contents.

Subsequent to the weighing process, the components enter the blending or mixing phase, where they undergo a thorough amalgamation to achieve a homogeneous mixture. In-process quality control measures are implemented during blending or mixing to scrutinize and verify the consistency and uniformity of the blend. The subsequent step involves Capsule Filling, where the meticulously formulated mixture is loaded into capsules. This stage integrates in-process quality control checks to guarantee the accurate and uniform filling of the capsules.

Post Capsule Filling, the capsules undergo a comprehensive inspection, with representative samples forwarded to the Quality Control (Q.C) department for meticulous evaluation. This inspection step validates the physical attributes and overall quality of the capsules. The process then progresses to the Labeling & Packaging phase, where capsules are appropriately labeled and packaged for distribution. In-process quality control measures and samples sent to Q.C remain integral during this phase to ensure compliance with regulatory standards.

The final stage encompasses the delivery of the packaged capsules to the Finished Goods Warehouse, where they are stored and readied for distribution to end-users. Throughout the entire Capsule Production Process, the incorporation of in-process quality control checks and sampling for Q.C ensures that each step aligns meticulously with regulatory guidelines and stringent quality standards. This comprehensive approach significantly contributes to the production of pharmaceutical capsules that are not only safe but also highly efficacious.

3. Process Flow Chart of Oral Liquid Production



Oral Liquid Production Process

The Oral Liquid Production Process starts with the reception of raw materials included in different elements reflected in the formulation. Weighing of these raw materials comes with the first step with the aim of obtaining accurate measurements. Subsequently, the process bifurcates into two parallel streams: Syrup Preparation and Vitamin Preparation.

After the Syrup Preparation, a crucial step is the sampling of the prepared syrup for in-process control checks. Samples are collected and sent to the Quality Control (QC) department for the assessment and verification of parameters, to make sure that the syrup conforms with the preset quality standards.

And then the Syrup and Vitamin ingredients are in the Final Mixing stage. An Additional Vitamin Preparation could be mixed to strengthen the formulation. After that, the mixture is pass thru Filtration process which is considered as the key process in the full step to discard impurities and get a pure product.

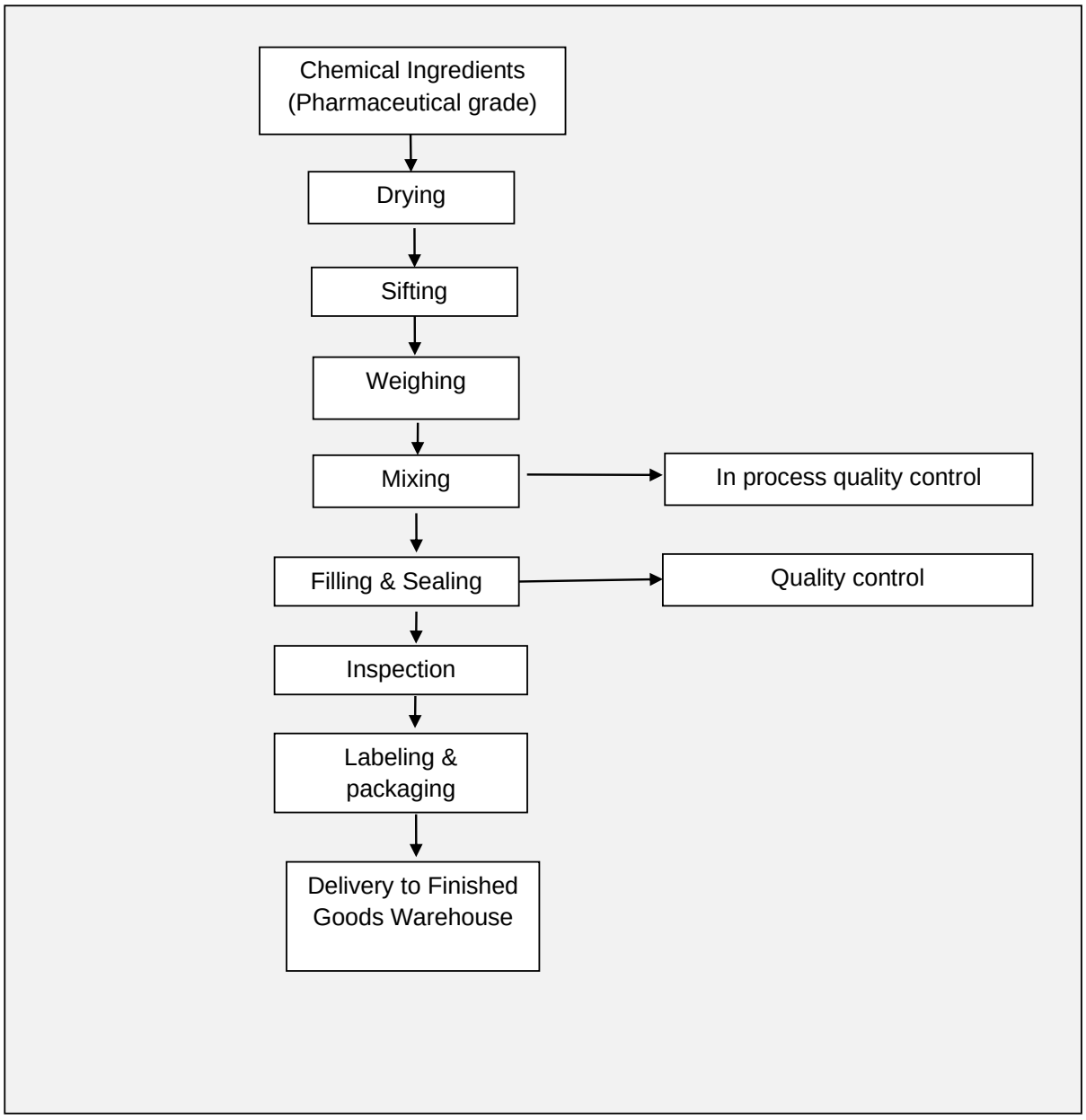
Following the Final Mixing and Filtration steps, samples are extracted for Quality Control (QC) assessment. If the samples pass through the QC evaluation (Yes), then the process proceeds to the Filling & Capping Inspection stage.

If the raw materials do not satisfy the quality standards (No), the process begins an Additional Vitamin Preparation stage. This entails vitamin supplements addition to improve the formulation. Once this stage is followed, the process goes to Final Mixing stage again with the target of achieving the need consistency and quality for the oral liquid product.

Filling & Capping inspection stage is done next, after Components Receiving stage, then comes Bottle & Cap Washing & Drying. This entails a very thorough cleaning and drying process of the bottles and their caps so that any impurities and contaminants are eliminated. Following the previous step, the process moves on to the Filling and Capping Inspection stage. In this step the filled bottles are checked for proper filling and sealing and therefore the quality and safety of the final product is guaranteed.

The Filling & Capping Inspection stage is followed by the Oral Liquid Production Process going on to the Labelling & Packaging stage. There the filled and inspected bottles are marked with suitable data and properly packed for distribution. The labeling process includes reviewing and confirming the label correctness. Packaged and labeled, the final orally consumed liquid products are ready for delivery to the Finished Goods Warehouse and stored there pending distribution to end users.

4. Process Flow Chart of Oral Powder Production



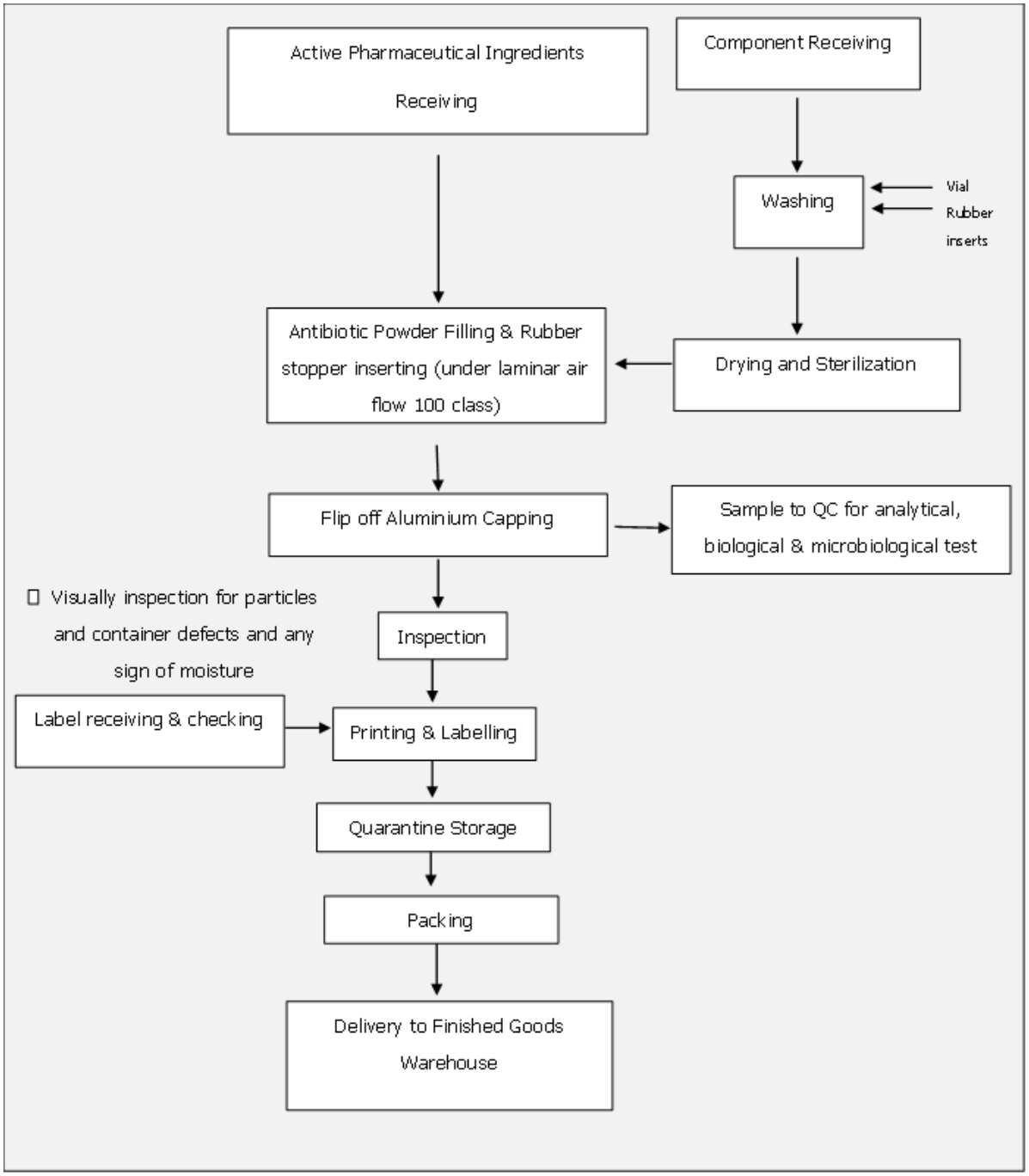
Oral Powder Production Process

The Oral Powder Production Process is a systematic sequence of steps designed to ensure the quality and integrity of pharmaceutical oral powder formulations. The process starts with the acquisition of chemical ingredients of pharmaceutical grade which include active pharmaceutical ingredients (APIs) and other components. The first critical stage which is drying, makes the raw materials to undergo the removal process of moisture to make the desired powder consistency.

Once the drying process is completed, the material is subjected to sieving, a process which results in fine particles and ensures that the size of the powder is uniform. Weighing is then done accurately to secure right formulation. The components undergo the mixing stage where they are fully mixed to form a uniform mixture. In-process quality control is implemented during mixing for the assessment and verification of the blend consistency.

After that follows Filling & Sealing where the powders are filled into suitable containers and firmly sealed. Quality control checks are the cornerstone of this phase, aimed at right filling and sealing processes. Once the products are filled and sealed, they are inspected testing both their physical qualities and the overall quality thereof. Labelling and packaging are the final stages during which the products are marked and prepared for distribution. The formulated oral powders are then sent off to the Finished Goods Warehouse for onwards distribution to the end customers.

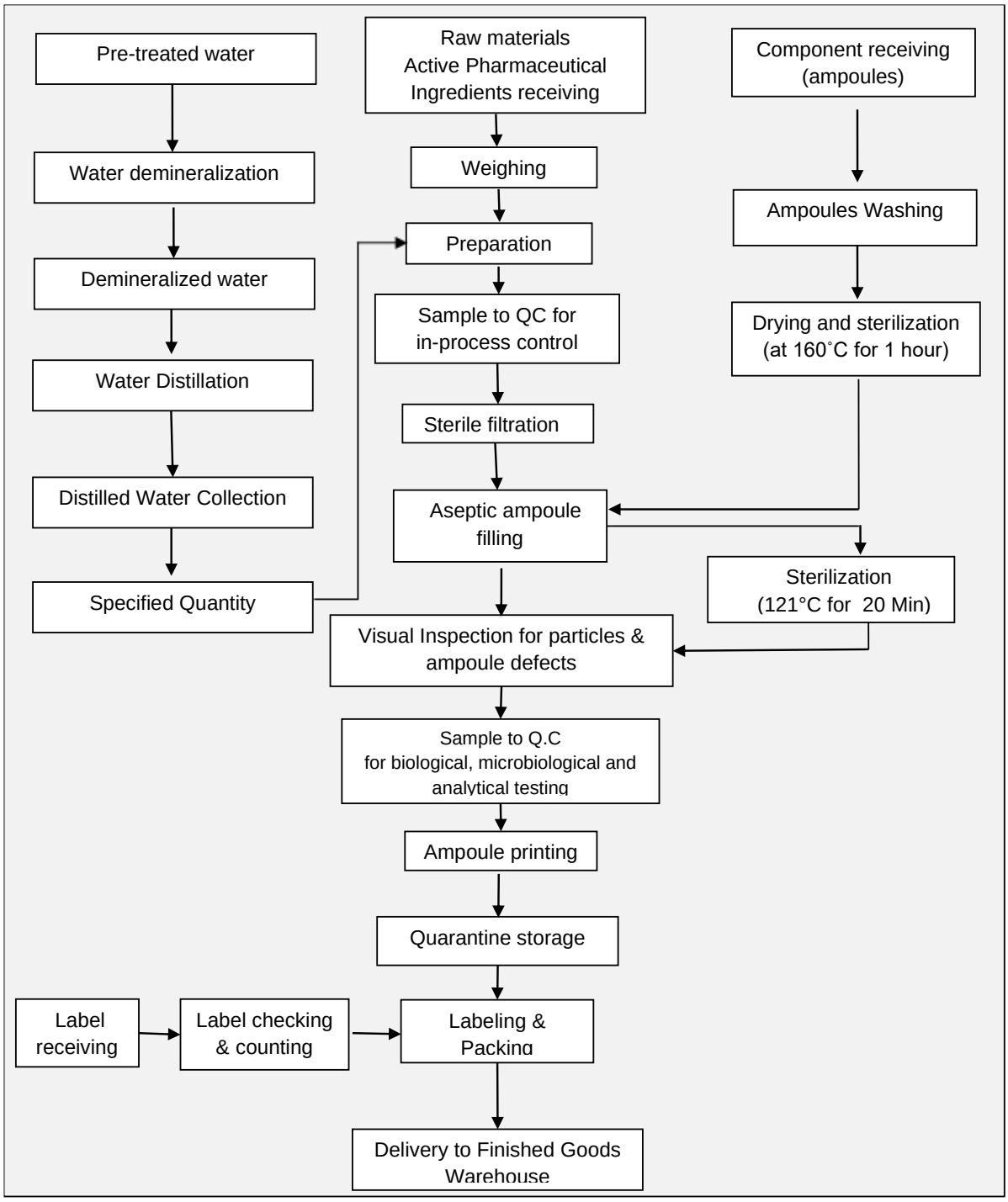
5. Process Flow Chart of Powder for Injection / Betalactam Injection



Antibiotic Power for Injection Production Process

The production of antibiotic powder for injection initiates with the reception of active pharmaceutical ingredients (API), and subsequent steps are carried out with meticulous precision to adhere to stringent quality standards. Components, including vials and rubber insets, undergo thorough washing to eliminate contaminants, followed by a critical phase of drying and sterilization to ensure cleanliness and the absence of microorganisms. Within a controlled laminar airflow environment classified as 100, antibiotic powder is accurately filled into vials, and rubber stoppers delicately inserted to maintain sterility. The process then advances to flip-off aluminum capping, sealing the vials securely for product protection. Representative samples are extracted for rigorous testing by the Quality Control (QC) department, covering analytical assessments, biological evaluations, and microbiological analyses to ensure integrity, potency, and compliance with standards. Visual inspection follows, checking for particles, container defects, and moisture signs. After inspection, products proceed to printing and labeling, ensuring accurate identification and regulatory compliance. In this phase, pharmaceutical product labels are acquired and meticulously inspected for accuracy and adherence to specifications. Approved labels undergo printing and labeling, affixed to respective products. Labeled items enter quarantine storage, subject to additional quality control checks. Upon successful completion, products are packaged and dispatched to the Finished Goods Warehouse, poised for distribution, completing a comprehensive process that ensures the safety, efficacy, and quality of the final pharmaceutical formulation.

6. Process Flow Chart of Small Volume Parenteral Solution Production



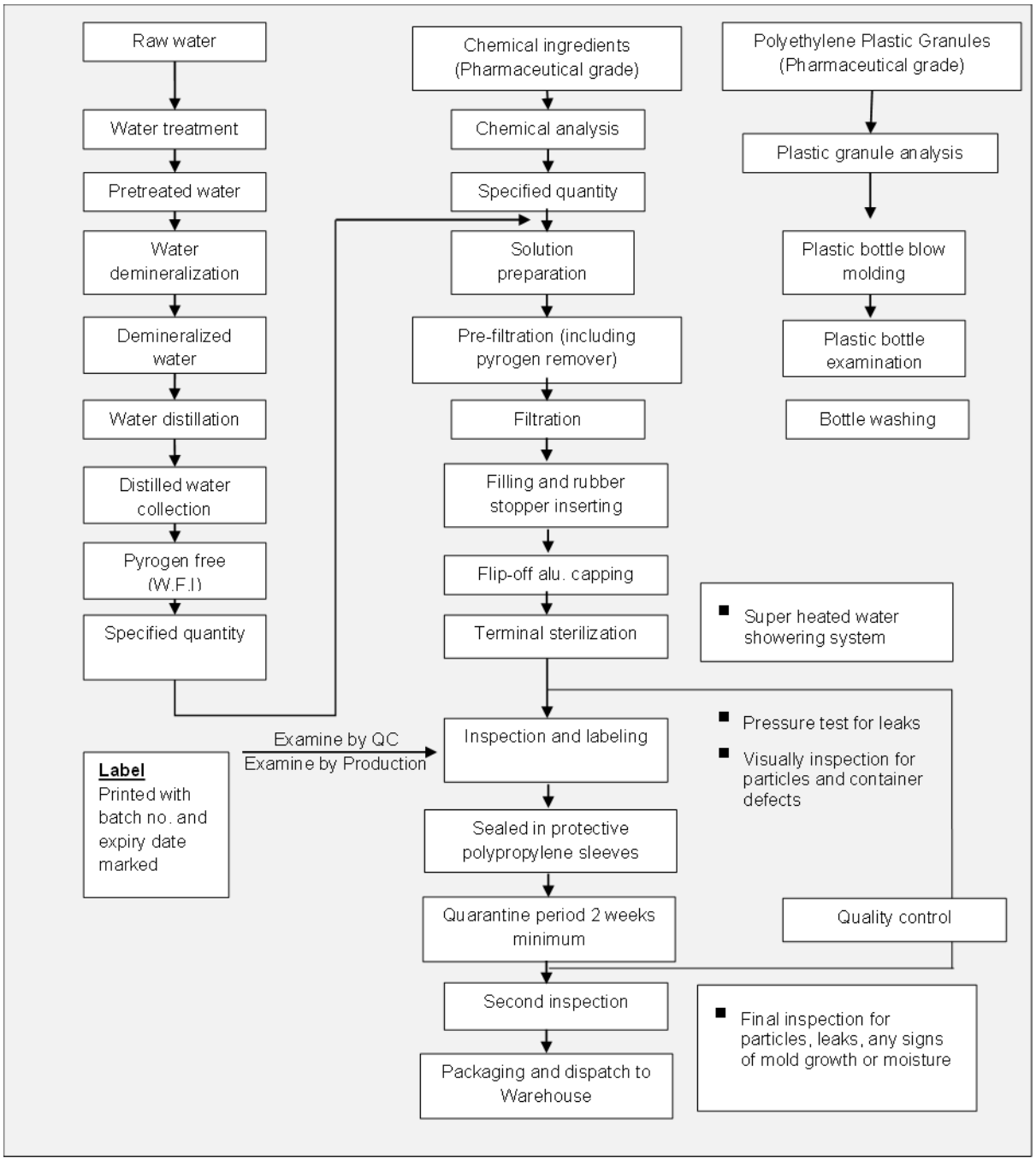
Small Volume Parenteral Solution Production Process

The Small Volume Parenteral Solution Production Process is a methodical sequence of procedures designed to uphold the quality, safety, and effectiveness of pharmaceutical solutions in small volumes. Commencing with the reception of Raw Materials, including Active Pharmaceutical Ingredients (APIs), the process meticulously weighs these components to ensure precision. The Preparation phase involves combining specified quantities of ingredients, including Distilled Water obtained through Water Distillation, undergoing purification steps like Demineralization. Samples undergo Quality Control (QC) checks for in-process control.

After preparation, the solution undergoes Sterile Filtration for impurity removal. The aseptic ampoule filling involves washing received ampoules, followed by component reception. The critical step of drying and sterilization at 160°C for 1 hour ensures ampoules are ready for aseptic filling. Post-filling, sterilization at 121°C for 20 minutes is conducted, followed by visual inspection and QC testing. Ampoules undergo printing for identification before Quarantine Storage.

Following label reception, a meticulous verification and counting process ensures accuracy, proceeding to the labeling phase. In the packing phase, labeled products are carefully placed in final packaging for delivery to the Finished Goods Warehouse, ready for distribution.

7. Process Flow Chart of Large Volume Parenteral Solution Product



Large Volume Parenteral Solution Production Process

Water

The Large Volume Parenteral Solution Production Process involves a meticulous series of steps to ensure the quality and purity of water, a fundamental component in pharmaceutical production. Commencing with the intake of raw water, the process initiates the Water Treatment phase, where comprehensive purification efforts eliminate impurities and contaminants, aligning the water with pharmaceutical standards. Subsequently, the obtained Pretreated Water undergoes further purification through Water Demineralization, aiming to remove minerals and ions. The resulting Demineralized Water signifies a heightened level of purity suitable for pharmaceutical applications.

Continuing the purification journey, the water undergoes the Water Distillation process, a crucial step involving heating, vaporization, and condensation to eliminate remaining impurities. The collection of Distilled Water post-distillation indicates a significantly purified state, meeting the stringent standards required for large volume parenteral solutions. The water is then designated as Pyrogen-Free (W.F.I), undergoing additional purification to eliminate pyrogens, ensuring the safety of parenteral solutions that are directly administered into the bloodstream.

The final step involves dispensing the Specified Quantity of the purified and pyrogen-free water, a critical component in formulating large volume parenteral solutions. Each stage in this process underscores the meticulous attention to water quality standards, ensuring the safety, efficacy, and compliance of pharmaceutical solutions with regulatory guidelines.

Plastic Bottles

In the Large Volume Parenteral Solution Production Process, involves the careful handling and processing of Polyethylene Plastic Granules, ensuring the quality and integrity of the containers used in pharmaceutical packaging. Beginning with the intake of Pharmaceutical Grade Polyethylene Plastic Granules, the process initiates the Plastic Granule Analysis phase. During this stage, a comprehensive analysis is conducted to assess the quality and suitability of the plastic granules for pharmaceutical use.

Following the analysis, the approved plastic granules progress to the Plastic Bottle Blow Molding stage. Here, the granules are subjected to a molding process to shape them into the desired form of plastic bottles. The resulting Plastic Bottles then undergo a meticulous examination to ensure proper molding, structural integrity, and absence of any defects.

Subsequently, the Plastic Bottles move on to the Bottle Washing phase, where they undergo thorough cleaning procedures. This step is crucial to eliminate any contaminants or residues that may have been introduced during the manufacturing process. The cleaned and inspected plastic bottles are now ready to be utilized for the packaging of large volume parenteral solutions.

Chemical Ingredients

The Large Volume Parenteral Solution Production Process details the meticulous steps involved in the preparation of solutions using chemical ingredients of pharmaceutical grade. The process begins with the acquisition of Chemical Ingredients of Pharmaceutical Grade, which undergo a thorough Chemical Analysis to ensure they meet the specified quality standards.

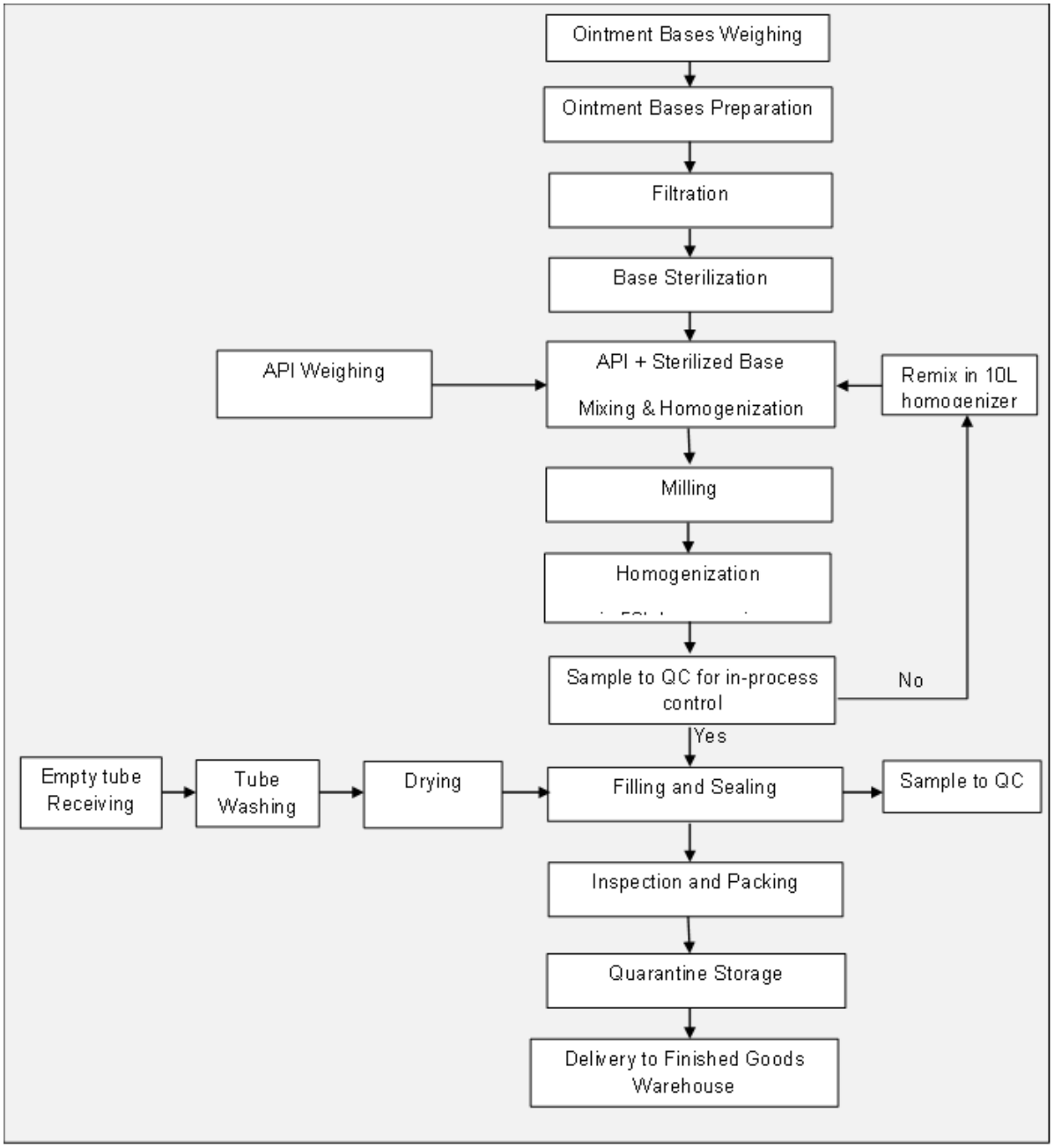
Upon successful analysis, the Chemical Ingredients are measured in a Specified Quantity, with a parallel stream ensuring a Pyrogen-free (W.F.I) Specified Quantity. The solution preparation phase follows, and the solutions move through pre-filtration, including the use of a pyrogen remover, to remove any impurities and ensure a high level of purity. The solutions then undergo Filtration to further refine their quality.

The next stage involves the filling of the solutions into containers and the insertion of rubber stoppers. Subsequently, Flip-off Aluminum Capping is applied to seal the containers securely. The sealed containers then undergo Terminal Sterilization using a superheated water showering system, ensuring the elimination of any remaining microorganisms.

After sterilization, the containers undergo a comprehensive Inspection and Labeling process, which includes examination by both Quality Control (QC) and Production. The labeling includes crucial information such as batch numbers and expiry dates. The containers also undergo a pressure test for leaks and visual inspection for particles, container defects, and other quality indicators.

Following inspection, the sealed containers are placed in protective polypropylene sleeves and subjected to a minimum 2-week Quarantine Period, where additional Quality Control checks are performed. A Second Inspection is conducted, serving as a final check for particles, leaks, signs of mold growth, or moisture. Once these checks are completed, the containers move on to the Packaging phase, and the finished products are dispatched to the warehouse for distribution.

8. Process Flow Chart of Ophthalmic Ointment Production



Ophthalmic Ointment Production Process

The Ophthalmic Ointment Production Process is a detailed chain of actions intended to maintain the quality and safety of ophthalmic ointments. It starts with Ointment Bases Weighing and it is where the required bases are weighed. Subsequently, the bases go to the steps of preparation, filtration, and sterilization.

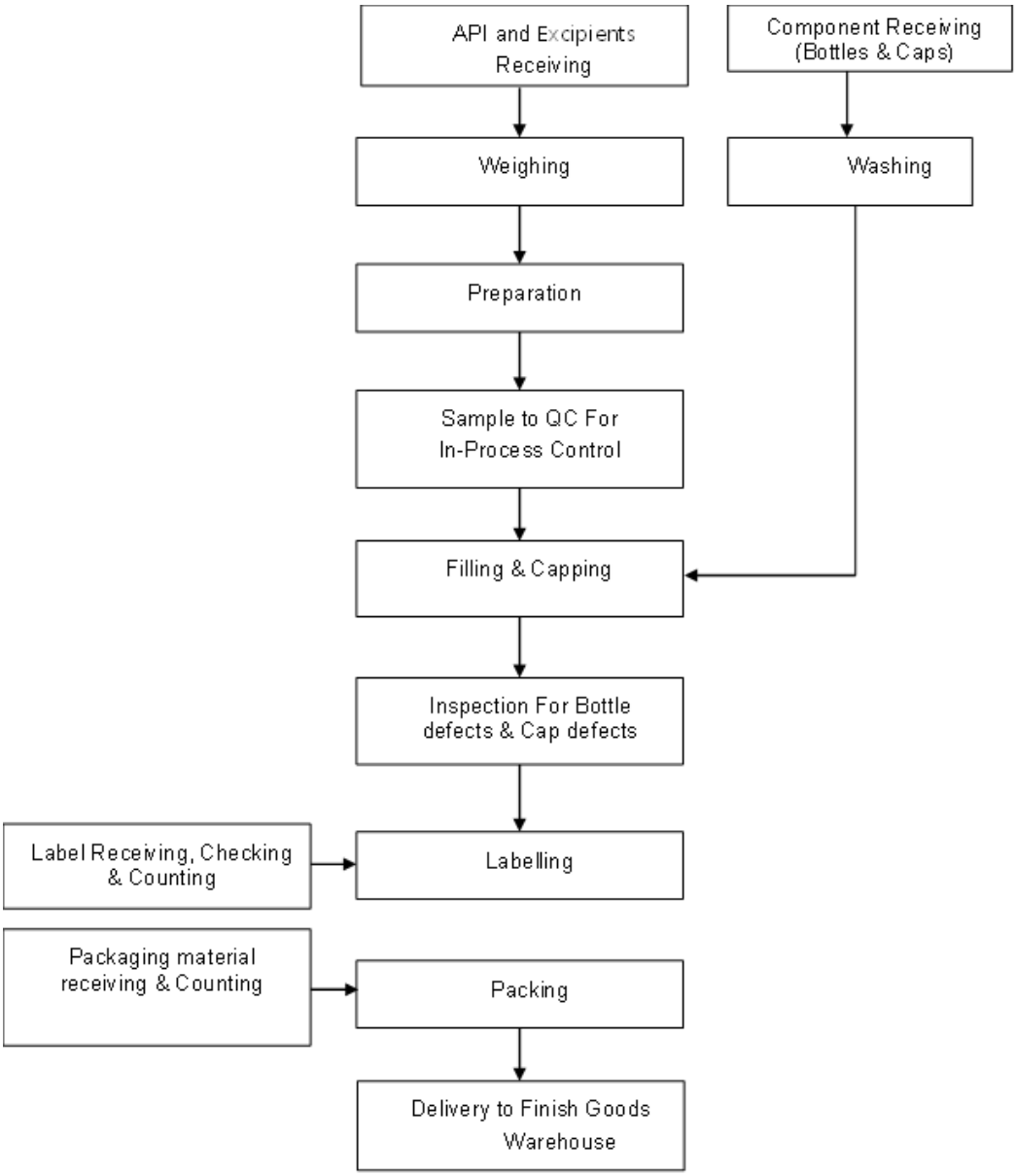
The API is weighed separately and then mixed with the sterilized base, undergoing homogenization and milling. Homogenization is done in 50L homogenizer, samples used for in-process control are sent to Quality Control.

At the " Sample to QC for in-process control" stage, the samples are subjected to quality checking. The QC analysis determination of the compliance to standards facilitates the process of proceeding to the Filling and Sealing. In case of any deviation or concern (No), a corrective action taken is remixing in 10L homogenizer and reverting to the API + Sterilize Base Mixing & Homogenization stage for further optimization before the progression to Filling and Sealing.

Empty Tube Receiving leads to a Tube Washing process. That is the intensive cleaning of the tubes to get rid of any impurities or remnants. After that, the tubes undergo a Drying stage which is aimed at removing the excess moisture. The last stage is the Filling and Sealing process in which the ointment is carefully filled into the cleaned and dried tubes which is followed by their secure sealing. The filled and sealed tubes are inspected; samples are sent to QC for additional evaluation.

Thereafter the final products are packed and kept in quarantine storage prior to delivery to the Finished Goods Warehouse.

9. Process Flow Chart of Liquid for External Use Production



Liquid (External Use) Production Process

The Liquid (external use) Production Process is a methodical series of steps designed to ensure the quality and safety of pharmaceutical liquids intended for external application. The process begins with the reception of Active Pharmaceutical Ingredients (API) and Excipients, which undergo careful Weighing to achieve precise measurements. The Preparation phase follows, and samples are sent to Quality Control (QC) for In-Process Control to monitor the product's quality during formulation.

The Filling & Capping phase involves a comprehensive process, starting with Washing and receiving Bottles & Caps as components. Following component receiving, the bottles are filled, and caps are securely applied. This stage undergoes Inspection for Bottle and Cap defects to ensure the integrity of the packaging.

The next steps involve Labeling, where received labels are checked, counted, and affixed to the products. Packaging follows, involving the reception and counting of packaging materials. The final products are then carefully packed and delivered to the Finished Goods Warehouse, ready for distribution.


ORAL POWDER


LARGE VOLUME PARENTERALS
PS
RL
DPS
D5
½DPS


SMALL VOLUME PARENTERALS
FOLIC ACID INJECTION
BURMETON INJECTION

There are a total of 10 buildings, containing over a hundred units dedicated to production. All units utilize an HVAC system (Heating, Ventilation, and Air Conditioning system), which undergoes annual validation by a third party. Each production room is equipped with a ventilation system specifically designed to maintain air quality and control particulate matter. The ventilation system typically incorporates high-efficiency particulate air (HEPA) filters and may include features such as air recirculation, exhaust fans, and pressure differentials to prevent cross-contamination and ensure compliance with regulatory standards.

3.5.1 *Raw Materials and Supporting Materials*

a) Source of Raw Material

A total of 273 types of raw materials will be imported mainly from India and China, Thailand and all Active pharmaceutical ingredients are to be purchased from reliable GMP sources with 100% QC pass.

b) Transportation

The raw materials are imported by air ways and transport to factory by company own car (cooling box container).

Traffic at factory for raw material transport is of about 3 to 5 numbers of vehicles per day. As they are all on hop, unload and go system, the factory has no need to manage the parking of trucks and transport. In site, there have enough car parking area with 3960 sqft for trucks.

c) Receiving and Arranging Process

In a pharmaceutical factory, the storage system for raw materials is crucial for maintaining the quality and integrity of the ingredients used in drug manufacturing.

Receiving and Inspection: Raw materials are received from suppliers, and upon arrival, they undergo inspection to ensure they meet quality standards and are accompanied by appropriate documentation (Certificates of Analysis, Material Safety Data Sheets, etc.).

Quarantine Area: Incoming raw materials are often placed in a quarantine area where they are segregated from approved materials until they are tested and cleared for use. This prevents any potentially contaminated or substandard materials from entering the production process.

Storage: Once approved, raw materials are transferred to designated storage areas. These areas are typically organized based on factors such as material type, hazard level, temperature sensitivity, and shelf-life requirements. Some materials require refrigerated storage, while others can be stored at ambient temperature.

Inventory Management: A robust inventory management system is essential for tracking the quantity, location, and expiry dates of raw materials. This ensures that materials are used in a timely manner and that expired or obsolete stock is removed from circulation.

Material Handling Equipment: Forklifts, pallet jacks, and other material handling equipment are used to transport raw materials within the storage facility safely and efficiently. Proper training and equipment maintenance are providing the worker to minimize the risk of accidents or damage to materials.

Raw Material Storage

Throughout the year, given the weather conditions in Pyin Oo Lwin where temperatures remain below 30°C, raw material storage relies on a ventilation system equipped with exhaust fans in the raw material, packing material, and finished goods warehouses.

Additionally, the factory has designated cold rooms set to temperatures between 15°C to 25°C, with humidity control for storing specialized items such as empty gelatin capsules (used for primary packing) and raw materials like antibiotics.

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<tr><td colspan="2">Raw Material Warehouse</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td colspan="2">Packaing Materials and Label Warehouse</td></tr>
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Table 18. List of raw materials to be imported

Sr No	Type of Raw Material	Unit	Price per unit	Year1		Year2		Year3	
				Qty	Value Kyats	Qty	Value Kyats	Qty	Value Kyats
1	Acacia BP	Kg	9,000	2,000.00	18,000,000	2,160.00	19,440,000	2,332.80	20,995,200
2	Allopurinol BP	Kg	30,000	400.00	12,000,000	432.00	12,960,000	466.56	13,996,800
3	Amaranth BPC	Kg	15,000	25.00	375,000	27.00	405,000	29.16	437,400
4	Amlodipine BESILATE Bp/EP	Kg	357,500	250.00	89,375,000	270.00	96,525,000	291.60	104,247,000
5	Amoxicillin Trihydrate BP	Kg	35,000	1,800.00	63,000,000	1,944.00	68,040,000	2,099.52	73,483,200
6	Thiamine (Aneurine)HCL BP Powder	Kg	35,000	2,000.00	70,000,000	2,160.00	75,600,000	2,332.80	81,648,00
7	Apple Green Dye (Food Grade)	Kg	25	114.00	2,850	123.12	3,078	132.97	3,324
8	Asorbic Acid BP	Kg	4,500	2,500.00	11,250,000	2,700.00	12,150,000	2,916.00	13,122,000
9	Aspirin powder (Granular)	Kg	22,100	200.00	4,420,000	216.00	4,773,600	233.28	5,155,488
10	Atenolol powder (Granular)	Kg	43,849	100.00	4,384,900	108.00	4,735,692	116.64	5,114,547
11	Avicel NF(PH 301) BP	Kg	9,490	3,620.00	34,353,800	3,909.60	37,102,104	4,222.37	40,070,272
12	Calciferol BP	Kg	7,500	25.00	187,500	27.00	202,500	29.16	218,700
13	Calcium Chloride BP (Inj., Grade)	Kg	75,400	46.00	3,468,400	49.68	3,745,872	53.65	4,045,542
14	Calcium Glycerophosphate B.P	Kg	98,540	135.00	13,302,900	145.80	14,367,132	157.46	15,516,503
15	Carbimazole BP	Kg	104,520	25.00	2,613,000	27.00	2,822,040	29.16	3,047,803
16	Carbocisteine BP	Kg	97,500	25.00	2,437,500	27.00	2,632,500	29.16	2,843,100
17	Ceftriaxone Sodium USP	Kg	234,000	332.25	77,746,500	358.83	83,966,220	387.54	90,683,518
18	Cetirizine Hcl BP	Kg	70,000	200.00	14,000,000	216.00	15,120,000	233.28	16,329,600
19	Chlorpheniramine Maleae BP	Kg	123,500	104.00	12,844,000	112.32	13,871,520	121.31	14,981,242
20	Chlopheniramine Maleae BP (Inj: grade)	Kg	123,500	25.00	3,087,500	27.00	3,334,500	29.16	3,601,260
21	Ciprofloxacin	Kg	51,324	750.00	38,493,000	810.00	41,572,440	874.80	44,898,235
22	Citric Acid	Kg	3,575	32.25	115,294	34.83	124,517	37.62	134,479
23	Crystalline Penicillin G BP (as Sodium Salt)	Kg	10,000	25.00	250,000	27.00	270,000	29.16	291,600
24	Dextrose Anhydrous BP	Kg	1,300	17,542.00	22,804,600	18,945.36	24,628,968	20,460.99	26,599,285
25	Dextrose Anhydrous BP (Pyrogen free) Crystalline Powder	Kg	1,180	262,005.00	309,165,900	282,965.40	333,899,172	305,602.63	360,611,106
26	Dextrose Monohydrate BP	Kg	949	53,866.00	51,118,834	58,175.28	55,208,341	62,829.30	59,625,008
27	Dispersed Orange	Kg	55,000	25.00	1,375,000	27.00	1,485,000	29.16	1,603,800

28	Dispersed Pink	Kg	72,000	25.00	1,800,000	27.00	1,944,000	29.16	2,099,520
29	Dispersed Yellow	Kg	195,000	25.00	4,875,000	27.00	5,265,000	29.16	5,686,200
30	Empty Capsule Gelatin Capsule (Size-0)(Flumoxy)	Kg	3.50	11,000,000.00	38,500,000	11,880,000.00	41,580,000	12,830,400.00	44,906,400
31	Empty Capsule Gelatin Capsule (Size-1)(Carbocisteine)	Kg	3.50	120,000.00	420,000	129,600.00	453,600	139,968.00	489,888
32	Empty Capsule Gelatin Capsule (Size 1)(Flucolaxacillin)	Kg	3.50	1,000,000.00	3,500,000	1,080,000.00	3,780,000	1,166,400.00	4,082,400
33	Enalapril Maleate USP	Kg	150,748	150.00	22,612,200	162.00	24,421,176	174.96	26,374,870
34	Essence of Orange	Kg	27,000	25.00	675,000	27.00	729,000	29.16	787,320
35	Ethyl Alcohol BP (Alcohol 95%)	Kg	950	5,110.00	4,854,500	5,518.80	5,242,860	5,960.30	5,662,289

Data Source: RVK Myanmar Co Ltd

Sr No	Type of Raw Material	Unit	Price per unit	Year4		Year 5		Year 6-30	
				Qty	Value Kyats	Qty	Value Kyats	Qty	Value Kyats
1	Acacia BP	Kg	9,000	2,519.42	22,674,816	2,720.98	24,488,801	2,938.66	26,447,905
2	Allopurinol BP	Kg	30,000	503.88	15,116,544	544.20	16,325,868	587.73	17,631,937
3	Amaranth BPC	Kg	15,000	31.49	472,392	34.01	510,183	36.73	550,998
4	Amlodipine BESILATE Bp/EP	Kg	357,500	314.93	112,586,760	340.12	121,593,701	367.33	131,321,197
5	Amoxicillin Trihydrate BP	Kg	35,000	2,267.48	79,361,856	2,448.88	85,710,804	2,644.79	92,567,669
6	Thiamine (Aneurine)HCL BP Powder	Kg	35,000	2,519.42	88,179,840	2,720.98	95,234,227	2,938.66	102,852,965
7	Apple Green Dye (Food Grade)	Kg	25	143.61	3,590	155.10	3,877	167.50	4,188
8	Asorbic Acid BP	Kg	4,500	3,149.28	14,171,760	3,401.22	15,305,501	3,673.32	16,529,941
9	Aspirin powder (Granular)	Kg	22,100	251.94	5,567,927	272.10	6,013,361	293.87	6,494,430
10	Atenolol powder (Granular)	Kg	43,849	125,97	5,523,711	136.05	5,965,608	146.93	6,442,857
11	Avicel NF (PH 301) BP	Kg	9,490	4,560.16	43,275,894	4,924.97	46,737,966	5,318.97	50,477,003
12	Calciferol BP	Kg	7,500	31.49	236,196	34.01	255,092	36.73	275,499
13	Calcium Chloride BP (Inj., Grade)	Kg	75,400	57.95	4,369,185	62.58	4,718,720	67.59	5,096,218
14	Calcium Glycerophosphate B.P	Kg	98,540	170.06	16,757,823	183.67	18,098,449	198.36	19,546,324
15	Carbimazole BP	Kg	104,520	31.49	3,291,627	34.01	3,554,958	36.73	3,839,354
16	Carbocisteine BP	Kg	97,500	31.49	3,070,548	34.01	3,316,192	36.73	3,581,487
17	Ceftriaxone Sodium USP	Kg	234,000	418,54	97,938,199	452.02	105,773,255	488.18	114,235,115
18	Cetirizine Hcl BP	Kg	70,000	251.94	17,635,968	272.10	19,046,845	293.87	20,570,593

19	Chlorpheniramine Maleae BP	Kg	123,500	131.01	16,179,741	141.49	17,474,120	152.81	18,872,050
20	Chlopheniramine Maleae BP (Inj: grade)	Kg	123,500	31.49	3,889,361	34.01	4,200,510	36.73	4,536,550
21	Ciprofloxacin	Kg	51,324	944.78	48,490,094	1,020.37	52,369,302	1,102.00	56,558,846
22	Citric Acid	Kg	3,575	40.63	145,237	43.88	156,856	47,39	169,404
23	Crystalline Penicillin G BP (as Sodium Salt)	Kg	10,000	31.49	314,928	34.01	340,122	36.73	367,332
24	Dextrose Anhydrous BP	Kg	1,300	22,097.87	28,727,228	23,865.70	31,025,407	25,774.95	33,507,439
25	Dextrose Anhydrous BP (Pyrogen free) Crystalline Powder	Kg	1,180	330,050.84	389,459,994	356,454.91	420,616,794	384,971.30	454,266,137
26	Dextrose Monohydrate BP	Kg	949	67,855.65	64,395,009	73,284.10	69,546,609	79,146.83	75,110,338
27	Dispersed Orange	Kg	55,000	31.49	1,732,104	34.01	1,870,672	36.73	2,020,326
28	Dispersed Pink	Kg	72,000	31.49	2,267,482	34.01	2,448,880	36.73	2,644,791
29	Dispersed Yellow	Kg	195,000	31.49	6,141,096	34.01	6,632,384	36.73	7,162,974
30	Empty Capsule Gelatin Capsule (Size-0)(Flumoxy)	Kg	3.50	13,856,832.00	48,498,912	14,965,378.56	52,378,825	16,162,608.84	56,569,131
31	Empty Capsule Gelatin Capsule (Size-1)(Carbocisteine)	Kg	3.50	151,165.44	529,079	163,258.68	571,405	176,319.37	617,118
32	Empty Capsule Gelatin Capsule (Size 1)(Flucolaxacillin)	Kg	3.50	1,259,712.00	4,408,992	1,360,488.96	4,761,711	1,469,328.08	5,142,648
33	Enalapril Maleate USP	Kg	150,748	188.96	28,484,960	204.07	30,763,648	220.40	33,224,740
34	Essence of Orange	Kg	27,000	31.49	850,306	34.01	918,330	36.73	991,796
35	Ethyl Alcohol BP (Alcohol 95%)	Kg	950	6,437.13	6,115,272	6,952.10	6,604,494	7,508.27	7,132,853

Data Source: RVK Myanmar Co Ltd

Sr.No	Type of Raw Material	Unit	Price per unit	Year 1		Year 2		Year 3	
				Qty	Value Kyats	Qty	Value Kyats	**Qty**	**Value Kyats**
36	Flucloxicillin Sodium BP	Kg	50,000	3,212.00	160,600,000	3,468.96	173,448,000	3,746.48	187,323,840
37	Foilc Acid BP	Kg	370,500	264.00	97,812,000	285.12	105,636,960	307.93	114,087,917
38	Gelatin	Kg	30,000	102.00	3,060,000	110.16	3,304,800	118.97	3,569,184
39	Glycerine BP	Kg	1,040	6,049.00	6,290,960	6,532.92	6,794,237	7,055.55	7,337,776
40	Lactose BP	Kg	3,650	40,000.00	146,000,000	43,200.00	157,680,000	46,656.00	170,294,400
41	Liquid Paraffin BP	Kg	10,000	195.00	1,950,000	210.60	2,106,000	227.45	2,274,480
42	Maize Starch BP	Kg	1,625	14,245.00	23,148,125	15,384.60	24,999,975	16,615.37	26,999,973
43	Magneaium Trisilicate BP	Kg	5,200	2,916.00	15,163,200	3,149.28	16,376,256	3,401.22	17,686,356
44	Magneaium Hydroxide N.F	Kg	5,460	4,200.00	22,932,000	4,536.00	24,766,560	4,898.88	26,747,885

45	Mannitol NF	Kg	5,460	4,000.00	21,840,000	4,320.00	23,587,200	4,665.60	25,474,176
46	Metformin HCL BP	Kg	8,710	4,500.00	39,195,000	4,860.00	42,330,600	5,248.80	45,717,048
47	Magnesium Stearate BP	Kg	9,000	771.00	6,939,000	832.68	7,494,120	899.29	8,093,650
48	Methyl Hydroxy Benzoate BP	Kg	15,000	22.25	333,750	24.03	360,450	25.95	389,286
49	Metroidazole BP	Kg	21,580	2,000.00	43,160,000	2,160.00	46,612,800	2,332.80	50,341,824
50	Metaphosporic Acid	Kg	75,000	25.00	1,875,000	27.00	2,025,000	29.16	2,187,000
51	Nicotinic Acid BP	Kg	18,330	2,000.00	36,660,000	2,160.00	39,592,800	2,332.80	42,760,224
52	Nicotinamide	Kg	84,500	40.25	3,401,125	43.47	3,673,215	46.95	3,967,072
53	Pantothenyl Alcohol	Kg	286,000	2.40	686,400	2.59	741,312	2.80	800,617
54	Purified Talc BP	Kg	5,000	846.30	4,231,500	914.00	4,570,020	987.12	4,935,622
55	Paracetamol BP	Kg	7,605	3,000.00	22,815,000	3,240.00	24,640,200	3,499.20	26,611,416
56	Potassium Chloride BP(Inj., Grade)	Kg	9,000	68.00	612,000	73.44	660,960	79.32	713,837
57	Propylene Glycol BP	Kg	16,250	626.00	10,172,500	676.08	10,986,300	730.17	11,865,204
58	Propyl Hydroxy Benzoate BP	Kg	25,000	2.70	67,500	2.92	72,900	3.15	78,732
59	Phenoxymethyl Penicillin Potassium BP	Kg	51,610	3,000.00	154,830,000	3,240.00	167,216,400	3,499.20	180,593,712
60	Pyridoxine HCL BP	Kg	61,100	992.00	60,611,200	1,071.36	65,460,096	1,157.07	70,696,904
61	Pantothenyl Alcohol	Kg	286,000	25.00	7,150,000	27.00	7,722,000	29.16	8,339,760
62	Repaglinide USP	Kg	10,569	225.25	2,380,667	243.27	2,571,121	262.73	2,776,810
63	Raspberry Flavour BE 7394	Lit	97,500	2,258.00	220,155,000	2,438.64	237,767,400	2,633.73	256,788,792
64	Riboflavin BP	Kg	239,200	3,256.00	778,835,200	3,516.48	841,142,016	3,797.80	908,433,377
65	Sodium Chloride B.P	Kg	1,300	20,705.00	26,916,500	22,361.40	29,069,820	24,150.31	31,395,406
66	Sodium Cirate B.P	Kg	1,560	40,342.00	62,933,520	43,569.36	67,968,202	47,054.91	73,405,658
67	Sodium Chloride B.P (Inj., Grade)	Kg	1,872	3,802.00	7,117,344	4,106.16	7,686,732	4,434.65	8,301,670
68	Soluble Saccharin BP	Kg	20,000	1,000.00	20,000,000	1,080.00	21,600,000	1,166.40	23,328,000
69	Sulphamethoxazole BP	Kg	24,180	1,000.00	24,180,000	1,080.00	26,114,400	1,166.40	28,203,552
70	Sodium Lactate Solution BP	Kg	104,000	541.00	56,264,000	584.28	60,765,120	631.02	65,626,330
71	Tetracycline Hcl(Micaronised)	Kg	250,000	20.00	5,000,000	21.60	5,400,000	23.33	5,832,000
72	Aluminium Hydroxide-Magnesium Carbonate-Co-Dried Gel BP	Kg	4,000	1,512.00	6,048,000	1,632.96	6,531,840	1,763.60	7,054,387
73	Potassium Chloride B.P	Kg	2,100	20,705.00	43,480,500	22,361.40	46,958,940	24,150.31	50,715,655

Data Source: RVK Myanmar Co Ltd

Sr.No	Type of Raw Material	Unit	Price per unit	Year 4		Year 5		Year 6-30	
				Qty	Value Kyats	Qty	Value Kyats	Qty	Value Kyats
36	Flucloxicillin Sodium BP	Kg	50,000	4,046.19	202,309,747	4,369.89	218.494,527	4,719.48	235,974,089
37	Foilc Acid BP	Kg	370,500	332.56	123,214,950	359.17	133,072,146	387.90	143,717,918
38	Gelatin	Kg	30,000	128.49	3,854,719	138.77	4,163,096	149.87	4,496,144
39	Glycerine BP	Kg	1,040	7,620.00	7,924,798	8,229.60	8,558,782	8,887.97	9,234,484
40	Lactose BP	Kg	3,650	50,388.48	183,917,952	54,419.56	198,631,388	58,773.12	214,521,899
41	Liquid Paraffin BP	Kg	10,000	245.64	2,456,438	265.30	2,652,953	286.52	2,865,190
42	Maize Starch BP	Kg	1,625	17,944.60	29,159,971	19,380.17	31,492,769	20,930.58	34,012,190
43	Magneaium Trisilicate BP	Kg	5,200	3,673.32	19,101,265	3,967.19	20,629,366	4,284.56	22,279,715
44	Magneaium Hydroxide N.F	Kg	5,460	5,290.79	28,887,716	5,714.05	31,198,733	6,171.18	33,694,631
45	Mannitol NF	Kg	5,460	5,038.85	27,512,110	5,441.96	29,713,079	5,877.31	32,090,125
46	Metformin HCL BP	Kg	8,710	5,668.70	49,374,412	6,122.20	53,324,365	6,611.98	57,590,314
47	Magnesium Stearate BP	Kg	9,000	971.24	8,741,142	1,048.94	9,440,433	1,132.85	10,19,668
48	Methyl Hydroxy Benzoate BP	Kg	15,000	28.03	420,429	30.27	454,063	32.69	490,388
49	Metroidazole BP	Kg	21,580	2,519.42	54,369,170	2,720..98	58,718,704	2,938.66	63,416,200
50	Metaphosporic Acid	Kg	75,000	31.49	2,361,960	34.01	2,550,917	36.73	2,754,990
51	Nicotinic Acid BP	Kg	18,330	2,519.42	46,181,042	2,720.98	49,875,525	2,938.66	53,865,567
52	Nicotinamide	Kg	84,500	50.70	4,284,438	54.76	4,627,193	59,14	4,997,368
53	Pantothenyl Alcohol	Kg	286,000	3.02	864,666	3.27	933,840	3.53	1,008,547
54	Purified Talc BP	Kg	5,000	1,066.09	5,330,471	1,151.38	5,756,909	1,243.49	6,217,462
55	Paracetamol BP	Kg	7,605	3,779.14	28,740,329	4,081.47	31,039,556	4,407.98	33,522,720
56	Potassium Chloride BP(Inj., Grade)	Kg	9,000	85.66	770,944	92.51	832,619	99.91	899,229
57	Propylene Glycol BP	Kg	16,250	788.58	12,814,420	851.67	13,839,574	919.80	14,946,740
58	Propyl Hydroxy Benzoate BP	Kg	25,000	3.40	85,031	3.67	91,833	3.97	99,180
59	Phenoxymethyl Penicillin Potassium BP	Kg	51,610	3,779.14	195,041,209	4,081.47	210,644,506	4,407.98	227,496,066
60	Pyridoxine HCL BP	Kg	61,100	1,249.63	76,352,656	1,349.61	82,460,868	1,457.57	89,057,738
61	Pantothenyl Alcohol	Kg	286,000	31.49	9,006,941	34.01	9,727,496	36.73	10,505,696
62	Repaglinide USP	Kg	10,569	283.75	2,998,955	306.45	3,238,872	330.97	3,497,981
63	Raspberry Flavour BE 7394	Lit	97,500	2,844.43	277,331,895	3,071.98	299,518,447	3,317.74	323,479,923
64	Riboflavin BP	Kg	239,200	4,101.62	981,108,047	4,429.75	1,059,596,691	4,784.13	1,144,364,427
65	Sodium Chloride B.P	Kg	1,300	26,082.34	33,907,038	28,168.92	36,619,601	30,422.44	39,549,169

66	Sodium Cirate B.P	Kg	1,560	50,819.30	79,278,110	54,884.85	85,620,359	59,275.63	92,469,988
67	Sodium Chloride B.P (Inj., Grade)	Kg	1,872	4,789.43	8,965,804	5,172.58	9,683,068	5,586.39	10,45,713
68	Soluble Saccharin BP	Kg	20,000	1,259.71	25,194,240	1,360.49	27,209,779	1,469.33	29,386,562
69	Sulphamethoxazole BP	Kg	24,180	1,259.71	30,459,836	1,360.49	32,896,623	1,469.33	35,528,353
70	Sodium Lactate Solution BP	Kg	104,000	681.50	70,876,436	736.02	76,546,551	794.91	82,670,275
71	Tetracycline Hcl(Micaronised)	Kg	250,000	25.19	6,298,560	27.21	6,802,445	29.39	7,346,640
72	Aluminium Hydroxide-Magnesium Carbonate-Co-Dried Gel BP	Kg	4,000	1,904.68	7,618,738	2,057.06	8,228,237	2,221.62	8,886,496
73	Potassium Chloride B.P	Kg	2,100	26,082.34	54,772,908	28,168.92	59,154,740	30,422.44	63,887,119

Data Source: RVK Myanmar Co Ltd

Sr. No	Type of Raw Material	Unit	Price per unit	Year 1		Year 2		Year 3	
				Qty	Value Kyats	Qty	Value Kyats	Qty	Value Kyats
74	PVP(K-30)BP	Kg	21,840	660.00	14,414,400	712.80	15,567,552	769.82	16,812,956
75	Yellow Soft Paraffin	Kg	5,720	1,536.00	8,785,920	1,658.88	9,448,794	1,791.59	10,247,897
76	Wool Fat BP	Kg	38,480	195.00	7,503,600	210.60	8,103,888	227.45	8,752,199
77	Trimethoprim	Kg	43,160	200.00	8,632,000	216.00	9,322,560	233.28	10,068,365
78	Cinnarizine BP/EP	Kg	73,000	25.00	1,825,000	27.00	1,971,000	29.16	2,128,680
78	Diclofenac Sodium BP	Kg	21,875	214.00	4,681,250	231.12	5,055,750	249.61	5,460,210
80	Dichlorometaxylenol	Kg	11	300.00	3,221	324.00	3,478	349.92	3,756
81	Chlorocresol BP	Kg	30,650	25.00	766,250	27.00	827,550	29.16	893,754
82	Chloroquine Phosphate BP	Kg	85,510	2,000.00	171,020,000	2,160.00	184,701,600	2,332.80	199,477,728
83	Ciprofloxacin BP	Kg	25,000	25.00	625,000	27.00	675,500	29.16	729,000
84	Doxycycline Hyclate BP	Kg	32,400	240.00	7,776,000	259.20	8,398,080	279.94	9,069,926
85	Haloperidol BP	Kg	83,750	25.00	2,093,750	27.00	2,261,250	29.16	2,442,150
86	Acetone BP	Lit	10,938	280.00	3,062,500	302.40	3,307,500	326.59	3,572,100
87	Albendazole USP	Kg	110,000	25.00	2,750,000	27.00	2,970,000	29.16	3,207,600
88	Thiamine HCL (Inj; Grade)	Kg	100,000	25.00	2,500,000	27.00	2,700,000	29.16	2,916,000
89	Ascorbic Acid BP(Inj; Grade)	Kg	4,500	25.00	113,625	27.27	122,715	29.45	132,532
90	Calcium Pantothenate	Kg	44,863	25.00	1.121,563	27.00	1,211,288	29.16	1,308,191

91	Castor Oil	Kg	15,000	25.00	375.000	27.00	405,000	29.16	437,400
92	Chloropheniramine Maleate (Inj;Grade)	Kg	115,000	25.00	2,875,000	27.00	3,105,000	29.16	3,353,400
93	Fluconazole UDP	Kg	148,750	100.00	14,875,000	108.00	16,065,000	116.64	17,350,200
94	Folic Acid BP Inj;	Kg	338,750	25.00	8,468,750	27.00	9,146,250	29.16	9,877,950
95	Glacial Acetic Acid BP	Kg	9,750	25.00	243,750	27.00	263,250	29.16	284,310
96	Grape Skin Extract	Kg	10,000	25.00	250,000	27.00	270,000	29.16	291,600
97	Olieic Acid	Kg	7,500	25.00	187,500	27.00	202,500	29.16	218,700
98	Pantothenyl Alcohol (Inj;)	Kg	27,500	25.00	687,500	27.00	742,500	29.16	801,900
99	Peach Flavor	Kg	10,000	25.00	250,000	27.00	270,000	29.16	291,600
100	Pine Oil	Kg	36,625	25.00	915,625	27.00	988,875	29.16	1,067,985
101	Sucrose	Lit	1,813	12,705.00	23,027,813	13.721.40	24,870,038	14,819.11	26,859,641
102	Sunset yellow	Kg	76,000	25.00	1,900,000	27.00	2,052,000	29.16	2,216,160
103	HPMC(Phthalate)BP	Kg	81,875	88.00	7,205,000	95.04	7,781,400	102.64	8,403,912
104	Inositol	Kg	28,000	25.00	700,000	27.00	756,000	29.16	816,480
105	Magnesium Trisilicate BP	Kg	5,000	25.00	125,000	27.00	135,000	29.16	145,800
106	Parachlorometaxylenol	Kg	22,500	25.00	562,500	27.00	607,500	29.16	656,100
107	Pantothenyl Alcohol (Inj)	Kg	27,500	25.00	687,500	27.00	742,500	29.16	801,900
108	Phytomenadione(Vitamin LK1) BP	Kg	2,750	25.00	68,750	27.00	74,250	29.16	80,190
109	Ponceau 4R colour	Kg	5,875	25.00	146,875	27.00	158,625	29.16	171,315
110	Potassium Hydroxide	Kg	4,500	310.00	1,395,000	334.80	1,506,600	361.58	1,627,128
111	Pyridoxine HCL Inj; Grade	Kg	100,000	25.00	2,500,000	27.00	2,700,000	29.16	2,916,00
112	Riboflavine '5' Phoshe Sodium Roche	Kg	174,000	25.00	4,350,000	27.00	4,698,000	29.16	5,073,840

Data Source: RVK Myanmar Co Ltd

Sr. No	Type of Raw Material	Unit	Price per unit	Year 4		Year 5		Year 6 - 30	
				Qty	Value Kyats	Qty	Value Kyats	Qty	Value Kyats
74	PVP(K-30)BP	Kg	21,840	831.41	18,157,993	897.92	19,610,632	969.76	21,179,483
75	Yellow Soft Paraffin	Kg	5,720	1,934.92	11,067,729	2,089.71	11,953,147	2,256.89	12,909,399
76	Wool Fat BP	Kg	38,480	245.64	9,452,375	265.30	10,208,565	286.52	11,025,250

77	Trimethoprim	Kg	43,160	251.94	10,873,834	272.10	11,743,741	293.87	12,683,240
78	Cinnarizine BP/EP	Kg	73,000	31.94	2,298,974	34.01	2,482,892	36.73	2,681,524
78	Diclofenac Sodium BP	Kg	21,875	269.58	5,897,027	291.14	6,368,789	314.44	6,878,292
80	Dichlodrometaxylenol	Kg	11	377.91	4.057	408.15	4,381	440.80	4,732
81	Chlorocresol BP	Kg	30,650	31.49	965,254	34.01	1,042,475	36.73	1,125,873
82	Chloroquine Phosphate BP	Kg	85,510	2,519.42	215,435,946	2,720.98	232,670,822	2,938.66	251,284,488
83	Ciprofloxacin BP	Kg	25,000	31.49	787,320	34.01	850,306	36.73	918,330
84	Doxycycline Hyclate BP	Kg	32,400	302.33	9,795,521	326.52	10,579,162	352.64	11,425,495
85	Haloperidol BP	Kg	83,750	31.49	2,637,522	34.01	2,848,524	36.73	3,076,406
86	Acetone BP	Lit	10,938	352.72	3,857,868	380.94	4,166,497	411.41	4,499,817
87	Albendazole USP	Kg	110,000	31.49	3,464,208	34.01	3,741,345	36.73	4,040,652
88	Thiamine HCL (Inj; Grade)	Kg	100,000	31.49	3,149,280	34.01	3,401,222	36.73	3,673,320
89	Ascorbic Acid BP(Inj; Grade)	Kg	4,500	31.81	143,135	34.35	154,586	37.10	166,952
90	Calcium Pantothenate	Kg	44,863	31.49	1,412,846	34.01	1,525,873	36.73	1,647,943
91	Caster Oil	Kg	15,000	31.49	472,392	34.01	510,183	36.73	550,998
92	Chloropheniramine Maleate (Inj;Grade)	Kg	115,000	31.49	3,621,672	34.01	3,911,406	36.73	4,224,318
93	Fluconazole UDP	Kg	148,750	125.97	18,738,216	136.05	20,237,273	146.93	21,856,255
94	Folic Acid BP Inj;	Kg	338,750	31.49	10,668,186	34.01	11,521,641	36.73	12,443,372
95	Glacial Acetic Aid BP	Kg	9,750	31.49	307,055	34.01	331,619	36.73	358,149
96	Grape Skin Extract	Kg	10,000	31.49	314,928	34.01	340,122	36.73	367,332
97	Olieic Acid	Kg	7,500	31.49	236,196	34.01	255,092	36.73	275,499
98	Pantothenyl Alcohol (Inj;)	Kg	27,500	31.49	866,052	34.01	935,336	36.73	1,010,163
99	Peach Flavor	Kg	10,000	31.49	314,928	34.01	340,122	36.73	367,332
100	Pine Oil	Kg	36,625	31.49	1,153,424	34.01	1,245,698	36.73	1,345,354
101	Sucrose	Lit	1,813	16,004.64	29,008,412	17,285.01	31,329,085	18,667,81	33,835,411
102	Sunset yellow	Kg	76,000	31.49	2,393,453	34.01	2,584,929	36.73	2,791,723
103	HPMC(Phthalate)BP	Kg	81,875	110.85	9,076,225	119.72	9,802,323	129.30	10,586,509
104	Inositol	Kg	28,000	31.49	881,798	34.01	952,342	36.73	1,028,530
105	Magnesium Trisilicate BP	Kg	5,000	31.49	157,464	34.01	170,061	36.73	183,666

106	Parachlorometaxylenol	Kg	22,500	31.49	708,588	34.01	765,275	36.73	826,497
107	Pantothenyl Alcohol (Inj)	Kg	27,500	31.49	866,052	34.01	935,336	36.73	1,010,163
108	Phytomenadione(Vitamin LK1) BP	Kg	2,750	31.49	86,605	34.01	93,534	36.73	101,016
109	Ponceau 4R colour	Kg	5,875	31.49	185,020	34.01	199,822	36.73	215,808
110	Potassium Hydroxide	Kg	4,500	390.51	1,757,298	421.75	1,897,882	455.49	2,049,713
111	Pyridoxine HCL Inj; Grade	Kg	100,000	31.49	3,149,280	34.01	3,401,222	36.73	3,673,320
112	Riboflavine '5' Phoshe Sodium Roche	Kg	174,000	31.49	5,479,747	34.01	5,918,127	36.73	6,391,577

Data Source: RVK Myanmar Co Ltd

Sr. No	Type of Raw Material	Unit	Price per unit	Year 1		Year 2		Year 3	
				Qty	Value Kyats	Qty	Value Kyats	Qty	Value Kyats
113	Sodium Acetate BP	Kg	18,038	25.00	450,938	27.00	487,013	29.16	525.974
114	Sodium Bicarbonate BP (Inj;Grade)	Kg	1,250	25.00	31,250	27.00	33,750	29.16	36,450
115	Sodium Hydroxide BP(Pellet)	Kg	5,325	25.00	133,125	27.00	143,775	29.16	155,277
116	Sodium Lauryl Sulphate	Kg	10,000	25.00	250,000	27.00	270,000	29.16	291,600
117	Sodium Metabisulphate BP	Kg	4,375	25.00	109,375	27.00	118,125	29.16	127,575
118	Tartrazine	Kg	91,000	25.00	2,275,000	27.00	2,457,000	29.16	2,653,560
119	Terpinolene	Kg	4,750	25.00	118,750	27.00	128,250	29.16	138,510
120	Tetracycline HCL BP	Kg	47,500	500.00	23,750,000	540.00	25,650,000	583.20	27,702,000
121	Tetracycline Hcl (Micronised)	Kg	250,000	25.00	6,250,000	27.00	6,750,000	29.16	7,290,000
122	Titanium Dioxide BP	Kg	225,000	25.00	5,625,000	27.00	6,075,000	29.16	6,561,000
123	Tween 80	Kg	4,000	25.00	100,000	27.00	108,000	29.16	116,640
124	Tween 80 (Suitable for Inj;)	Kg	5,625	25.00	140,625	27.00	151,875	29.16	164,025
125	Cefipime	Lit	8,750	25.00	218,750	27.00	236,250	29.16	255,150
126	Spray Ninhydrin	Kg	142,500	25.00	3,562,500	27.00	3,847,500	29.16	4,155,300
127	Sodium-1 pentane sulfonate	Kg	97,500	25.00	2,437,500	27.00	2,632,500	29.16	2,843,100
128	Acetonitrile	Kg	176,250	25.00	4,406,250	27.00	4,758,750	29.16	5,139,450
129	Acetic acid	Kg	2,500	25.00	62,500	27.00	67,500	29.16	72,900
130	Tenofovir Disoproxil Fumarate	Kg	250,000	25.00	6,250,000	27.00	6,750,000	29.16	7,290,000

131	Emtricitabine	Kg	187,500	25.00	4,687,500	27.00	5,062,500	29.16	5,467,500
132	Microcrystalline Cellulose	Kg	27,608	25.00	690,206	27.00	745,422	29.16	805,056
133	Dibasic Calcium Phosphate	Kg	10,375	25.00	902,625	93.96	974,835	101.48	1,052,822
134	Isopropyl Alcohol	ml	5,375	25.00	134,375	27.00	145,125	29.16	156,735
135	Povidone K-30	Kg	15,000	25.00	480,000	34.56	518,400	37.32	559,872
136	Polysorbate 80	Kg	5,000	25.00	125,000	27.00	135,000	29.16	145,800
137	Colloidal Anhydrous Silica	Kg	18,750	25.00	468,750	8.91	506,250	29.16	546,750
138	Sodium Starch Glycollate	Kg	8,500	8.25	70,125	27.00	75,735	9.62	81,794
139	Croscarmellose Sodium	Kg	33,500	25.00	837,500	27.00	904,500	29.16	976,860
140	Indigo carmine	Kg	30,000	25.00	750,000	27.00	810,000	29.16	874,800
141	Isopropyl alcohol	ml	5,000	25.00	125,000	27.00	135,000	29.16	145,800
142	Dichloromethane	ml	15,138	25.00	378,438	27.00	408,713	29.16	441,410
143	Tenofovir Disoproxil Fumarate	Kg	337,500	25.00	8,437,500	27.00	9,112,500	29.16	9,841,500
144	Microcrystalline Cellulose (Avicel pH 102)FM	Kg	9,750	25.00	243,750	27.00	263,250	29.16	284,310
145	Dibasic calcium Phosphate Dihydrate(ENARCHEM)	Kg	10,375	25.00	259,375	27.00	280,125	29.16	302,535
146	Lactose (Dinamix)	Kg	2,500	49.60	124,000	53.57	133,920	57.85	144,634
147	Polysorate 80BP	Kg	3,750	25.00	93,750	27.00	101,250	29.16	109,350
148	Talcum Powder extra white	Kg	3,700	25.00	92,500	27.00	99,900	29.16	107,892
149	Magnesium Stearate(Sunshine)	Kg	2,500	25.00	62,500	27.00	67,500	29.16	72,900
150	Aerosil	Kg	19,000	25.00	475,000	27.00	513,000	29.16	554,040

Data Source: RVK Myanmar Co Ltd

Sr. No	Type of Raw Material	Unit	Price per unit	Year 4		Year 5		Year 6-30	
				Qty	Value Kyats	Qty	Value Kyats	Qty	Value Kyats
113	Sodium Acetate BP	Kg	18,038	31.49	568,051	34.01	613.495	36.73	662,575
114	Sodium Bicarbonate BP (Inj;Grade)	Kg	1,250	31.49	39,366	34.01	42,515	36.73	45,917
115	Sodium Hydroxide BP(Pellet)	Kg	5,325	31.49	167,699	34.01	181,115	36.73	195,604
116	Sodium Lauryl Sulphate	Kg	10,000	31.49	314,928	34.01	340,122	36.73	367,332
117	Sodium Metabisulphate BP	Kg	4,375	31.49	137,781	34.01	148,803	36.73	160,708
118	Tartrazine	Kg	91,000	31.49	2,865,845	34.01	3,095,112	36.73	3,342,721

119	Terpinolene	Kg	4,750	31.49	149,591	34.01	161,558	36.73	174,483
120	Tetracycline HCL BP	Kg	47,500	629.86	29,918,160	680.24	32,311,613	734.66	34,896,542
121	Tetracycline Hcl (Micronised)	Kg	250,000	31.49	7,873,200	34.01	8,503,056	36.73	9,183,300
122	Titanium Dioxide BP	Kg	225,000	31.49	7,085,880	34.01	7,652,750	36.73	8,264,970
123	Tween 80	Kg	4,000	31.49	125,971	34.01	136,049	36.73	146,933
124	Tween 80 (Suitable for Inj;)	Kg	5,625	31.49	177,147	34.01	191,319	36.73	206,624
125	Cefipime	Lit	8,750	31.49	275,562	34.01	297,607	36.73	321,416
126	Spray Ninhydrin	Kg	142,500	31.49	4,487,724	34.01	4,846,742	36,73	5,234,481
127	Sodium-1 pentane sulfonate	Kg	97,500	31.49	3,070,548	34.01	3,316,192	36.73	3,581,487
128	Acetonitrile	Kg	176,250	31.49	5,550,606	34.01	5,994,654	36.73	6,474,227
129	Acetic acid	Kg	2,500	31.49	78,732	34.01	85,031	36.73	91,833
130	Tenofovir Disoproxil Fumarate	Kg	250,000	31.49	7,873,200	34.01	8,503,056	36.73	9,183,300
131	Emtricitabine	Kg	187,500	31.49	5,904,900	34.01	6,377,292	36.73	6,887,475
132	Microcrystalline Cellulose	Kg	27,608	31.49	869,460	34.01	939,017	36.73	1,014,138
133	Dibasic Calcium Phosphate	Kg	10,375	109.59	1,137,048	118.36	1,228,011	127.83	1,326,252
134	Isopropyl Alcohol	ml	5,375	31.49	169,274	34.01	182,816	36.73	197,441
135	Povidone K-30	Kg	15,000	40.31	604,662	43.01	653,035	47.02	705,277
136	Polysorbate 80	Kg	5,000	31.49	157,464	43.54	170,061	36.73	183,666
137	Colloidal Anhydrous Silica	Kg	18,750	31.49	590,490	34.01	637,729	36.73	688,748
138	Sodium Starch Glycollate	Kg	8,500	10.39	88,337	34.01	95,404	12.12	103,037
139	Croscarmellose Sodium	Kg	33,500	31.49	1,055,009	11.22	1,139,410	36.73	1,230,562
140	Indigo carmine	Kg	30,000	31.49	944,784	34.01	1,020,367	36.73	1,101,996
141	Isopropyl alcohol	ml	5,000	31.49	157,464	34.01	170,061	36.73	183,666
142	Dichloromethane	ml	15,138	31.49	476,722	34.01	514,860	36.73	556,049
143	Tenofovir Disoproxil Fumarate	Kg	337,500	31.49	10,628,820	34.01	11,479,126	36.73	12,397,456
144	Microcrystalline Cellulose (Avicel pH 102)FM	Kg	9,750	31.49	307,055	34.01	331,619	36.73	358,149
145	Dibasic calcium Phosphate Dihydrate(ENARCHEM)	Kg	10,375	62.48	326,738	34.01	352,877	36.73	381,107
146	Lactose (Dinamix)	Kg	2,500	31.49	156,204	67.48	168,701	72.88	182,197
147	Polysorate 80BP	Kg	3,750	31.49	118,098	34.01	127,546	36.73	137,750
148	Talcum Powder extra white	Kg	3,700	31.49	116,523	34.01	125,845	36.73	135,913

149	Magnesium Stearate(Sunshine)	Kg	2,500	31.49	78,732	34.01	85,031	36.73	91,833
150	Aerosil	Kg	19,000	31.49	598,363	34.01	646,232	36.73	697,931

Data Source: RVK Myanmar Co Ltd

Sr.No	Type of Raw Material	Unit	Price per unit	Year 1		Year 2		Year 3	
				Qty	Value Kyats	Qty	Value Kyats	Qty	Value Kyats
151	Sodium Starch Glycolate(Promogel)	Kg	4,375	25.00	109,375	27.00	118,125	29.16	127,575
152	Avicel-102	Kg	9,750	25.00	243,750	27.00	263,250	29.16	284,310
153	Sodium lauryl sulphate	Kg	10,000	25.00	250,000	27.00	270,000	29.16	291,600
154	Crosscarmellose Sodium (AC-DISOL)	Kg	33,500	25.00	837,500	27.00	904,500	29.16	976,860
155	S-Amlodipine Besylate	Kg	375,000	25.00	9,375,000	27.00	10,125,000	29.16	10,935,000
156	Microcrystalline Cellulose pH 102	Kg	9,750	25.00	423,750	27.00	263,250	29.16	284,310
157	Sodium Starch Glyccolate	Kg	4,375	25.00	109,375	27.00	118,125	29.16	127,575
158	Colloidal Sillicon Dioxide	Kg	25,000	25.00	625,000	27.00	675,000	29.16	729,000
159	Rabeprazole Sod EC 20mg	Kg	1,875	25.00	46,875	27.00	50,625	29.16	54,675
160	Domeridone 10 mg Pellets	Kg	10,125	25.00	253,125	27.00	273,375	29.16	295,245
161	Orlistat Pellets 120mg	Kg	65,000	25.00	1,625,000	27.00	1,755,000	29.16	1,895,400
162	Cefprozil	Kg	563,750	25.00	14,093,750	27.00	15,221,250	29.16	16,438,950
163	Cefdinir	Kg	356,250	25.00	8,906,250	27.00	9,618,750	29.16	10,388,250
164	Cefixime	Kg	141,250	25.00	3,531,250	27.00	3,813,750	29.16	4,118,850
165	Cefpodoxime	Kg	205,000	25.00	5,125,000	27.00	5,535,000	29.16	5,977,800
166	Cefditoren	Kg	275,000	25.00	6,875,000	27.00	7,425,000	29.16	8,019,000
167	Faropenam Sodium	Kg	125,000	25.00	3,125,000	27.00	3,375,000	29.16	3,645,000
168	Ceftubuten	Kg	375,000	25.00	9,375,000	27.00	10,125,000	29.16	10,935,000
169	Amoxicillin clavulanic Acid	Kg	1,250	25.00	31,250	27.00	33,750	29.16	36,450
170	Amoxycillin+sulbactum	Kg	1,260	25.00	31,250	27.00	33,750	29.16	36,450
171	Deferiprone	Kg	176,250	25.00	4,406,250	27.00	4,758,750	29.16	5,139,450
172	Deferisirox	Kg	1,250	25.00	31,250	27.00	33,750	29.16	36,450
173	Esomeprozole	Kg	430,000	25.00	10,750,000	27.00	11,610,000	29.16	12,538,800
174	Pregabalin	Kg	108,750	25.00	2,718,750	27.00	2,936,250	29.16	3,171,150

175	Gabapentin	Kg	47,500	25.00	1,187,500	27.00	1,282,500	29.16	1,385,100
176	Mecobalmin	Kg	487,500	25.00	12,187,500	27.00	13,162,500	29.16	14,215,500
177	Sevelamer carbonate	Kg	1,875	25.00	46,875	27.00	50,625	29.16	54,675
178	Glimepride	Kg	300,000	25.00	7,500,000	27.00	8,100,000	29.16	8,748,000
179	Glibenclamide	Kg	118,750	25.00	2,968,750	27.00	3,206,250	29.16	3,462,750
180	Rosuvastatin	Kg	306,250	25.00	7,656,250	27.00	8,268,750	29.16	8,930,250
181	Moxifloxacin	Kg	395,000	25.00	9,875,000	27.00	10,665,000	29.16	11,518,200
182	Fenofibrate	Kg	53,750	25.00	1,343,750	27.00	1,451,250	29.16	1,567,350
183	Valsartans	Kg	125,000	25.00	3,125,000	27.00	3,375,000	29.16	3,645,000
184	Irbesartans	Kg	160,000	25.00	4,000,000	27.00	4,320,000	29.16	4,665,600
185	Telmisartan	Kg	168,750	25.00	4,218,750	27.00	4,556,250	29.16	4,920,750
186	Candesartan	Kg	525,000	25.00	13,125,000	27.00	14,175,000	29.16	15,309,000
187	Vildagliptin	Kg	491,250	25.00	12,281,250	27.00	13,263,750	29.16	14,324,850
188	Citicholine	Kg	9,375	25.00	234,375	27.00	253,125	29.16	273,375
189	Perindopril	Kg	412,500	25.00	10,312,500	27.00	11,137,500	29.16	12,018,500

Data Source: RVK Myanmar Co Ltd

Sr.No	Type of Raw Material	Unit	Price per unit	Year 4		Year 5		Year 6-30	
				Qty	Value Kyats	Qty	Value Kyats	Qty	Value Kyats
151	Sodium Starch Glycolate(Promogel)	Kg	4,375	31.49	137,781	34.01	148,803	36.73	160,708
152	Avicel-102	Kg	9,750	31.49	307,055	34.01	331,619	36.73	358,149
153	Sodium lauryl sulphate	Kg	10,000	31.49	314,928	34.01	340,122	36.73	367,332
154	Crosscarmellose Sodium (AC-DISOL)	Kg	33,500	31.49	1,055,009	34.01	1,139,410	36.73	1,230,562
155	S-Amlodipine Besylate	Kg	375,000	31.49	11,809,800	34.01	12,754,584	36.73	13,774,951
156	Microcrystalline Cellulose pH 102	Kg	9,750	31.49	307,055	34.01	331,619	36.73	358,149
157	Sodium Starch Glyccolate	Kg	4,375	31.49	137,781	34.01	148,803	36.73	160,708
158	Colloidal Sillicon Dioxide	Kg	25,000	31.49	787,320	34.01	850,306	36.73	918,330
159	Rabeprazole Sod EC 20mg	Kg	1,875	31.49	59,049	34.01	63,773	36.73	68,875
160	Domeridone 10 mg Pellets	Kg	10,125	31.49	318,865	34.01	344,374	36.73	371,924
161	Orlistat Pellets 120mg	Kg	65,000	31.49	2,047,032	34.01	2,210,795	36.73	2,387,658
162	Cefprozil	Kg	563,750	31.49	17,754,066	34.01	19,174,391	36.73	20,708,343
163	Cefdinir	Kg	356,250	31.49	11,219,310	34.01	12,116,855	36.73	13,086,203

164	Cefixime	Kg	141,250	31.49	4,448,358	34.01	4,804,227	36.73	5,188,565
165	Cefpodoxime	Kg	205,000	31.49	6,456,024	34.01	6,972,506	36.73	7,530,306
166	Cefditoren	Kg	275,000	31.49	8,660,520	34.01	9,353,362	36.73	10,101,631
167	Faropenam Sodium	Kg	125,000	31.49	3,936,600	34.01	4,251,528	36.73	4,591,650
168	Ceftubuten	Kg	375,000	31.49	11,809,800	34.01	12,754,584	36.73	13,774,951
169	Amoxicillin clavulanic Acid	Kg	1,250	31.49	39,366	34.01	42,515	36.73	45,917
170	Amoxycillin+sulbactum	Kg	1,260	31.49	39,366	34.01	41,515	36.73	45,917
171	Deferiprone	Kg	176,250	31.49	5,550,606	34.01	5,994,654	36.73	6,474,227
172	Deferisirox	Kg	1,250	31.49	39,366	34.01	42,515	36.73	45,917
173	Esomeprozole	Kg	430,000	31.49	13,541,904	34.01	14,625,256	36.73	15,795,277
174	Pregabalin	Kg	108,750	31.49	3,424,842	34.01	3,698,829	36.73	3,994,736
175	Gabapentin	Kg	47,500	31.49	1,495,908	34.01	1,615,581	36.73	1,744,827
176	Mecobalmin	Kg	487,500	31.49	15,352,740	34.01	16,580,959	36.73	17,907,436
177	Sevelamer carbonate	Kg	1,875	31.49	59,049	34.01	63,773	36.73	68,875
178	Glimepride	Kg	300,000	31.49	9,447,840	34.01	10,203,667	36.73	11,019,961
179	Glibenclamide	Kg	118,750	31.49	3,739,770	34.01	4,038,952	36.73	4,362,068
180	Rosuvastatin	Kg	306,250	31.49	9,644,670	34.01	10,416,244	36.73	11,249,543
181	Moxifloxacin	Kg	395,000	31.49	12,439,656	34.01	13,434,828	36.73	14,509,615
182	Fenofibrate	Kg	53,750	31.49	1,692,738	34.01	1,828,157	36.73	1,974,410
183	Valsartans	Kg	125,000	31.49	3,936,600	34.01	4,251,528	36.73	4,591,650
184	Irbesartans	Kg	160,000	31.49	5,038,848	34.01	5,441,956	36.73	5,877,312
185	Telmisartan	Kg	168,750	31.49	5,314,410	34.01	5,739,563	36.73	6,198,728
186	Candesartan	Kg	525,000	31.49	16,533,720	34.01	17,856,418	36.73	19,284,931
187	Vildagliptin	Kg	491,250	31.49	15,470,838	34.01	16,708,505	36.73	18,284,931
188	Citicholine	Kg	9,375	31.49	295,245	34.01	318,865	36.73	344,374
189	Perindopril	Kg	412,500	31.49	12,990,780	34.01	14,030,042	36.73	15,152,446

Data Source: RVK Myanmar Co Ltd

Sr. No	Type of Raw Material	Unit	Price per unit	Year 1		Year 2		Year 3	
				Qty	Value kyats	Qty	Value Kyats	Qty	Value Kyats
190	Atorvastatin	Kg	381,250	25.00	9,531,250	27.00	10,293,750	29.16	11,117,250
191	Pyrazinamide	Kg	21,250	25.00	531,250	27.00	573,750	29.16	619,650

192	Anastrazole	Kg	6,875	25.00	171,875	27.00	185,625	29.16	200,475
193	Ebastine	Kg	341,250	25.00	8,531,250	27.00	9,213,750	29.16	9,950,850
194	Sofosbuvir	Kg	187,500	25.00	4,687,500	27.00	5,062,500	29.16	5,467,500
195	Diacerin	Kg	393,750	25.00	9,843,750	27.00	10,631,250	29.16	11,481,750
196	Linezolid	Kg	325,000	25.00	8,125,000	27.00	8,775,000	29.16	9,477,000
197	Sitagliptin	Kg	472,500	25.00	11,812,500	27.00	12,757,500	29.16	13,778,100
198	Choline alfoscerate	Kg	20,000	25.00	500,000	27.00	540,000	29.16	583,200
199	Ibuprofen	Kg	13,375	25.00	334,375	27.00	361,125	29.16	390,015
200	Etoricoxib	Kg	18,750	25.00	468,750	27.00	506,250	29.16	546,750
201	Hydroxyurea	Kg	52,500	25.00	1,312,500	27.00	1,417,500	29.16	1,530,900
202	Clarithromycin	Kg	196,250	25.00	4,906,250	27.00	5,298,750	29.16	5,722,650
203	Azithromycin	Kg	106,250	25.00	2,656,250	27.00	2,868,750	29.16	3,098,250
204	Fabuxostat	Kg	243,750	25.00	6,093,750	27.00	6,581,250	29.16	7,107,750
205	Ursodeoxycholic acid	Kg	9,375	25.00	234,375	27.00	253,125	29.16	273,375
206	Ambroxol	Kg	62,500	25.00	1,562,500	27.00	1,687,500	29.16	1,822,500
207	Taldalafil	Kg	1,250	25.00	31,250	27.00	33,750	29.16	36,450
208	Dapoxetin Hydrochloride	Kg	375,000	25.00	9,375,000	27.00	10,125,000	29.16	10,935,000
209	Dimeticon	Kg	17,500	25.00	437,500	27.00	472,500	29.16	510,300
210	Azithromycin Dyhydrate	Kg	127,50	25.00	3,187,500	27.00	3,442,500	29.16	3,717,900
211	Clarithromycin	Kg	187,500	25.00	4,687,500	27.00	5,062,500	29.16	5,467,500
212	Cyproheptadine	Kg	96,875	25.00	2,421,875	27.00	2,615,625	29.16	2,824,875
213	Amboroxol hydrochloride BP	Kg	69,375	25.00	1,734,375	27.00	1,873,125	29.16	2,022,975
214	Guifenasin	Kg	1,250	25.00	31,250	27.00	33,750	29.16	36,450
215	Salbutamaol sulphate BP	Kg	100,000	25.00	2,500,000	27.00	2,700,000	29.16	2,916,000
216	Amino Acid	Kg	1,875	25.00	46,875	27.00	50,625	29.16	54,675
217	Clarithromycin	Kg	9,975	25.00	249,375	27.00	269,325	29.16	290,871
218	Macragol	Kg	5,000	25.00	125,000	27.00	135,000	29.16	145,800
219	Lactobacillu	Kg	312,500	25.00	7,812,500	27.00	8,437,500	29.16	9,112,500
220	Isabgol	Kg	13,750	25.00	343,750	27.00	371,250	29.16	400,950
221	Diomsectite	Kg	1,870	25.00	46,875	27.00	50,625	29.16	54,675
222	Glucosamine hydrochloride BP	Kg	11,000	25.00	275,000	27.00	297,000	29.16	320,760

223	Ondensetron hydrochloride	Kg	5,750	25.00	143,750	27.00	155,250	29.16	167,670
224	Amikacin sulphate	Kg	4,375	25.00	109,375	27.00	118,125	29.26	127,575
225	Azythromycin Dihydrate	Kg	30,625	25.00	765,625	27.00	826,875	29.26	893,025
226	Montelukast Sodium	Kg	312,500	25.00	7,812,500	27.00	8,437,500	29.16	9,112,500
227	Levetiracetam	Kg	243,750	25.00	6,093,750	27.00	6,581,250	29.16	7,107.750
228	Tranexamic acid	Kg	112,500	25.00	2,812,500	27.00	3,037,500	29.16	3,280,500

Data Source: RVK Myanmar Co Ltd

Sr. No	Type of Raw Material	Unit	Price per unit	Year 4		Year 5		Year 6-30	
				Qty	Value Kyats	Qty	Value Kyats	Qty	Value Kyats
190	Atorvastatin	Kg	381,250	31.49	12,006,630	34.01	12,967,160	36.73	14,004,533
191	Pyrazinamide	Kg	21,250	31.49	669,222	34.01	722,760	36.73	780,581
192	Anastrazole	Kg	6,875	31.49	216,513	34.01	233,834	36.73	252,541
193	Ebastine	Kg	341,250	31.49	10,746,918	34.01	11,606,671	36.73	12,535,205
194	Sofosbuvir	Kg	187,500	31.49	5,904,900	34.01	6,377,292	36.73	6,887,475
195	Diacerin	Kg	393,750	31.49	12,400,290	34.01	13,392,313	36.73	14,463,698
196	Linezolid	Kg	325,000	31.49	10,235.160	34.01	11,053,973	36.73	11,938,291
197	Sitagliptin	Kg	472,500	31.49	14,880,348	34.01	16,070,776	36.73	17,356,438
198	Choline alfoscerate	Kg	20,000	31.49	629,856	34.01	680,244	36.73	734,664
199	Ibuprofen	Kg	13,375	31.49	421,216	34.01	454,913	36.73	491,307
200	Etoricoxib	Kg	18,750	31.49	590,40	34.01	637,729	36.73	688,748
201	Hydroxyurea	Kg	52,500	31.49	1,653,372	34.01	1,785,642	36.73	1,928,493
202	Clarithromycin	Kg	196,250	31.49	6,180,462	34.01	6,674,899	36.73	7,208,891
203	Azithromycin	Kg	106,250	31.49	3,346,110	34.01	3,613,799	36.73	3,902,903
204	Fabuxostat	Kg	243,750	31.39	7,676,370	34.01	8,290,480	36.73	8,953,718
205	Ursodeoxycholic acid	Kg	9,375	31.49	295,245	34.01	318,865	36.73	344,374
206	Ambroxol	Kg	62,500	31.49	1,968,300	34.01	2,125,764	36.73	2,295,825
207	Taldalafil	Kg	1,250	31.49	39,366	34.01	42,515	36.73	45,917
208	Dapoxetin Hydrochloride	Kg	375,000	31.49	11,809,800	34.01	12,754,584	36.73	13,774,951
209	Dimeticon	Kg	17,500	31.49	551,124	34.01	595,214	36.73	642,831
210	Azithromycin Dyhydrate	Kg	127,50	31.49	4,015,332	34.01	4,336,559	36.73	4,683,483
211	Clarithromycin	Kg	187,500	31.49	5,904,900	34.01	6,377,292	36.73	6,887,475

212	Cyproheptadine	Kg	96,875	31.49	3,050,865	34.01	3,294,934	36.73	3,558,529
213	Amboroxol hydrochloride BP	Kg	69,375	31.49	2,184,813	34.01	2,359,598	36.73	2,548,366
214	Guifenasin	Kg	1,250	31.49	39,366	34.01	42,515	36.73	45,917
215	Salbutamaol sulphate BP	Kg	100,000	31.49	3,149,280	34.01	3,401,222	36.73	3,673,320
216	Amino Acid	Kg	1,875	31.49	59,049	34.01	63,773	36.73	68,875
217	Clarithromycin	Kg	9,975	31.49	314,141	34.01	339,272	36.73	366,414
218	Macragol	Kg	5,000	31.49	157,464	34.01	170,061	36.73	183,666
219	Lactobacillu	Kg	312,500	31.49	9,841,500	34.01	10,628,820	36.73	11,479,126
220	Isabgol	Kg	13,750	31.49	433,026	34.01	467,668	36.73	505,082
221	Diomsectite	Kg	1,870	31.49	59,049	34.01	63,773	36.73	68,875
222	Glucosamine hydrochloride BP	Kg	11,000	31.49	346,421	34.01	374,134	36.73	404,065
223	Ondensetron hydrochloride	Kg	5,750	31.49	181,084	34.01	195,570	36.73	211,216
224	Amikacin sulphate	Kg	4,375	31.49	137,781	34.01	148,803	36.73	160,708
225	Azythromycin Dihydrate	Kg	30,625	31.49	964,467	34.01	1,041,624	36.73	1,124,954
226	Montelukast Sodium	Kg	312,500	31.49	9,841,500	34.01	10,628,820	36.73	11,479,126
227	Levetiracetam	Kg	243,750	31.49	7,676,370	34.01	8,290,480	36.73	8,953,718
228	Tranexamic acid	Kg	112,500	31.49	3,542,940	34.01	3,826,375	36.73	4,132,485

Data Source: RVK Myanmar Co Ltd

Sr. No	Type Of Raw Material	Unit	Price per unit	Year 1		Year 2		Year 3	
				Qry	Value Kyats	Qty	Value Kyats	Qty	Value Kyats
229	Tramadol	Kg	18.125	25.00	453,125	27.00	489,375	29.16	528.525
230	Diclofenac sodium BP(Inj;grade)	Kg	23,125	25.00	578,125	27.00	624,375	29.16	674,325
231	Sodium Chloride (Inj;grade)	Kg	1,000	25.00	25,000	27.00	27,000	29.16	29.160
232	Levofloxacin	Kg	37,500	25.00	937,500	27.00	1,012,500	29.16	1,093,500
233	Moxifloxacin	Kg	193,750	25.00	4,843,750	27.00	5,231,250	29.16	5,649,750
234	Ofloxacin	Kg	50,000	25.00	1,250,000	27.00	1,350,000	29.16	1,458,000
235	TRETINOIN	Kg	250,000	25.00	6,250,000	27.00	6,750,000	29.16	7,290,000
236	Mometasone FUROATE USP	Kg	250,000	25.00	6,250,000	27.00	6,750,000	29.16	7,290,000
237	Eflonithine HCL	Kg	11,250	25.00	281,250	27.00	303,750	29.16	328,050
238	MOXIFLOXACIN HCL USP	Kg	187,500	25.00	4,687,500	27.00	5,062,500	29.16	5,467,500

239	Amikacin sulphate (Inj;grade)	Kg	13,750	25.00	343,750	27.00	371,250	29.16	400,950
240	Ofloxacin	Kg	56,250	25.00	1,406,250	27.00	1,518	29.16	1,640,250
241	TIMOLOL MALEATE USP	Kg	412,500	25.00	10,312,500	27.00	11,137,500	29.16	12,028,500
242	Omeprazole pellet	Kg	8,750	25.00	218,750	27.00	236,250	29.16	255,150
243	Methylcobalmin	Kg	225,000	25.00	5,625,000	27.00	6,075,000	29.16	6,561,000
244	Hypromellose	Kg	41,250	25.00	1,031,250	27.00	1,113,750	29.16	1,202,850
245	Triacetin	Kg	3,750	25.00	93,750	27.00	101,250	29.16	109,350
246	Copovidone	Kg	50,000	25.00	1,250,000	27.00	1,350,000	29.16	1,458,000
247	Carnauba Wax	Kg	11,250	25.00	281,250	27.00	303,750	29.16	328,050
248	Methylene Dichloride	Kg	1,250	25.00	31,250	27.00	33,750	29.16	36,450
249	COLLOIDAL ANHYDROUS SILICA	Kg	6,500	25.00	162,500	27.00	175,500	29.16	189,540
250	Sitagliptin Phosphate	Kg	500,000	25.00	12,500,000	27.00	13,500,000	29.16	14,580,000
251	Diabasic Calcium Phosphate	Kg	3,750	25.00	93,750	27.00	101,250	29.16	109,350
252	Sodium stearly fumarate	Kg	93,750	25.00	2,343,750	27.00	2,531,250	29.16	2,733,750
253	Sodium Lautyl Sulfate	Kg	1,250	25.00	31,250	27.00	33,750	29.16	36,450
254	Cefepime	Kg	300,000	25.00	7,500,000	27.00	8,100,000	29.16	8,748,000
255	Faropenem Sodium	Kg	375,000	25.00	9,375,000	27.00	10,125,000	29.16	10,935,000
256	Cefaclor	Kg	187,500	25.00	4,687,500	27.00	5,062,500	29.16	5,467,500
257	Cefuroxime	Kg	282,500	25.00	7,062,500	27.00	7,627,500	29.16	8,237,700
258	Cefpirome sulphate	Kg	375,000	25.00	9,375,000	27.00	10,125,000	29.16	10,935,000
259	Cefoperazone	Kg	437,500	25.00	10,937,500	27.00	11,812,500	29.16	12,757,500
260	Cefoxitin	Kg	250,000	25.00	6,250,000	27.00	6,750,000	29.16	7,290,000
261	Capecitabine	Kg	312,500	25.00	7,812,500	27.00	8,437,500	29.16	9,112,500
262	Hydrochlorice Acid (AR)	Kg	625	25.00	15,625	27.00	16,875	29.16	18,225
263	Liquefied Phenol BP	Kg	27,500	25.00	687,500	27.00	742,500	29.16	801,900
264	Sodium Acetate BP(Inj;Grade)	Kg	1,250	25.00	31,500	27.00	33,750	29.16	36,450
265	Lactose Anhydrous	Kg	10,250	25.00	256,250	27.00	276,750	29.16	298,890
266	Rabeprazole Sodium	Kg	2,125	25.00	53,125	27.00	57,375	29.16	61,965
267	Sodium Stearyl Fumarate	Kg	81,250	25.00	2,031,250	27.00	2,193,750	29.16	2,369,250
268	Cross Caramellose Sodium	Kg	5,125	25.00	128,125	27.00	138,375	29.16	149,445

269	Caramel/Pink Size 1 hard gelatin Capsules	Pcs	3	12,000.00	36,000	12,960.00	38,880	13,996.80	41,990
270	Yellow/Yellow Size 2 hard gelatin Capsules	Pcs	3	12,000.00	36,000	12,960.00	38,880	13,996.80	41,990
271	White/White Size 2 hard gelatin capsules	Pcs	3	12,000.00	36.000	12,960.00	38.880	13,996.80	41,990
272	Yellow/Yellow Size3 hard gelatin capsules	Pcs	3	12,000.00	36.000	12,960.00	38,880	13,996.80	41,990
273	Sodium Starch Glycolate	Kg	2,500	25.00	62,500	27.00	67,500	29.16	72,900

Data Source: RVK Myanmar Co Ltd

Sr. No	Type Of Raw Material	Unit	Price per unit	Year 4		Year 5		Year 6-30	
				Qty	Value Kyats	Qty	Value Kyats	Qty	Value Kyats
229	Tramadol	Kg	18.125	31.49	570,807	34.01	616,472	36.73	665,789
230	Diclofenac sodium BP(Inj;grade)	Kg	23,125	31.49	728,271	34.01	786,533	36.73	849,455
231	Sodium Chloride (Inj;grade)	Kg	1,000	31.49	31,493	34.01	34,012	36.73	36,733
232	Levofloxacin	Kg	37,500	31.49	1,180,980	34.01	1,275,458	36.73	1,377,495
233	Moxifloxacin	Kg	193,750	31.49	6,101,730	34.01	6,589,868	36.73	7,117,058
234	Ofloxacin	Kg	50,000	31.49	1,574,640	34.01	1,700,611	36.73	1,836,660
235	TRETINOIN	Kg	250,000	31.49	7,873,200	34.01	8,503,056	36.73	9,183,300
236	Mometasone FUROATE USP	Kg	250,000	31.49	7,873,200	34.01	8,503,056	36.73	9,183,300
237	Eflonithine HCL	Kg	11,250	31.49	354,294	34.01	382,638	36.73	413,249
238	MOXIFLOXACIN HCL USP	Kg	187,500	31.49	5,904,900	34.01	6,377,292	36.73	6,887,475
239	Amikacin sulphate (Inj;grade)	Kg	13,750	31.49	433,026	34.01	467,668	36.73	505,082
240	Ofloxacin	Kg	56,250	31.49	1,771,470	34.01	1,913,188	36.73	2,066,243
241	TIMOLOL MALEATE USP	Kg	412,500	31.49	12,990,780	34.01	14,030,042	36.73	15,152,446
242	Omeprazole pellet	Kg	8,750	31.49	275,562	34.01	297,607	36.73	321,416
243	Methylcobalmin	Kg	225,000	31.49	7,085,880	34.01	7,652,750	36.73	8,264.970
244	Hypromellose	Kg	41,250	31.49	1,299,078	34.01	1,403,004	36.73	1,515,245
245	Triacetin	Kg	3,750	31.49	18,098	34.01	127,546	36.73	137,750
246	Copovidone	Kg	50,000	31.49	1,574,640	34.01	1,700,611	36.73	1,836,660
247	Carnauba Wax	Kg	11,250	31.49	354,294	34.01	382,638	36.73	413,249

248	Methylene Dichloride	Kg	1,250	31.49	339,366	34.01	42,515	36.73	45,917
249	COLLOIDAL ANHYDROUS SILICA	Kg	6,500	31.49	204,703	34.01	221,079	36.73	238,766
250	Sitagliptin Phosphate	Kg	500,000	31.49	15,746,400	34.01	17,006,112	36.73	18,366,601
251	Diabasic Calcium Phosphate	Kg	3,750	31.49	118,098	34.01	127,546	36.73	137,750
252	Sodium stearly fumarate	Kg	93,750	31.49	2,952,450	34.01	3,118,646	36.73	3,443,738
253	Sodium Lautyl Sulfate	Kg	1,250	31.49	39,3666	34.01	42,515	36.73	45,917
254	Cefepime	Kg	300,000	31.49	9,447,840	34.01	10,203,667	36.73	11,019,961
255	Faropenem Sodium	Kg	375,000	31.49	11,809,800	34.01	12,754,584	36.73	13,774,951
256	Cefaclor	Kg	187,500	31.49	5,904,900	34.01	6,377,292	36.73	6,887,475
257	Cefuroxime	Kg	282,500	31.49	8,896,716	34.01	9,608,453	36.73	10,377,130
258	Cefpirome sulphate	Kg	375,000	31.49	11,809,800	34.01	12,754,584	36.73	13,774,951
259	Cefoperazone	Kg	437,500	31.49	13,778,100	34.01	14,880,348	36.73	16,070,776
260	Cefoxitin	Kg	250,000	31.49	7,873,200	34.01	8,503,056	36.73	9,183,300
261	Capecitabine	Kg	312,500	31.49	9,841,500	34.01	10,628,820	36.73	11,479,126
262	Hydrochlorice Acid (AR)	Kg	625	31.49	19,683	34.01	21,258	36.73	22,958
263	Liquefied Phenol BP	Kg	27,500	31.49	866,052	34.01	935,336	36.73	1,010,163
264	Sodium Acetate BP(Inj;Grade)	Kg	1,250	31.49	39,366	34.01	42,515	36.73	45,917
265	Lactose Anhydrous	Kg	10,250	31.49	322,801	34.01	348,625	36.73	376,515
266	Rabeprazole Sodium	Kg	2,125	31.49	66,922	34.01	72,276	36.73	78,058
267	Sodium Stearyl Fumarate	Kg	81,250	31.49	2,558,790	34.01	2,763,493	36.73	2,984,573
268	Cross Caramellose Sodium	Kg	5,125	25.00	128,125	27.00	138,375	29.16	149,445
269	Caramel/Pink Size 1 hard gelatin Capsules	Pcs	3	12,000.00	36,000	12,960.00	38,880	13,996.80	41,990
270	Yellow/Yellow Size 2 hard gelatin Capsules	Pcs	3	12,000.00	36,000	12,960.00	38,880	13,996.80	41,990
271	White/White Size 2 hard gelatin capsules	Pcs	3	12,000.00	36.000	12,960.00	38.880	13,996.80	41,990
272	Yellow/Yellow Size3 hard gelatin capsules	Pcs	3	12,000.00	36.000	12,960.00	38,880	13,996.80	41,990
273	Sodium Starch Glycolate	Kg	2,500	25.00	62,500	27.00	67,500	29.16	72,900

Data Source: RVK Myanmar Co Ltd.

3.5.2 *Type and Capacity of Production*

The goods to be produced are planned as 61 units of the existing products and 165 units as new molecules of different kinds of medicinal products under the categories of i) Tablets, ii) Capsules, iii) Small Volume Parental (Injections), iv) Large Volume Parental (Injections), v) Oral Liquids, vi) Oral Powder, vii) Betalactam Oral, viii) Betalactam Injection, and viiii) Ophthalmi.

The production of Pharmaceuticals will be gradually increased in the first phase of 10 years and next phases from year 11 to year 30. The raw materials, some of the machineries or equipment and spare parts will be imported and the pharmaceutical products manufactured in the factory under the study project, in the first phase is to be for army issue (Military Hospital, Government Hospital supply) and domestic sale. The system of local sales from Year 1 to Year 5 is 100% for both existing products and new molecule products, but from Year 6 to Year 30 is local sale 80 % and export 20% for existing products and local sale 90 % and export 10% for new molecule products.

Table 19. Current Production Capacity and Estimated Capacity after Renovation

	DESCRIPTION	PRODUCT	CAPACITY	CAPACITY (After Upgrading)
1.	Oral Solid Dosage Form	Tablet and Capsule	40 millions/mth	60 millions/mth
2.	Oral Solid (Beta Lactam)	Tablet and Capsule	2-3 millions/mth	4 millions/mth
3.	Oral Powder	Sachet	1,000,000-1,200,000 sac/mth	1.5 millions/mth
4.	Oral Liquid	100 ML/Bottle	70,000 Bot/mth	90,000 Bot:/mth
5.	Ophthalmic	Tube	48,000 tubes/mth	60,000 tubes/mth
6.	Powder for Injection	Vial	33,612 vial/mth	39,612 vial/mth
7.	Large Volume Parenteral Solution	Plastic Bottle	72,000 Bot:/mth	200,000 Bot:/mth
8.	Small Volume Parenteral Solution	Ampoule	200,000 Amp/mth	350,000 Amp/mth

Data Source: RVK Myanmar Co Ltd

Table 20. Current Production statement

No.	Item	A/U	2022-2023
1.	Tablet and Capsule	Ton	130.00
2.	Beta Oral	Ton	19.60
3.	Oral Liquid	Liter	22,100
4.	Oral Powder	Ton	1,474
5.	Beta Injection	Ton	0.80
6.	Small Volume Parenteral Solution	Liter	930
7.	Ophthalmic	Ton	1.363
8.	Large Volume Parenteral Solution	Liter	51,950
9.	DAP (Liquid)	Liter	31,000

Data Source: RVK Myanmar Co Ltd

RVK Group of Companies facilitates technology transfers for new products from India, leveraging its R&D facility in the country. In addition to its Indian R&D operations, RVK maintains a local R&D team in Myanmar dedicated to the technical transfer process and the development of new drugs. Given that RVK focuses solely on formulation activities in Myanmar, without engaging in chemical alterations, it minimizes environmental pollution.

Product Transportation and Distribution

The finished products packaged in appropriate containers are sent to the storage warehouse within the factory compound. Additionally, pharmaceutical finished products are transported from the factory to their destinations via trucks.

Storage Method

Tablets, Capsules, Oral Liquids, Oral Powder:

- Store in temperature-controlled warehouses with appropriate ventilation.
- Maintain storage temperatures within recommended ranges specified by regulatory guidelines.
- Utilize organized shelving or racks to prevent packaging damage.

Small Volume Parenteral (Injections), Large Volume Parenteral (Injections), Betalactam Oral, Betalactam Injection:

- Store in dedicated temperature-controlled areas.
- Implement FIFO (first in first out) inventory system and adhere to strict hygiene protocols.

Ophthalmic Products:

- Store in separate area with controlled temperature and humidity levels.
- Use specialized storage containers to prevent light exposure.
- Conduct regular inspections for packaging integrity and cleanliness.

	
Finished Good Warehouse	Cold Storage

Table 21. Existing Products to be produced

No	Description	Unit	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10-30
I.	**Tablets and Capsule**											
1	Bevit Tablet	100's Bottle	200,000	220,000	242,000	266,200	292,820	307,461	322,834	338,976	355,925	373,721
2	Cevit Tab	100's Bottle	300,000	330,000	363,000	399,300	439,230	461,192	484,251	508,464	533,887	560,581
3	Burplex Tablet	100's Bottle	150,0000	165,000	181,500	199,650	219,615	230,596	242,126	254,232	266,943	280,291
4	Ribovit Tab	100's Bottle	150,000	165,000	181,500	199,650	219,615	230,596	242,126	254,232	266,943	280,291
5	Folic Acid Tab	100's Bottle	400,000	440,000	484,000	532,400	585,640	614,922	645,668	677,952	711,849	747,442
6	Behexavit Tab	100's Bottle	100,000	110,000	121,000	133,100	146,410	153,731	161,417	169,488	177,962	186,860
7	Metronidazole Tab	100's Bottle	50,000	55,000	60,500	66,550	73,205	76,865	80,709	84,744	88,981	93,430
8	Penicillin V Tab	100's Bottle	100,000	110,000	121,000	133,100	146,410	153,731	161,417	169,488	177,962	186,860
9	Flumoxy 500mg Capusle	10x10's Box	50,000	55,000	60,500	66,550	73,205	76,865	80,709	84,744	88,981	93,430
10	Amlodipine Tab	10x10's Box	200,000	220,000	242,000	266,200	292,820	307,461	322,834	338,976	355,925	373,721
11	Metformin Tab	10x10's Box	75,000	82,500	90,750	99,825	109,808	115,298	121,063	127,116	133,472	140,145
12	Burmeton Tablet	100's Bottle	200,000	220,000	242,000	266,200	292,820	307,461	322,834	338,976	355,925	373,721
13	Cetirzine Tablet	10x10's Box	50,000	55,000	60,500	66,550	73,205	76,865	80,709	84,744	88,981	93,430
14	Cream f Magnisia	100's Bottle	100,000	110,000	121,000	133,100	146,410	153,731	161,417	169,488	177,962	186,860
15	Tetracycline Eye Ointment	tube	200,000	220,000	242,000	266,200	292,820	307,461	322,834	338,976	355,925	373,721
16	Carbocistein Capsule	10x10's Box	13,700	15,070	16,577	18,235	20,058	21,061	22,114	23,220	24,381	25,600
17	Atenolol Tablet	100's Bottle	16,000	17,600	19,360	21,296	23,426	24,597	25,827	27,118	28,474	29,898
18	Carbimazole Tablet	100's Bottle	15,600	17,160	18,876	20,764	22,840	23,982	25,181	26,440	27,762	29,150
19	Allopurinol Tablet	10x10's Box	36,000	39,600	43,560	47,916	52,708	55,343	58,110	61,016	64,066	67,270
20	Cotrimoxazole Tab	100's Bottle	48,000	52,800	58,080	63,888	70,277	73,791	77,480	81,354	85,422	89,693
21	Repaglinide Tab	100's Bottle	11,800	12,980	14,278	15,706	17,276	18,140	19,047	20,000	21,000	22,050
22	Enalapril Tab	10x10's Box	17,200	18,920	20,812	22,893	25,183	26,442	27,764	29,152	30,610	32,140
23	Paracetamol Caplet	100's Bottle	79,200	87,120	95,832	105,415	115,957	121,755	127,842	134,234	140,946	147,993
24	Aspirin Tab Chewable	100's Bottle	24,100	26,510	29,161	32,077	35,285	37,049	38,902	40,847	42,889	45,033
25	Ciprofloxacin Caplet	10x10's Box	14,000	15,400	16,940	18,634	20,497	21,522	22,598	23,728	24,915	26,160
26	Flucloxacin Capsule	10x10's Box	36,100	39,710	43,681	48,049	52,854	55,497	58,272	61,185	64,244	67,457
27	Amoxicillin capsule	10x10's Box	20,000	22,000	24,200	26,620	29,282	30,746	32,283	33,898	35,592	37,372
28	Gelmag Tab	50's Bottle	50,000	55,000	60,500	66,550	73,205	76,865	80,709	84,744	88,981	22,423
29	Chlorofos	100's Bottle	20,000	22,000	24,200	26,620	29,282	30,746	32,283	33,898	35,592	22,423
30	Diclofenac	100's Bottle	12,000	13,200	14,520	15,972	17,569	18,448	19,370	20,339	21,355	22,423

31	Albendazole	1x1 Box	12,000	13,200	14,520	15,972	17,569	18,448	1,370	20,339	21,355	22,423
32	Fluconazole	10x10's Box	12,000	13,200	14,520	15,972	17,569	18,448	19,370	20,339	21,355	22.423
33	Doxycycline Capsule	10x10's Box	12,000	13,200	14,520	15,972	17,569	18,448	19,370	20,339	21,355	22,423
34	Cinnarizine	10x10's Box	10,000	11,000	12,100	13,310	14,641	15,373	16,142	16,949	17,796	18,686
35	Tetracycline Capsule	10x10's Box	20,000	22,000	24,200	26,620	29,282	30,746	32,283	33,898	35,592	37,372
36	Haloperidol	10x10's Box	10,000	11,000	12,100	13,310	14,641	15,373	16,142	16,949	17,796	18,686
II.	**Small Volume Parentral**											
37	Cevit Injection	vial	12,000	13,200	14,520	15,972	17,569	18,448	19,370	20,339	21,355	22,423
38	Burmeton Injection	Ampoule	12,000	13,200	14,520	15,972	17,569	18,448	19,370	20,339	21,355	22,423
39	Behexavit Injection	Ampoule	12,000	13,200	14,520	15,972	17,569	18,448	19,370	20,339	21,355	22,423
40	Water or Injection	Ampoule	100,000	110,000	121,000	133,100	146,410	153,731	161,417	169,488	177,962	186,860
41	Burplex Forte Injection	Ampoule	12,000	13,200	14,520	15,972	17,569	18,448	19,370	20,339	21,355	22,423
42	Folic Acid Injection	Ampoule	12,000	13,200	14,520	15,972	17,569	18,448	19,370	20,339	21,355	22,423
43	Phytomenadione Injection	Ampoule	12,000	13,200	14,520	15,972	17,569	18,448	19,370	20,339	21,355	22,423
44	Ceftriaxone Injection+wfi	vial	65,000	71,500	78,650	86,515	95,167	99,925	104,921	110,167	115,675	121,459
45	Cefotaxime	vial	45,500	50,050	55,055	60,561	66,617	69,947	73,445	77,117	80,973	85,021
46	Benzyl Pencillin(10's)	vial	27,900	30,690	33,759	37,135	40,848	42,891	45,035	47,287	49,651	52,134
	Liquid											
47	Aseptol	500ml Bottle	20,000	22,000	24,200	26,620	29,282	30,746	32,283	33,898	35,592	37,372
III	**Oral Powder**											
48	Oral Rehydration Salts Flavored1L	Sachet	500,000	550,000	605,000	665,500	732,050	768,653	807,085	847,439	889,811	934,302
49	Cal-D Glucose	450g sachet	60,000	66,000	72,600	79,860	87,846	92,238	96,850	101,93	106,777	112,116
50	Oral Rehydration Salts	20,5g sachet	500,000	550,000	605,000	665,500	732,050	768,653	807,085	847,439	889,811	934,302
51	Electrolyte Beverage	20.5g sachet	500,000	550,000	605,000	665,500	732,050	768,653	807,085	847,439	889,811	934,302
52	Oral Rehydration Salts Flavored 250ml	Sachet	1,000,000	1,100,000	1,210,000	1,331,000	1,464,100	1,537,305	1,614,170	1,694,879	1,779,623	1,868,604
53	Oral Rehydration Salts	27.9g sachet	12,000,000	13,200,000	14,520,000	15,972,000	17,569,200	18,447,660	19,370,043	20,338,545	21,355,472	22,423,246
IV	**Oral Liquid**											

54	Burplex Elixir	100ml Bottle	173,000	190,300	209,330	230,263	253,289	265,954	279,251	293,214	307,875	323,268
55	Paracetamol Eixir	100ml Bottle	55,000	60,500	66,550	73,205	80,526	84,552	88,779	93,218	97,879	102,773
V	**Large volume parentral**											
56	Dextrose 25% Injection	vial	50,000	55,000	60,500	66,550	73,205	76,865	80,709	84,744	88,981	93,430
57	1/2 DPS Dextrose 2.5% Sodium Chloride 0.45%	Bottle	72,000	79,200	87,120	95,832	105,415	110,686	116,220	122,031	128,133	134,539
58	PS/NS(Sodium Chloride 0.9%Solution)	500ml Bottle	275,000	302,500	332,750	366,025	402,628	422,759	443,897	466,092	489,396	513,866
59	D5W-Dextrse 5% Solution	500ml Bottle	275,000	302,500	332,750	366.025	402,628	422,759	443,897	466,092	489,396	513,866
60	DNS/DPS(Dextrose 5% and Sodium Chloride 0.9% Solution)	500ml Bottle	335,000	368,500	405,350	445,885	490,474	514,997	540,747	567,784	596,174	625,982
61	Ringer Lactate	500ml Bottle	335,000	368,500	405,350	445,885	490,474	514,997	540,747	567,784	596,174	625,982

Data Source: RVK Myanmar Co Ltd

Table 22. New Molecules to be produced

No	Description	Unit	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10-30
I.	**CEPHALOSPORINS**											
1	Cefdinir capsule 300	10x10's Box		12,000.00	14,400.00	17,280.00	20,736.00	22,809.60	25,090.56	26,345.09	27,662.34	29,045.46
2	Cefaclor susp	Bottle		12,000.00	14,400.00	17,280.00	20,736.00	22,809.60	25,090.56	26,345.09	27,662.34	29,045.46
3	Cefdinir sachets	Sachet		12,000.00	14,400.00	17,280.00	20,736.00	22,809.60	25,090.56	26,345.09	27,662.34	29,045.46
4	Cefditoren dry syrup	Packet		12,000.00	14,400.00	17,280.00	20,736.00	22,809.60	25,090.56	26,345.09	27,662.34	29,045.46
5	Cefditoren tabs 200	10x10's Box		12,000.00	14,400.00	17,280.00	20,736.00	22,809.60	25,090.56	26,345.09	27,662.34	29,045.46
6	Cefepime 1gm	Box		12,000.00	14,400.00	17,280.00	20,736.00	22,809.60	25,090.56	26,345.09	27,662.34	29,045.46
7	Cefepime 2gm	Box		12,000.00	14,400.00	17,280.00	20,736.00	22,809.60	25,090.56	26,345.09	27,662.34	29,045.46
8	Cefixime100mg	10x10's Box		12,000.00	14,400.00	17,280.00	20,736.00	22,809.60	25,090.56	26,345.09	27,662.34	29,045.46
9	Cefixime200mg	10x10's Box		12,000.00	14,400.00	17,280.00	20,736.00	22,809.60	25,090.56	26,345.09	27,662.34	29,045.46

10	Cefixime 400mg	10x10's Box		12,000.00	14,400.00	17,280.00	20,736.00	22,809.60	25,090.56	26,345.09	27,662.34	29,045.46
11	Cefixime susp	Packet			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27
12	Cefpodoxime 200mg	10x10's Box			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40		11,525.98	12,102.27
13	Cefoperazone+sulbactum1.5gm	Box			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27
14	Cefoperazone+sulbactum2 gm	Box			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27
15	Cefotaxime1 gm	Box			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27
16	Cefotaxime 2gm	Box			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27
17	Cefoxitin inj	Box			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27
18	Cefpirome 1mg	Box			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27
19	Cefpodoxime distab	Box			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27
20	Cefpodoxime sachets	Box			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27
21	Cefpodoxime tab 100mg	10x10's Box			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27
22	Cefpodoxime susp 125mg/5ml	Packet			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27
23	Cefprozil tablet 500mg	10x10's Box			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27
24	Cefprozil tablets 250mg	10x10's Box			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27
25	Ceftazidime 1 gm	Box			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27
26	Ceftzidime 2gm	Box				6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98
27	Ceftriaxone 1gm	Box				6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98
28	Ceftriaxone 2gm	Box				6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98
29	Ceftubuten 200	10x10's Box				6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98
30	Cefuroxime 1.5mg	Box				6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98
31	Cefuroxime750mg	Box				6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98
32	Faropenam tabs 200mg	10x10's Box				12,000.00	14,400.00	17,280.00	19,008.00	20,908.80	21,954.24	23,051.95
33	Faropenam tabs 400mg	10x10's Box				12,000.00	14,400.00	17,280.00	19,008.00	20,908.80	21,954.24	23,051.95
II	**BETALACTAMS**											
34	Amoxy sachet	Sachet				6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98
35	Amoxycillin+flucloxacillin	10x10's Box				6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98
36	Amoxycillin+sulbactum	10x10's Box				6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98
37	Amoxyclav	10x10's Box		12,000.00	14,400.00	17,280.00	20,736.00	22,809.60	25,090.56	26,345.09	27,662.34	29,045.46
38	Amoxyclav 1gm tablets	10x10's Box		6,000.00	7,200.00	8,640.00	10,368.00	11,404.80	12,545.28	13,172.54	13,831.17	14,522.73
39	Amoxyclav distab	10x10's Box			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27
40	Amoxyclav sachet	Sachet			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27
41	Amoxyclav sachet	Sachet			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27
42	Amoxyclav susp 30ml	Bottle			6,000.00	7,201.20	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27
43	Amoxyclav tablet 625	10x10's Box		12,000.00	14,400.00	17,280.00	20,736.00	22,809.60	25,090.56	26,345.09	27,662.34	29,045.46

44	Amoxyclav susp Orals(tablets/capsules)	Bottle		12	14,400.00	17,280.00	20,736.00	22,809.60	25,090.56	26,345.09	27,662.34	29,045.46
45	Ambroxol	10x10's Box			12,000.00	14,400.00	17,280.00	19,008.00	20,908.80	21,954.24	23,051.95	24,204.55
46	Amlodipin+atrovastatin	10x10's Box		30,000.00	36,000.00	43,200.00	51,840.00	57,024.00	62,726.40	65,862.72	69,155.86	72,613.65
47	Anastrazole tablet	10x10's Box		30,000.00	36,000.00	43,200.00	51,840.00	57,024.00	62,726.40	65,862.72	69,155.86	72,613.65
48	Azithromycin 250g	10x10's Box			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27
49	Azithromycin 500mg	10x10's Box			12,000.00	14,400.00	17,280.00	19,008.00	20,908.80	21,954.24	23,051.95	24,204.55
50	Calcium with Viamin D3	10x10's Box			12,000.00	14,400.00	17,280.00	19,008.00	20,908.80	21,954.24	23,051.95	24,204.55
51	Candesartan	10x10's Box		12,000.00	14,400.00	17,280.00	20,736.00	22,809.60	25,090.56	26,345.09	27,662.34	29,045.46
52	Capecitabine Tablet	10x10's Box			12,000.00	14,400.00	17,280.00	19,008.00	20,908.80	21,954.24	23,051.95	24,204.55
53	Choline alfoscerate	10x10's Box			12,000.00	14,400.00	17,280.00	19,008.00	20,908.80	21,954.24	23,051.95	24,204.55
54	Citicholine	10x10's Box			12,000.00	14,400.00	17,280.00	19,008.00	20,908.80	21,954.24	23,051.95	24,204.55
55	Clarithromycin tablet 250	10x10's Box			12,000.00	14,400.00	17,280.00	19,008.00	20,908.80	21,954.24	23,051.95	24,204.55
56	Clarithromycin tablet 500	10x10's Box			12,000.00	14,400.00	17,280.00	19,008.00	20,908.80	21,954.24	23,051.95	24,204.55
57	Dapoxetin	10x10's Box		6,000.00	7,200.00	8,640.00	10,368.00	11,404.80	12,545.28	13,172.54	13,831.17	14,522.73
58	Deferiprone	10x10's Box		6,000.00	7,200.00	8,640.00	10,368.00	11,404.80	12,545.28	13,172.54	13,831.17	14,522.73
59	Deferisirox tablets	10x10's Box		6,000.00	7,200.00	8,640.00	10,368.00	11,404.80	12,545.28	13,172.54	13,831.17	14,522.73
60	Diacerin	10x10's Box		6,000.00	7,200.00	8,640.00	10,368.00	11,404.80	12,545.28	13,172.54	13,831.17	14,522.73
61	Ebastine tablet	10x10's Box				6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98
62	Erdostein 300gm	10x10's Box				6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98
63	Esomeprozole Mumps 40mg	10x10's Box				6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98
64	Esomperozole+domeridone	10x10's Box					6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12
65	Esomperozole pellet 40mg	10x10's Box					6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12
66	Etoricoxib	10x10's Box					6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12
67	Fabuxostat	10x10's Box		6,000.00	7,200.00	8,640.00	10,368.00	11,404.80	12,545.28	13,172.54	13,831.17	14,522.73
68	Fenofibrate 160mg	10x10's Box		6,000.00	7,200.00	8,640.00	10,368.00	11,404.80	12,545.28	13,172.54	13,831.17	14,522.73
69	Gabamet(Gabapentin300mg an	10x10's Box		6,000.00	7,200.00	8,640.00	10,368.00	11,404.80	12,545.28	13,172.54	13,831.17	14,522.73
70	Gabapentin 300mg	10x10's Box		12,000.00	14,400.00	17,280.00	20,736.00	22,809.60	25,090.56	26,345.09	27,662.34	29,045.46
71	Hydroxyrea	10x10's Box		6,000.00	7,200.00	8,640.00	10,368.00	11,404.80	12,545.28	13,172.54	13,831.17	14,522.73
72	Ibuprofen+paracetamol	10x10's Box			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27
73	Irbesartans				6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27
74	Iron combination with folic acid				6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27
75	Itraconzole			30,000.00	36,000.00	43,200.00	51,840.00	57,024.00	62,726.40	65,862.72	69,155.86	72,613.65
76	Levofloxacin tablet 250mg			30,000.00	36,000.00	43,200.00	51,840.00	57,024.00	62,726.40	65,862.72	69,155.86	72,613.65
77	Levofloxacin Tablet 500mg			6,000.00	7,200.00	8,640.00	10,368.00	1,404.80	12,545.28	13,172.54	13,831.17	14,522,73

78	Levofloxacin tablet 750mg	10×10′s Box		6,000.00	7,200.00	8,640.00	10,368.00	11,404.80	12,545.28	13,172.54	13,831.17	14,522.73
79	LInezoid 600	10×10′s Box		6,000.00	7,200.00	8,640.00	10,368.00	11,404.80	12,545.28	13,172.54	13,831.17	14,522.73
80	Magnesium+almunium hydroxide	10×10′s Box				6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98
81	Metformin+Glibenclamide	10×10′s Box				12,00.00	14,400.00	17,280.00	19,008.00	20,908.80	21,954.24	23,051.95
82	Metformin+glimepride	10×10′s Box				6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98
83	Moxifloxacin tablets 400mg	10×10′s Box				6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98
84	Omeprozole	10×10′s Box						6,000.00	7,200.00	8,640.00	9,504.00	9.979.20
85	Omeprozole+Domperidone	10×10′s Box						6,000.00	7,200.00	8,640.00	9,504.00	9.979.20
86	Slimgat-120(Orlistat Capsules6	10×10′s Box						6,000.00	7,200.00	8,640.00	9,504.00	9.979.20
87	Slimgar-120(Orlistat Capsules1	10×10′s Box			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27
88	Paracetamol+tramadol	10×10′s Box			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27
89	Perindopril	10×10′s Box			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27
90	Pregabalin 150mg	10×10′s Box			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27
91	Pregabalin 50mg	10×10′s Box			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27
92	Pregabalin 75mg	10×10′s Box			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27
93	Pyrazinamide Tablet	10×10′s Box					6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12
94	Rabeprazole Capsules 20mg	10×10′s Box					6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12
95	Rabidef D-Rabeprazole 20mg&	10×10′s Box					6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12
96	Rosuvastatin tablet 10mg	10×10′s Box					6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12
97	Rosuvastatin tablet 20mg	10×10′s Box					6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12
98	S amlodipine 2.5mg	10×10′s Box					6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12
99	S amlodipoine 5mg	10×10′s Box					6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12
100	S amlodipoine+HCTZ Tablet	10×10′s Box					6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12
101	Sevelamer carbonate	10×10′s Box					6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12
102	Sitaglo-25 Sitagliptin	10×10′s Box		3,000.00	3,600.00	4,320.00	5,184.00	5,702.40	6.272.64	6,586.27	6,915.59	7,261.36
103	Sitaglo-50	10×10′s Box		3,000.00	3,600.00	4,320.00	5,184.00	5,702.40	6.272.64	6,586.27	6,915.59	7,261.36
104	Sitaglo-100	10×10′s Box		3,000.00	3,600.00	4,320.00	5,184.00	5,702.40	6.272.64	6,586.27	6,915.59	7,261.36
105	Sofosbuvir	10×10′s Box		3,000.00	3,600.00	4,320.00	5,184.00	5,702.40	6.272.64	6,586.27	6,915.59	7,261.36
106	Taldalafil	10×10′s Box		6,000.00	7,200.00	8,640.00	10,368.00	11,088.00	12,545.28	13,172.54	13,831.17	14,522.73
107	Taldalafil+Dapoxetin	10×10′s Box			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12.102.27
108	Telmisartan	10×10′s Box			7,000.00	8,400.00	10,080.00	11,088.00	12,196.80	12,806.64	13,446.97	14,119.32
109	Hepazol-E(Tenofovir Disoproxil Fumatate 300mg& Emtricitabine 200mg Tablets)	10×10′s Box			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27

110	Hepazol-Tenofovir Disoproxil	10×10's Box			10,000.00	12,000.00	14,400.00	15,840.00	17,424.00	18,295.20	19,209.96	20,170.46
111	Tenofovir tab 300mg Tablet	10×10's Box			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27
112	Ursodeoxycholic acid	10×10's Box		6,000.00	7,200.00	8,640.00	10,368.00	11,404.80	12,545.28	13,172.54	13,831.17	14,522.73
113	Valsartans	10×10's Box		6,000.00	7,200.00	8,640.00	10,368.00	11,404.80	12,545.28	13,172.54	13,831.17	14,522.73
114	Vidagliptin	10×10's Box		6,000.00	7,200.00	8,640.00	10,368.00	11,404.80	12,545.28	13,172.54	13,831.17	14,522.73
115	Vitamin B complex tablets	10×10's Box		6,000.00	7,200.00	8,640.00	10,368.00	11,404.80	12,545.28	13,172,54	13,931.17	14,522.73
III	**Liquid**	10×10's Box		6,000.00	7,200.00	8,640.00	10,368.00	11,404.80	12,545.28	13,172.54	13,831.17	14,522.73
116	Aminoacid drops 60ml						10,368.00					
117	Aminoacid syp 60ml	10×10's Box		6,000.00	7,200.00	8,640.00	10,368.00	11,404.80	12,545.28	14,172.54	13,831.17	14,522.73
118	Aythromycin syp 15ml	10×10's Box		6,000.00	7,200.00	8,640.00	10,368.00	11,404.80	12,545.28	13,172.54	13,831.17	14,522.73
119	Clarithromycin susp 60ml	10×10's Box		6,000.00	7,200.00	8,640.00		11,404.80	12,545.28	13,172.54	13,831.17	14,522.73
120	Cough syp(amboroxol ,Guifenasin,salbutamol)60ml	10×10's Box				12,000.00	14,400.00	17,280.00	19,008.00	20,908.80	21,954.24	23,051.95
121	Cyproheptadine(elkana)60ml	10×10's Box				6,000.00	7,200.00	8,640.00	9,504.00	10,454,40	10,977.12	11,525.98
122	Dizzo drops 15ml	10×10's Box				6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98
123	Dizzo syp 60ml	10×10's Box				6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98
124	Montelukast Susp	10×10's Box				6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98
125	MV syp 60ml	10×10's Box						6,000.00	7,200.00	8,640.00	9,504.00	9,979.20
126	Zinc OD syp 30ml							6,000.00	7,200.00	8,640.00	9,504.00	9,979.20
IV	**Sachets**							6,000.00	7,200.00	8,640.00	9,504.00	9,979.20
127	Acetylcsytiene	Packet										
128	Antacid sachet	Packet			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27
129	Diomsectite	Packet			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27
130	Glucosamine+chondriotion	Packet					7,000.00	8,400.00	10,080.00	11,088.00	12,196.80	12,806.64
131	Isabgol	Packet					12,000.00	14,400.00	17,280.00	19,008.00	20,908.80	21,954.24
132	lactobacillus+vitamin	Packet			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27
133	Macragol	Packet			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.80	12,102.27
134	Macragol plus	Packet					6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12
V	**Injections**						5,000.00	6,000.00	7,200.00	7,920.00	8,712.00	9,147.60
135	Amikacin injection											
136	Bupivicaine injection	Box			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27
137	Ciprofloxacin 200 100 ml	Box			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12	11,525.98	12,102.27
138	Citicoline 500mg/2ml	Bottle			12,000.00	14,400.00	17,280.00	19,008.00	20,908.80	21,954.24	23,051.95	24,204.55
139	Diclofenac inj	Box			12,000.00	14,400.00	17,280.00	19,008.00	20,908.80	21,954.24	23,051.95	24,204.55

140	Edaravone	Box			12,000.00	14,400.00	17,280.00	19,008.00	20,908.80	21,954.24	23,051.95	24,204.55
141	Levitracetam inj	Box						6,000.00	7,200.00	8,640.00	9,504.00	9,979.20
142	Levofloxacin inf 500mg	Box						6,000.00	7,200.00	8,640.00	9,504.00	9,979.20
143	Levofloxacin inf 750mg	Bottle		10,000.00	12,000.00	14,400.00	17,280.00	19,008.00	20,908.80	21,954.24	23,051.95	24,204.55
144	Metronidazole 100ml	Bottle		6,000.00	7,200.00	8,640.00	10,360.00	11,404.80	12,545.28	13,172.54	13,831.17	14,522.73
145	Moxifloxacin inf 400	Bottle		6,000.00	7,200.00	8,640.00	10,360.00	11,404.80	12,545,28	13,172.54	13,831.17	14,522,73
146	Multivitamin inj	Bottle		12,000.00	14,400.00	17,280.00	20,736.00	22,809.60	25,090.56	26,345.09	27,662.34	29,045.46
147	Sodium Chloride inj	Box		6,000.00	7,200.00	8,640.00	10,368.00	11,404.80	12,545.28	13,172.54	13,831.17	14,522.73
148	Ofloxacin ing 100ml	Box					12,000.00	14,400.00	17,280.00	19,009.00	20,908.80	21,954.24
149	Ondensetron 4mg/2ml	Bottle					6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12
150	Ondensetron 8mg/2ml	Box					1,000.00	1,200.00	1,440.00	1,584.00	1,742.40	1,829.52
151	Purified water 750 ml	Box					6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10,977.12
152	Tramadol inj	Bottle				6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	11,499.84	12,074.83
153	Tranxamic acid	Box				6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	11,499.84	12,074.83
154	Vitamin D3	Box				6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	11,499.84	12,074.83
155	Water for inj 5 ml	Box				6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	11,499.84	12,074.83
156	Water for inj 10ml	Box				6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	11,499.84	12,074.83
VI	**Ointments**											
157	Isotretinione cream	Box				6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	11,499.84	12,074.83
158	Mometasone cream	Box			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10.977.12	11.525.98	12,102.27
159	Eflonithine cream	Box				6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	11,499.84	12,074.83
VII	**Eye drops**											
160	Amixacin eye drops				6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10.977.12	11,525.98	12,102.27
161	Ciprofloxacin eye drop	Box			6,000.00	7,200.00	8,640.00	9.504.00	10,454.40	10.977.12	11,525.98	12,102.27
162	Moxifloxacin eye drop	Box			6,000.00	7,200.00	8,640.00	9,504.00	10,454.40	10.977.12	11,535.98	12,102.27
163	Occumol eye drop	Box					6,000.00	7,200.00	8,640.00	9.504.00	9,979.20	10,478.16
164	Ofloxacin +Dexa eye drops	Box					6,000.00	7,200.00	8,640.00	9.504.00	9,979.20	10,478.16
165	Methylated Spirit	Bottle					6,000.00	7,200.00	8,640.00	9.504.00	9,979.20	10,478.16

Data Source: RVK Myanmar Co Ltd


ANTI-BACTERIAL


ANTI-BACTERIAL


ANTI-BACTERIAL


ANTI-BACTERIAL


ANTI-HISTAMINE
ANTI-DIABETES


CALCIUM ANTAGONIST
BETA ADRENOCEPTOR ANTAGONIST


VITAMINS


VITAMINS

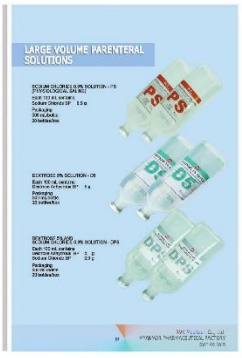

VITAMINS
ENERGY SUPPLEMENT


ANTI-FUNGAL
DISINFECTANT (ANTISEPTIC)

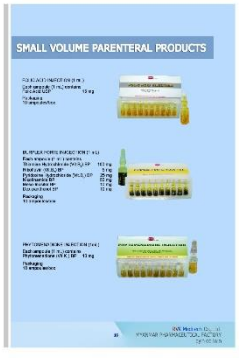

ANALGESIC


ANTACID
LAXATIVE


ANTHELMINTIC
XANTHINE OXIDASE INHIBITOR


LARGE VOLUME PARENTERAL SOLUTIONS


LARGE VOLUME PARENTERAL SOLUTIONS


SMALL VOLUME PARENTERAL PRODUCTS

3.5.2 *The Factory Operating Hours*

The employees, Foreign Expert and technicians, are working in 1 shift a day in the factory. Factory Operation is (5) working days a week and (7:30) working hours a day. There will be only one working shifts as follows:

3.5.4 Number of Working Shifts

Table 23. Number of Working Shifts

Monday to Friday		
8:00 am - 11:30 am	(3:30) hours	Working
11:30 am - 12:30 pm	(1) hour	For Lunch and Rest
12:30 pm - 16:30 pm	(4) hours	Working
16:30 pm – 17:00 pm	(30) minutes	Rest
17:00 pm – 19:00 pm	(2) hours	Overtime (if required)
Saturday and Sunday	**whole day off**	

Data Source: RVK Myanmar Co Ltd

3.6 Types of Production Equipment and Machines

The running machineries are already included in the lease contract from the Myanmar Pharmaceutical Factory but still some necessary machineries, 41 sets in total, of modernized equipment such as High-Performance Liquid Chromatography and various columns, Gas Chromatography etc. are going to be imported from various countries, in accordance to our requirement with machine performance and specification. Only the Brand-new machinery, equipment and spare parts will be imported. The import countries are included Japan, India, China.

Table 24. Types of Production Equipment

No.	Type of Machine	Quantity
	Machinery for β-Lactam Oral Solid Department	
1	Steam Jacketted Vessel (300L)	1
2	Duplex Mixer	2
3	Comminuting (Kneader)	1
4	Tablet Friability Tester	1
5	Tablet Filling Machine	1
6	Drying Oven	1
7	Rotary Granulator	1
8	Fluid Bed Dryer	1
9	Blister Packing Machine	1
10	Capsule Filling Machine	1
11	Air Compressor	1
12	Platform Scale	2
13	Platform Balance	2
14	Electric Balance	1
15	Capsule Polishing Machine	1
16	Capsule Filling Machine BOSCH 6 KF400 (i) size 0 mould (ii)size 1 mould (iii)size 2 mould (iv)size 3 mould	1
17	Hardness Tester UPJHON	1
18	Dust Collector DHE MYUNG ENGINEERING	1
19	Granulator	1
20	Dust Collector Ohm electric 900mm x 600mmx 1200mm	1
21	Blister Packing Machine DPP-250 (i) size 0 mould (ii) size 1 mould	1
22	Vibrator Controller	1

23	Automatic Capsule Filling Machine NJP-1200 (i) Dust collector - 1 No (ii) Polishing machine - 1 No (iii) size 0 & 1 mould (iv) dosing rods	1
24	Dust collector	1
	Machinery For β-Lactam Injection Department	
1	Dehumidifier	4
2	Electronic Balance	1
3	Platform Balance	1
4	Electronic Top Balance	1
5	Electronic Top Balance	1
6	Ampoule Washing Machine Semiautomatic S/S Showering Ampoule Machine with Accessories	2
7	Drying Oven (0-250·C)	2
8	Autoclave with accessories	1
9	Rubber Insert washing machine with accessories	1
10	Distill Water Plant (Multi-Effect) with accessories	1
11	Demineralization water plant with accessories	1
12	Constant pressure deminerlized water supply system including 5000L.D.P.E Storage Tank and Accessories Storage Tank	1
13	Vial Screw machine with accessories (Vial Filling & Insterting Machine)	1
14	Sticker Label Machine	1
15	Sticker Label Machine	1
16	Sticker Label Machine	1
17	Sticker Label MachineTAEYANG	1
18	Date Stamping Machine	1
19	Dosing Pump	1
20	Dosing Pump	1
21	Inspection Coveyors	2
	Machinery for Tablet/Capsule	
1	Water Distiller	1
2	Demineralized Water	2
3	Blender	2
4	Blender	1
5	Film Coating Machine	2
6	Capsule Filling Machine	2
7	Soft-Gel Capsule	1
8	Blister Packing Machine	5

9	Sifting Machine*	3
10	Stream Jacketted Vessel(300L)	2
11	Duplex Mixer	2
12	Oil Bath Heater*	2
13	Comminuting (kneader)	4
14	Tablet Friability Tester	1
15	Tablet Filling Machine	3
16	Thickness Tester (Micro Meter)	3
17	Refrigerator	1
18	Fluid Bed Dryer	3
19	Drying Oven	4
20	Air Compressor	4
21	Strip Packing Machine	4
22	Electric Kettle*	3
23	Tablet Press M/C	4
24	Tablet Press M/C compress M/C	2
25	Tablet Press M/C compress M/C	2
26	Granulating and Mixing Machine (High Speed)	2
27	Tablet Disintergration Test Appratus Model AVMDT-2	2
28	Castor Mounted S.S Container (250L)	8
29	Castor Mounted S.S Container (100L)	16
30	Castor Mounted S.S Container (50L)	18
31	Caster Mounted S.S Container(20L)	18
32	Tablet Dissolution Time Tester, Type-DT 606/1000 H H	2
33	Open-Drum Type High-Strength Aluminium Alloy Process	500 sets
34	Machanical Stirrer 1.0HP (ACE)	6 units
35	Punch&Die	22 sets
36	Top Pen Balance	2
37	HNS Singapore ဆေးပြားပုံဖော်ကိရိယာ(3^10)	10 Items
38	Hand Counter (6/10)	20
39	Hand Counter (10/10)	2
1	Capsule inspection machine	1
2	Oil Free Air Compressor GRH 50 HANSHIN	1
3	Air Dryer XD-50 ANSHIN	1
4	Granulator (DT)	1

5	Air Compressor (Atlas Copo)	1
6	Tablet Compression m/c (India) (1) 10 mm NC Tablet (i) upper punch - 59 Nos (ii) lower punch - 60 Nos (iii) die - 60 Nos (2) 15 x 8 mm (i) upper punch - 60 Nos (ii) lower punch - 60 Nos (iii) die - 60 Nos	1
7	Vaccum Cleaner HITACHI	1
8	High Speed Mixer SE JONG	1
9	Tablet Inspection conveyor KOREA	1
10	Deduster	1
11	Film Coating Machine Assy; (MANCHESTY)	1
12	Drum Mixer and 4 Tanks KOREA	1
13	Dust Collector	1
14	Dust Collector	1
15	Tablet Press Machine KTM 3300	1
16	Auto Loader (Korea)	3
17	Blister Machine Hong A Corporation (MINISTAR S8) (i) upper & lower preheat mould (ii)upper & lower forming mould (iii) lower cooling plate (iv) size "00"upper & lower sealing mould (v)guide rail - 6 pcs (vi) tray for manual feeding-2 pcs (vii) punching tool	1
18	Packing Line (Tablet counting ,filling, plastic inserting & capping)	1
19	Film Coating Machine	1
20	Blister Packing Mahince WIDER A II (i) socket for lot No - 2 pcs	1
21	Drum Lifter KOREA	1
22	Metal detector LOCK METALCHEK	1
23	Metal detector SAFELINE	1
24	Auto Loader	1
25	Disintegrator	1
26	Spray Pump	1
	Machinery for Galanical Production (Oral Powder)	
1	Peerless mixer (Fitted with 5kg bowl)	1

2	Turbo drum mixer (Fitted with 100kgx2 drums)	1
	Tumbler mixer or Drum Mixer	
3	Powder Dryer (Electrically heated, Dry oven	1
4	Peerless Mixer (Fitted with 20kg bowl)	1
5	Comminuting Mill	2
6	Transfer Pump (Lobe)1.5HP	2
7	Semi Pneumatic Filling Machine	2
8	Fully Automatic Tube Filling Machine(10-15gm)	1
1	Lifter	1
2	Double Cone Mixer KOREA	2
3	Blender	1
4	Date Stamping Machine	2
5	Powder Packing Filling Machine DXDF	1
	Local	
1	ORS Filling & Packing Machine	15
2	Drying Oven	1
3	Homogenizer	2
4	Plastic Sealing Machine	1
5	Cal D Filling Machine	2
6	Drying Oven	2
7	Drum mixer, Blender (China)	2
8	Manual filling machine	1
9	Manual printing machine	1
	Machinery for Oral Liquid Department	
1	Top Pen Balance (AVM-EWT-3 KA)	2
2	Steam Jacketted Pan with motor stirrer	1
3	Steam Jacketted Pan with motor stirrer (S.S Container)1000Lit	2
4	Steam Jacketted Pan with motor stirrer (S.S Container)750Lit	1
6	Mixing Tank with motor stirrer S.S (container - Gratuated in 100L) 2500L	2
7	Liquid Filter Pump 1000L/hr	2
8	Transfer Pump 1000Lit/hr	2
9	Process Stainless Steel Container (graduated - in 100L)1000L	10
10	Process Stainless Steel Container (graduated - in 100L)2000L	2
11	Process Stainless Steel Container (graduated - in 100L)500L	2
12	Liquid Filling Machine (4 Nozzies)500ml bottles 20Nos/min	1

13	Liquid Filling Machine (6 Nozzies)100-120 ml bottles 36Nos/min	1
14	Liquid Filling Machine (2Nozzies)15-50ml bottles 24Nos /min	1
15	Automatic Top Sealing and Capping Machine1800pcs/hr	3
16	Mechanical Stirres with motor (mobile)/HP	2
1	Manual Bottle Washing Machine KOREA	1
2	Date Stamping Machine	1
	Local	
1	Laminar Flow Hood Class 100% 4 nozzle & 6 nozzles	2
	Laboratory Instrument and Equipments (Quality Control Department)	
1	Electronic Top Loading Balance (Top Pen)	6
2	Spectrophotofluorimeter (6200)	1
3	Moisture Testing Apparatus for Tabletting Process Control	1
4	Moisture Testing Apparatus	1
5	Muffle Furnace (LEF-115S)	2
6	SH 30t Orbital Shaker (SH 30t)	2
7	Anemometer(C-400,6120.00N)	1
8	Compound Microscope (WF-10X)	1
9	Scientific Freezer (BT-30 FS-4)	1
10	Refrigerator (Kirsh, super 720)	2
11	High Performance Liquid Chromatography (GBC-LC 1205 K) *	1
12	Rapid Digester (Kjeldahl apparatus) (Labconco 65410, Rapid Still II) COLE PARMER	1
13	TLC Chambers (WHEATOL) Developping Tank	5
14	TLC Plate Preparator	1
15	Drying and Sterilization Ovens "Conterm SELECTA (A: 5.2, W-1200)	2
16	Oven, Drying and Sterilisation Oven "Conterm" SELECTA (A:4, W-920)	1
17	Laboratory Water Still (W 4000)	1
18	Ductless Fume Hood Safety Flow Standard-ESCO (ADC-4, ESCO Smart)	1
19	Ductless Fume Hood Safety Flow Standard-ESCO (ADC-4, ESCO Smart)	1
20	Micrometer (0-25MM)	1
21	Autoclave (PRESOCLAVE 30)	1
22	Accessories	1

23	Particle Size Analyzer for Powder (CIS 50)	1
24	UV-Visible Spectrophotometer (UV-1700 Pharmaspec)	1
25	Fourier Transform Infrared Spectrophotometer FT-IR-8400 S)	1
26	Gas Chromatography (GC-14B)	1
27	Polarimeter (RSP-3)	1
28	Centrifuge (REMI-R-24)	1
29	Vortex Mixer (CM-101)	3
30	PH Meter (F-51)	1
31	PH Meter (CL-54)	1
32	PH Meter Digital 2 Decimals (CL-54)	1
33	PH Meter (PHS-3B)	2
34	Refractometer (WYA-2S)	1
35	UV Lamp (UVGL-25)	1
36	Digital Potentiometric Titrator Apparatus (Automatic Titrator)	1
37	Automatic Karl-Fischer Titrator Apparatus (VEEGO/MATIC-I)	1
38	Digital Tablet Dissolution Test Apparatus (ERWEKA DT-600)	2
39	Laboratory Vacuum Drying Oven Digital (EYS-27)	1
40	Vacuum Drying Oven (Round)	1
41	Rotary High Vacuum Pump	1
42	Water Bath 6 Places (203 RTCA)	2
43	Water Bath 6 Places (203 RTCA)	1
44	Water Bath 6 Places (DSB 1000, 220V)	1
45	Tablet Hardness Tester (TBH-220)	1
46	Precision Digital Melting/ Boiling Point (VMP-D, 39/0804)	1
47	Viscosity Tube 'U'(A, B,C,D,E,F,G,H)	8
48	Magnetic Stirrer with Hot Plate (TMA 2071)	2
49	Magnetic Stirrer	2
50	Electric Hot Plate (20 TC)	2
51	Liquid Particle Counter, automatic parenteral (9703 CE)	1
52	Micro Colony Counter (LAPI 2)	1
53	Shaker Water Bath (RSB-12, Remin)	1
54	Bacteriological Incubator Chamber (60 ASS)	1
55	Analytical Balance Readability 0.01 mg (APX 200)	2
56	Analytical Balance Readability 0.1 mg	2
57	Disintegration Time Tester (17/0804, VEEGO)	1

58	Lab Glass Ware	indefinite
59	Lab Chemical	indefinite
60	Exaust Fan (5/10)	2nos
61	Small animal Lab (10/10)	1 Lot
1	Incubator SAMHEUNG INSTRUMENTS, INCUBATOR JBI 302	2
2	life Tester FINE SCIENTIFIC INSTRUMENTS FLT-400SI	1
3	Centrifuge BACKMAN J 6B	1
4	Stability Chamber (MTH-2200T)	1
5	Nikon Microscope	1
6	HPLC	1
7	Disintegrator (BJ-2)	1
8	Soxhlent Exctrator	1
9	Quartz Cell	1
10	N2 KjeldahI	1
11	D2 Lamp	1
	Machinery for Ophthalmic	
1	Top Pen Balance	1
2	Platform Balance (Division 100g)	1
3	Platform Balance	1
4	Membrane Filter holder 293 mm	1
5	Bottle and 5g Tube washing machine with accessories	1
6	Oven (Dryer) Truck In-Type (0-250˚C) electrical heated with accessories 75 cuft	1
7	(a) EO gas Sterillzer for plastic with accessories	1
	(b) Steam Sterilizer with accessories (Portable autoclave)	1
8	Contanier Orientation, Filling Nozzle Placing and Capping Line with accessories (Eye Drop Filling M/C)	1
9	Ointment Plant (Homogenizer) (For Mixing Base and active ingredients) with accessories	1
10	Ointment Plant (Homogenizer) (For Mixing Base and active ingredients) with accessories	1
11	Tripple Roller For grinding & Homogenizing of active ingredients and Eye Ointment Base (with accessories)	1
12	Tube Filling and Crimping Machine with accessories	1
13	HEPA Filter &Laminar Flow Cabinet with accessories	1
14	Screw Type Oil-Free Air Compressor Complete with air Tank and accessories	1
15	Steam Pan (Preparation tank Fitted with top-entry Stirrer with accessories) (Material Compounding Pot)	1
16	Filtration Vessel (Pressure Tank) with accessories	1

17	Compounding Vessel (Eye Ointment Base Mixing Vessel Including Stirrer & Heating accessories for Heating Ointment Base Up to 110˚C (Material Compound Pot)	1 LOT
	Machinery For Sterile Production (Injection) (S.V.P.S)	
1	Ampoule Ultrasonic Washing M/C with accessories	3
2	S/S Steel Ampoule Water Extractor (with accessories)	2
3	Stainless Steel Container	2
4	Mixing Vessel	1
5	Stainless Steel Storage Tank Material Compounding pot	1
6	Filter Press with Accessories	2
7	Membrane Holder	2
8	Pressure Tank (Pressure Vessel)	2
9	Liquid Transfer Pump	2
10	Free Steaming Sterilizer (Koch Sterilizer)	1
11	Vacuum Pump	3
12	Automatic Ampoule Filling Machine	4
13	Protable Autoclave	1
14	Repid Spray Cooling Programmed Autoclave	2
15	Ampoule Printing Machine Conveyor Line	5lines
16	Quick Drying ink Printer	1LOT
17	Ampoule Inspection machine with	2
18	Eye Viewer (Ampoule Inspection M/C)	1
19	Screw Type Oil-Free Air Compressor Complete with air tank and accessories	2
20	Automatic multi-effect distilled water still with accessories	1
21	Demineralization water plant (Double R.O System) with Accessories	1
22	Steam Heated Distilled water still with accessories	2
23	Clean Room equipment with accessories	1
24	Stirrer (Mechanically Stirrer with motor)	2
25	Vial Washing Machine with accessories	1
26	Oven (Dryer) Truck In-Type (0-250˚C)	2
27	Rubber Insert washing machine	1
28	Vial Screw machine with accessories (Filling&Inserting M/C)	1
29	Vial Filling Machine with accessories	1
30	Clean Room equipment with accessories	1

31	Distill Water Still (Multi-effect) with accessories	1
32	Vial Washing Machine with accessories	1
33	Oven (Dyer)Truck In-type(0-250'C) Electrical Heated with Accessories	2
34	Tray For Drying Vial with accessories	250 nos
35	Constant pressure deminerlized water supply system	1
36	including 5000LS/S 316Lstorage with temperature controller with accessories	
37	Vial Capping Machine with accessories	1
38	(a) Clean Room equipment including HEPA Filters, baromentric dampers. Lighting Fixtures, Electrical Equioment & central air conditioning Unit with accessories (b)Air Showering Room with accessories	2
39	Constant pressure demineralized water supply system including 5000 LDPE	1
40	Constant pressure distilled water supply system including1000L	1
41	Perforated S/S Ampoule Tray for Drying and Sterillization of varioussize of Ampoule	150 nos
42	Constant pressure distilled water supply system (Heat exchanger for cooling 5000L)	1
43	Constant Pressure Distilled Water Supply System(5000L)	1
44	Platform Scale	3
45	Analytical Electronic Balance	2
1	Temperature Control Chamber	1
2	Auto Clave	1
3	Pure Steam Generator FP 200 FAC KOREA	1
4	Auto Washing Machine RW 300 ROTA	1
5	Auto Filling Machine BAUSH& STROBEL	1
6	Semi Auto Ampoule Filling Machine	1
7	Mixing Vessel (100L)	1
8	Nitrogen Generator SPEC	1
9	Oxygen Generator	1
10	Auto Drying Machine	1
11	Laminar Flow Hood DWYER	1
	Machinery For Liquid Infusion (Dextrose) (L.V.P.S)	
1	Plastic Blow moulding Machine and accessories	5
2	Mixer	1
3	Hot water shower sterilizer	4
4	Steam sterilizer	2

5	Hot Air Sterilizer	1
6	Water chiller and accessories	5
7	Spot Air cooles with accessories	5
8	Multi effect distallation plant with accessories	2
9	Storage Tank for Distilled water &accessories	2
10	Pure Steam unit with accessories	1
11	Heat Exchanger	1
12	Stainless Steel.Vessel with stirrer and accessories	2
13	Stainless Steel.Vessel with stirrer and accessories	2
14	Stainless Steel.Vessel *	2
15	Fiter Press	2
16	Cartridge Filter unit with Housing	4
17	Solution Transfer Pump	2
18	Rotary Bottle washing machine with accessories	2
19	Automatic solution Filling Rubber Inserting and	2
20	Aluminium capping machine with accessories	2
21	Crusher	1
22	Leack Testing Device with accessories	2
23	Canveyor Bench with accessories	2
24	Clean Room Equipment with accessories	1
25	Liquid Eye viewer with Accessories	2
26	Cooling Tower and accessories	2
27	Transfer Pump	2
28	Process Control Equipment	1lot
29	Weight Checking Scale	3
30	Intravenous Infusion Solution (5/10)	1
31	သွေးကြောသွင်းဆေးဘူးတင်စင် (9^10)	5
32	Pyrex Bottle (2/12)	10
33	Pyrex Bottle (2/12)	48
34	Pyrex Bottle (2/12)	15
35	Pyrex Bottle (2/12)	7

Data Source: RVK Myanmar Co Ltd

Table 25. Yearly Investment and Capital Cost of Machinery & Equipment

Sr No	Description	Equality USD	Remark
1	Machineries, Equipments and others (Import+ Local)	2,000,000.00	30 years
2	Working capital	3,000,000.00	
	Total	5,000,000.00	

Data Source: RVK Myanmar Co Ltd

Remarks:
(1) Equality capital of USD 5,000,000 in total, out of which allocation is as follows:
(a)USD 3,000,000 as a start up and working capital
(b)USD 2,000,000 for Capex

Table 26. List of Machineries (spare parts) to be imported

Sr No	Description	Unit	Qty	Price (USD) per Unit	Amount (USD)
1	HPLC column for new product	Pcs	37	1,000.00	37,000.00
2	Milli Q	Pcs	1	25,250.00	25,250.00
3	Gas Chromatography	Set	1	57,708.00	57,708.00

Data Source: RVK Myanmar Co Ltd

3.7 Manpower

There will be about (500) employees and (6) Foreign Experts and technicians, when in full swing but currently (368) employees and (1) Foreign Expert, are working in 1 shift a day in the factory.

Table 27. Manpower Requirement Plan for factory

Sr:	Types	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
	Local Employee	**Number**	**Number**	**Number**	**Number**	**Number**	**Number**	**Number**	**Number**	**Number**	**Number**
1	Accountant	-	-	-	1	2	2	4	2	2	5
2	Administration Manager	-	-	1	1	1	1	1	1	1	1
3	Administrative Assistant	-	-	-	-	-	-	-	1	-	-
4	Area Sales Manager	-	-	-	-	-	1	3	1	-	-
5	Area Sales Manager (LM)	-	-	1	1	1	1	1	1	-	-
6	Area Sales Manager (UM)	-	-	-	1	1	2	2	1	-	-
7	Assistant Account Manager	-	-	-	-	-	1	1	1	-	-
9	Assistant Boiler Operator	-	-	-	-	-	-	-	1	1	1
10	Assistant Engineer	-	-	-	-	-	-	-	1	-	1
11	Assistant Factory Manager	1	1	1	1	1	1	1	1	1	1
12	Assistant Manager	30	30	30	30	28	26	25	24	23	24
13	Assistant Product Manager	-	-	-	-	-	1	1	1	-	-
14	Assistant Supervisor	49	49	49	48	45	40	33	32	31	32
15	Assistant Tender Manager	-	-	1	1	1	1	1	1	-	-

16	Boiler Operator	-	-	-	-	-	-	1	-	-	-
17	Brand Manager (OTC)	-	-	-	-	1	-	-	1	-	-
18	Business Development	-	-	-	-	-	2	1	1	-	-
19	Chief Accountant	-	1	1	1	1	1	1	1	-	1
20	Chief Executive Officer	1	1	1	1	1	1	1	1	1	1
21	Commercial and Marketing Head	-	-	-	1	-	1	1	1	-	-
22	Commercial Head (Lower Myanmar)	-	-	-	-	1	1	1	1	-	-
23	Commercial Head (POM Upper	-	-	-	-	1	1	1	1	-	-
24	Content Writer & Graphic Designer	-	-	-	-	-	-	-	1	-	-
25	Delivery and Cash Collection	-	-	-	-	-	-	-	2	-	-
26	Deputy Factory Manager	1	1	1	1	1	1	1	1	1	1
27	Deputy General Manager/Factory Director	1	1	1	1	1	1	1	1	1	1
28	Director of Manufacturing	-	1	1	-	-	-	-	-	-	-
29	Driver	3	3	3	4	5	6	5	3	3	5
30	Engineering Assistant	-	-	1	1	1	1	1	1	4	1
31	Executive Assistant	-	-	-	-	1	2	2	3	-	-
32	Factory Assistant	-	-	45	45	45	45	28	22	13	22

33	Factory Manager (Admin)	-	-	-	1	1	1	1	1	1	1
34	Finance Executive	-	-	1	1	-	-	-	-	-	-
35	Financial Controller	-	-	1	1	1	1	1	1	1	1
36	General Labour	14	23	23	46	34	31	18	16	14	16
37	General Labour (MPF)	20	15	15	15	15	15	14	12	12	12
38	General Manager (Commercial)	-	1	1	1	1	1	1	1	1	1
39	Graphic Designer	-	-	-	-	1	1	1	3	-	-
40	Head of Driver	-	-	1	1	1	1	1	1	-	-
41	Housekeeper	-	-	1	2	2	2	3	3	1	1
42	HR & Admin Assistant	-	-	-	1	1	-	-	-	-	-
43	HR Manager	-	-	-	1	1	1	1	1	-	-
44	Invoicing II	-	-	-	-	-	-	-	1	-	-
45	IT Officer	-	1	1	1	1	1	1	1	1	1
46	Junior Accountant	-	-	1	1	1	1	1	-	-	-
47	Key Account Executive	-	-	-	-	1	2	3	2	-	-
48	Key Account Manager	-	1	1	1	1	1	1	1	1	-
49	Landscaping Staff	-	-	-	-	-	-	2	3	3	3
50	Logistics Assistant	-	-	1	1	1	1	1	1	1	1
51	Manager	14	14	15	15	13	12	11	11	12	11
52	Manager (Client Management cum	-	1	1	1	1	-	-	-	-	-
53	Marketing Executive	-	-	-	-	-	-	-	3	-	-
54	Medical Representative	-	3	28	26	35	29	26	22	-	-
55	National OTC Head	-	-	-	1	1	1	1	1	-	-

56	National Sales Manager	-	-	-	-	1	-	2	1	-	-
57	Office Helper	-	-	-	-	-	-	-	1	-	-
58	**Operations Manager**	**-**	**-**	**-**	**-**	**1**	**1**	**1**	**1**	**-**	**-**
61	Procurement Accountant	-	-	-	1	1	1	1	1	1	1
62	Procurement Assistant	-	-	1	-	1	1	1	1	1	1
63	Procurement Executive	-	-	-	1	1	1	1	1	1	1
64	Procurement Manager	1	1	1	1	1	1	1	1	1	1
65	Product and Portfolio Executive	-	-	-	1	2	-	-	2	-	-
66	Product Executive (OTC) cum	-	-	-	-	-	1	-	-	-	-
67	Product Manager	-	-	-	-	1	1	1	1	-	-
68	Product Specialist	-	-	-	-	1	2	2	2	-	-
70	Production Assistant	62	19	-	23	7	33	51	60	89	60
71	QA Assistant	-	1	2	2	2	2	2	2	3	2
72	Quality Head	-	-	1	1	1	1	1	1	1	1
73	RA Manager	1	1	1	1	1	1	1	1	1	
74	R&D Executive	-	-	-	-	-	-	2	1	-	-
75	RA Assistant	-	-	-	-	1	1	1	2	2	2
76	R & D Officer	-	-	-	-	-		-	-	1	1
77	R & D Assistant	-	-	-	-	-	1	1	-	-	-
78	Sales & Marketing Executive	-	-	-	1	1	-	-	-	-	-

79	Sales Manager (OTX)	-	-	-	1	-	-	-	-	-	-
80	Sales Accountant	-	-	-	-	1	1	1	1	1	1
81	Sales Admin	-	-	-	-	-	1	3	3	-	-
82	Sales Manager (OTC)	-	-	-	-	-	1	-	-	-	-
83	Sales Representative	-	-	-	-	4	5	5	5	-	-
84	Sales Supervisor (OTC)	-	-	-	1	1	-	-	-	-	-
85	Security Staff	1	1	1	1	1	1	13	17	18	17
86	Senior Accountant	1	1	1	1	2	1	1	2	1	2
87	Senior Medical Representative	-	-	-	-	2	1	-	-	-	-
88	Stock Accountant	-	-	-	-	-	-	1	1	1	1
89	Supervisor	16	16	18	18	19	20	17	21	22	21
90	Supervisor Grade 1	28	28	28	27	25	24	21	18	18	18
91	Technical Consultant	1	1	1	1	1	1	1	1	1	1
92	Technician (3)	27	27	25	25	25	23	19	17	16	17
93	Technician (4)	71	71	71	68	66	62	39	38	36	38
94	Technician (5)	68	69	77	72	69	64	40	36	34	36
95	Tender Manager (Tender Team)	-	-	-	1	1	1	1	1	-	-
96	Warehouse Manager	1	1	1	1	1	1	1	1	1	1
		411	**383**	**457**	**505**	**493**	**497**	**438**	**436**	**379**	**368**
	Foreign Employee	**Number**	**Number**	**Number**	**Number**	**Number**	**Number**	**Number**	**Number**	**Number**	**Number**
		1	2	3	2	3	3	3	3	1	1

Data Source: RVK Myanmar Co Ltd

3.8 Electricity Utilization

The Factory has different types of Production Equipment and Machines and air conditioners besides other electrical devices and equipment that require electricity. Though it will acquire the electricity supply of 200,000 units – 300,000 units per month from 3479.31KWH of ESC, it also has 2 backup generators with 500 KVA.

Table 28. Energy Utilization

	Unit	Capacity	Capacity
Electricity requirements	Monthly	200,000 – 300,000 units	3479.31KWH
Generator (KVA)	-	500 KVA	2 backup generators

Data Source: RVK Myanmar Co Ltd

3.9 Water Utilization

At factory, water serves as a vital component and is essential for production and cleaning purposes across all departments of manufacturing facilities. The factory sources water from both the Se Thar Dam and Tube Wells. Moreover, factory prioritize water recycling initiatives, utilizing it for various purposes such as gardening and landscaping whenever feasible. The main uses of water in the proposed project are for the operation of the boiler, operation process and for domestic usage such as drinking, personal washing, food preparation, and washing utensils. Water for the factory is underground water source from its own tube well, for about 50,000 gallon per day and also from water source of Sitha Dam, for about 100,000 gallons per day. The water flow rate of the three tube wells are 10,000 gallons per hour respectively. The underground tubewell is only used in summers when Sitha Dam suppies are intermittent. The direct tube well water and water from dam will be stored in the raw tanks, sedimented, filtered, store at under groung water tank before distribute to related department.

With concern for regulatory compliance, cost savings and environmental protection, the factory will try to reduce energy and water use and to value other natural resources more carefully.

Raw Water Storage

Water purification system

	
	Under Ground Water Storage

The factory has installed potable water treatment and water for pharmaceutical use systems to ensure safe water for both production processes and employee drinking purposes. Specifically, for water used in pharmaceutical manufacturing (Purified water and distilled water), the factory utilizes Reverse Osmosis (RO) and distillation systems. These systems have a combined capacity of 450,000 liters. The factory's water consumption rate is typically 75,000 gallons per day, but it decreases to 50,000 gallons per day when there is no operation of Large Volume Parenterals (LVPs) and Small Volume Parenterals (SVPs).

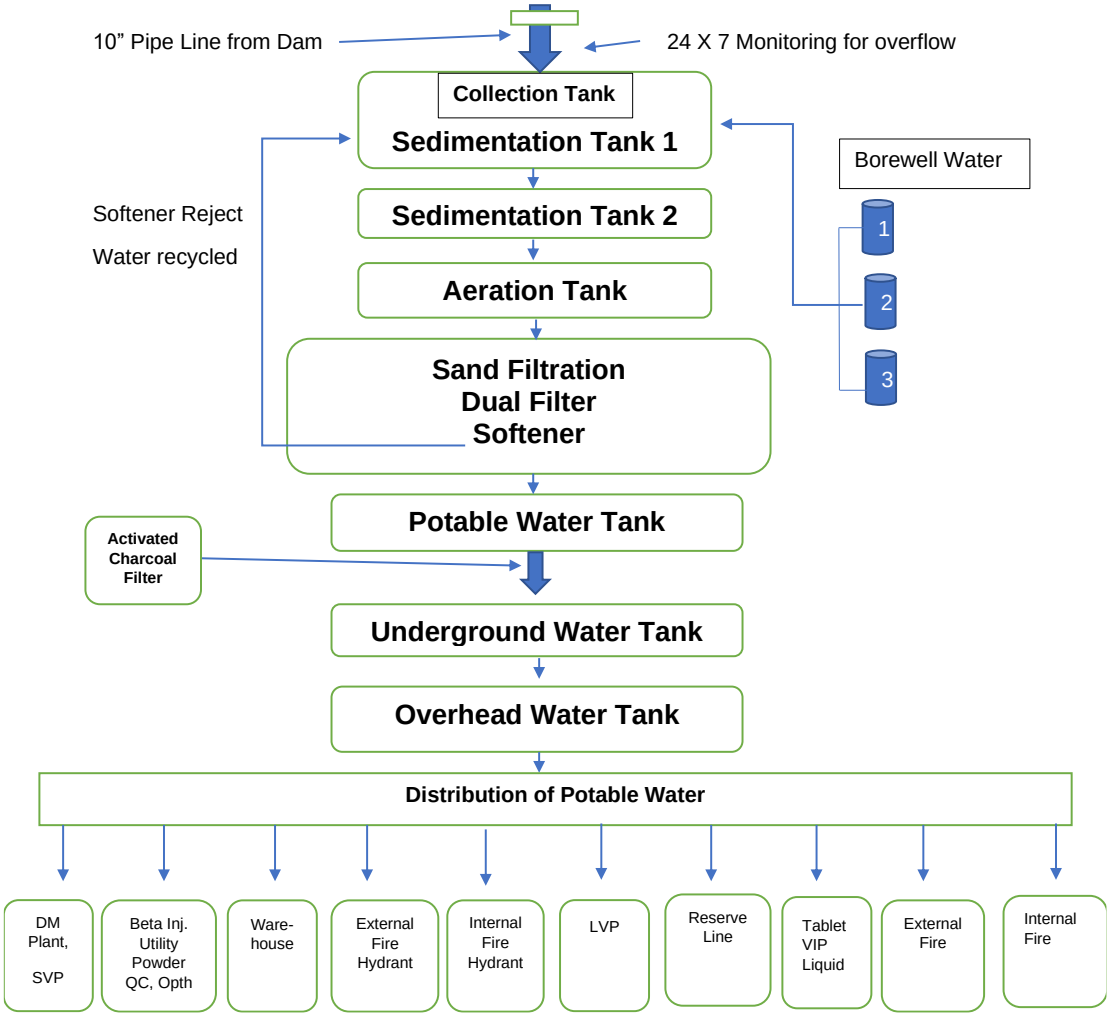


Figure 8. Water Treatment

Table 29. Water Utilization

	Years	Annual Usage
Annual water requirements (gallon)	Year 1 to 10	24,000,000 gallons

Data Source: RVK Myanmar Co Ltd

Water Purification Process (Reverse Osmosis Filtration)

An RO water filter has been installed to purify underground water for use in pharmaceutical factory processes, ensuring the safety of the product by eliminating contaminants such as bacteria, heavy metals, dust, calcium ions, and iron ions.

3.10 Strom Water and Drainage System

The factory has concrete drainage system around the buildings, such as offices, main buildings, canteen, warehouse etc. They are for the domestic use water, storm water or rain water to flow along and have no connection with the waste water disposal from the factory production area. It usually goes out into public drain system. Rest room water will be directly channeled into the septic tank.

Drainage System

3.11 Waste Management Plan

a) Liquid Waste

Wastewater from the production will be from:

Cleaning and Sanitization: Cleaning and sanitizing equipment, production areas, and utilities such as tanks and pipelines can result in the generation of wastewater containing detergents, solvents, and residues from pharmaceutical products. Cleaning and sanitizing operations produce a substantial amount, approximately 68,400 liters per day, which is discharged to a wastewater treatment pond. Following treatment and rigorous testing procedures, the water undergoes recycling, primarily for use in the factory's landscaping, effectively minimizing water waste.

Production Processes: Various stages of pharmaceutical production, including synthesis, purification, and formulation, may involve the use of water as a solvent or a reaction medium. Wastewater can be generated from the washing of reaction vessels, purification columns, and

other equipment. the production processes contribute around 6600 liters per day to the wastewater stream, also directed to the treatment pond. Once treated and verified for quality, this water is integrated back into the factory's landscaping, further reducing the reliance on external water sources.

Quality Control and Testing: Laboratory testing and quality control procedures may involve the use of water for analytical purposes. Wastewater can be produced from the cleaning of laboratory equipment and disposal of test samples. The negligible discharge from quality control and testing activities implies minimal environmental impact.

Utilities and Facilities: General domestic activities such as handwashing, restroom usage, and cleaning of common areas can contribute to wastewater generation in the facility.

Wastewater Management Plan

The factory has implemented a comprehensive wastewater management plan, which includes the operation of a dedicated wastewater treatment plant. This facility is designed to effectively treat effluents discharged from the production process, ensuring that all wastewater undergoes proper treatment to meet acceptable environmental standards. As part of this plan, the treated water is repurposed for watering plants within the factory compound, contributing to sustainable water usage practices. For liquid waste generated during production, a systematic approach is followed. Initially, the waste is diluted with water or a suitable solvent as recommended or specified in standard operating procedures (SOPs). Subsequently, the pH of the liquid waste is carefully checked to determine its acidity or basicity. Depending on the nature of the waste, neutralization is carried out as an initial step to adjust the pH level. Following neutralization, the liquid waste undergoes further treatment in the wastewater treatment plant, where contaminants are removed to ensure compliance with environmental regulations.

Wastewater Treatment System

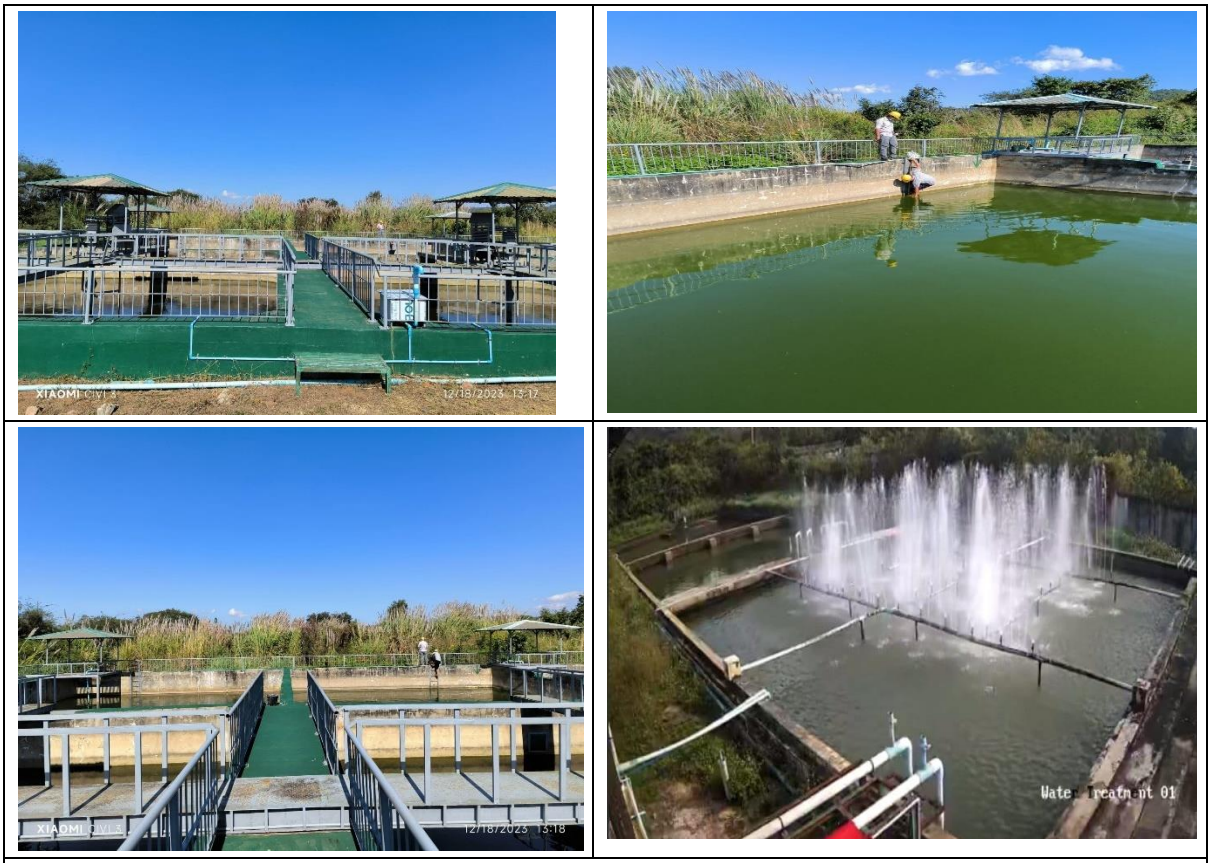
The RVK uses a holistic, multi-staged wastewater treatment system in order to guarantee the effective clarification of wastewater before its release or reuse. The initial actions are the deployment of filter grills that trap the larger debris, to start the process that will lead to fracture filtration later. Grease traps are thereafter exploited to produce a separation and collection of grease and oils, prohibiting the entry of the later into subsequent treatment processes. Skimmers also play the role of taking out any free oil which permits enforcement of high-quality effluent.

Treatment stage continues with the use of dissolved air flotation or oil water separators which have the objective of filtering oily droplets and suspended particles. After that, the filtration stage uses to eliminate finer suspended sediments, thus, creating the crystalline and cleaner water flow. Steps like flow and load equalization aim at equalizing variations in flow and pollutant loads so as to optimize the treatment efficacies, and assure consistent processing. Sedimentation is a critical factor in the removal of suspended solids, wherein they settle following the downward movement of their own weight. Next, a full treatment is pursued in

order to minimize the BOD, COD, and TDS. These factors serve as a basis for measurement of organic pollutants, chemically oxidizable substances, and dissolved minerals, respectively.

Aeration pump has been installed in the pond to promote microbial growth. Additionally, the impeller operates daily for sedimentation purposes.

Finally, chlorination is implemented if necessary, adding chlorine for disinfection by eradicating or inactivating pathogenic microorganisms that were present in the secondary treated effluent. In order to manage the residual sludge or waste generated as a part of the treatment process, RVK ascertains its safe disposal in sanctioned landfills for hazardous wastes.



Wastewater Treatment

Water Recycling

Following the takeover from MEHL, RVK has implemented water recycling initiatives aimed at minimizing wastage and optimizing water utilization across various stages of the water treatment process, including Pre-treatment, Demineralization, and Distillation. Key actions undertaken by RVK include:

Recycling rejected water from Pre-treatment by recirculating it to sedimentation Tank 1.

Recycling rejected water from the Demineralization plant, including RO 1st stage rejects and Filter washings.

Recycling rejected water from the Distillation plant, particularly from Large Volume Parenteral production, by sending it to the Boiler for re-use.

Progressing towards the recycling of Distillation reject water from SVP and Beta Lactam Injection.

Initiating plans to recycle circulation Potable water generated from the Oral Liquid Plant.

Figure 9. Location Map of Water and Wastewater treatment plant

b) Solid Waste

In a pharmaceutical manufacturing facility, various types of solid waste can be produced, including:

Packaging Materials: Packaging materials such as cardboard boxes, plastic containers, and blister packs are commonly used for storing and transporting pharmaceutical products. Waste generated from packaging materials can include empty containers, packaging inserts and shipper boxes. Plastic and paper waste are segregated and resell outside for recycling

Glassware: Glassware, such as vials, ampoules, and laboratory glass equipment, is also frequently used in pharmaceutical production processes. Waste generated from glassware includes broken or discarded glass items and laboratory glassware that has reached the end of its usable life.

Product waste comprises intermediates, finished products, and stability samples, which may be damaged, rejected, returned, expired, or off-spec. It also includes spill-offs during sampling, dispensing, or processing, as well as dust from normal cleaning, vacuum cleaners, dust extraction systems, and AHU filters. Additionally, it covers leftover residue from batches, non-conforming initial trial rejects, rejects from machine breakdowns or settings, online rejects, and residues from manufacturing, IPQC, and IPQA testing.

Pharmaceutical waste is being disposed of in accordance with WHO guidelines as follows:

a) Antibiotic products are incinerated for proper disposal.

b) Beta-lactam products are treated with sodium hydroxide before being discarded to the waste treatment plant.

c) Vitamins and other pharmaceuticals are dissolved in water and then disposed of to the waste treatment plant.

Cleaning Materials: Cleaning materials such as wipes, towels, and disposable mop heads used for cleaning equipment, production areas, and laboratories can contribute to solid waste generation.

Personal Protective Equipment (PPE): Disposable gloves, masks, gowns, and other PPE worn by personnel during manufacturing, handling, and testing processes can become solid waste after use.

Filters and Filtration Media: Filters and filtration media used in various stages of the manufacturing process to remove impurities or contaminants from liquids or gases can become solid waste once they reach the end of their service life.

Laboratory Waste: Solid waste generated from laboratory activities, including plasticware, and other laboratory consumables, as well as contaminated materials such as gloves and sample vials.

Microbiological Waste: Microbiological waste can originate from laboratory activities, research and development processes, and production areas where biological agents are handled. This waste may include cultures, specimens, tissues, or equipment contaminated with microbiological materials. Microbiological waste is typically treated through autoclaving, chemical disinfection, or other appropriate methods to inactivate or destroy pathogens before disposal.

Biological Lab Waste: Pharmaceutical facilities involved in research or production involving laboratory test animals generate waste from animal lab including bedding materials, feces, urine, and carcasses. Biological Lab waste is incinerated with proper segregated storage to minimize the risk of environmental contamination and ensure worker safety.

Table 30. Types of Wastes and Waste Handling & Management Plan

No.	Activity Plan/Stage	Activities that will Produced waste/ other pollutant	Type of Waste	Quantity/ Volume	Waste Handling/ Management Plan
1.	Operation	Packaging Materials	Empty containers, packaging inserts, and shipper boxes.	920kg/ monthly	Stored in a separate area to be delivered to a scrap vendor for final disposal or recycling.
		Glass ware	Vials, ampoules, and laboratory glass equipment	10kg/ monthly	Collected separately and placed in designated containers to be delivered to a scrap vendor for recycling.
		Product Waste	Damaged, rejected, returned, expired products, spilled materials, dust from cleaning and filter	30 kg/ week	Waste is dissolved in water within designated containers and then directed to the Effluent Treatment Plant (ETP) for further processing.
		Cleaning Materials	Wipes, towels, and disposable mop heads used for cleaning equipment, production areas, and laboratories	33kg/ monthly	Kept in separate poly bag for giving scrap vendor for final disposal or for recycling.
		Personal Protective Equipment (PPE)	Disposable gloves, masks, gowns, and other PPE	40kg/ monthly	Waste disposal to Municipal
		Filters and Filtration Media to remove impurities or contaminants from liquids or gases	Filters and filtration materials	140kg/year	Waste disposal to Municipal
		Laboratory Waste	disposable glassware, plasticware, and other laboratory consumables, as well as	240kg/year	Waste disposal to Municipal

			contaminated materials such as gloves, pipette tips, and sample vials		
		Microbiological waste	Cultures, specimens, tissues, or equipment contaminated with microbiological materials	10kg/year	sterilization in dedicated autoclaves is done prior to disposal.
		Biological Lab waste	Bedding materials, feces, urine, and carcasses	240kg/year	incineration method is used for disposal
2.	Office Waste	Office operation	Paper, plastic, metal clipping, string, etc.	50 kg/ week	give to scrap vendor who can recycle it
3.	Domestic and Kitchen Waste	Staff Quarter and Canteen	Food waste, domestic waste	250 kg/ week	a properly engineered pit is constructed to decomposte in engineered pit and utilized in the garden

Data Source: RVK Myanmar Co Ltd

The pharmaceutical factory will undertake challenges in the widespread adoption of packing reduction, materials substitute, waste recycling and reuse in their operations. By minimizing packaging, using recyclable materials and reducing the toxicity of raw materials the factory can decrease the overall impacts of products including use and consumption by consumers. The factory will establish waste minimization goals and report its progress to management annually or as per the requirements.

For disposing waste from factory, the Proponent Company will follow its own International Solid waste, liquid waste, microbiological waste and biological waste disposal system of Specific Standard Operating Procedures (SSOP) Waste Material Destruction, Reference SOP No. MPF (POL)-WH-SOP-07 and Reference SOP No. MPF (POL)-WH-SOP-09. The company will coordinate with township city development committee, and disposing will be made under guidance of those respective authorities.

3.12 Fuel Usage

Table 31. Fuel Utilization

	Years	Amount	Remark
Annual furnace oil requirements for Boiler (Gallons)	Year 1 to 10	24,000 gallons	
Annual diesel requirements for Generator (Gallons)		500 gallons	

Data Source: RVK Myanmar Co Ltd

3.13 Chemical Use

Table 32. Chemical Use for factory

No.	Raw Material Name	A/U	Annual Usage Qty	Unit Price (MMK)	Total (MMK)	Product Name
1	Ethanol	Liter	33,702	1,950	65,718,900	Methlylated Sprits 500 ml
						Spray Clean 100 ml
						Spray Clean 500 ml
						Spray Clean 30 ml
						Spray Clean 1 L
						Spray Clean 5 L
						Aseptol
						Burplex Elixir
						Paracetamol Elixir
						Penicillin V 100's Bot
						Pencillin V 500's Bot
2	Castor Oil (Commercial Grade) BP	Kg	2,435	14,300	34,820,500	Aseptol
3	Dichlorometaxylenol BP	Kg	429	32,798	14,070,342	Aseptol
4	Eucalyptus	Kg	8	60,000	480,000	Aseptol
5	Glycerin BP	Kg	16,374	3,680	60,256,320	Burplex Elixir
						Paracetamol Elixir
6	Methanol BP	Liter	1,200	1,450	1,740,000	Methylated Sprits 100 ml
						Methylated Sprits 500 ml
7	Oleic Acid BP	Kg	24	20,000	480,000	Aseptol
8	Parachlorometaxylenol BP	Kg	429	42,3200	18,155,280	Aseptol
9	Pine Oil BP	Kg	532	26,666	14,186,312	Aseptol
10	Propylene Glycol BP	Liter	1,771	13,485	23,881,935	Paracetamol Elixir
11	Silica gel	Nos	7,920,000	8	63,360,000	All Bottle medicine
12	Terpinolene Oil BP	Kg	1,162	33,500	38,927,000	Aseptol
13	Acetonitrile	Liter	360	60,450	21,762,000	QC analysis process
14	Hydrochloric acid	Gal	50	8,536	426,800	Water treatment process

Data Source: RVK Myanmar Co Ltd

Storage Method

Chemicals are purchased as and when require from local chemical shops and it was observed that they are kept systematically and as appropriate, either in cool or dark places at room temperature and away from sunlight.

Transportation Method

The chemical used for factory are transported by the company own trucks and vehicles.

Chemical Storage

3.14 Utilities of the Steam Boiler

The steam boiler runs 8 hours a day, 6 days a week, for the pelleting and extraction processes, and diesel is used as the fuel for the boiler. General information on the proposed boiler is mentioned below.

Table 33. Utilities of the Steam Boiler

Description	Process
Brand Name of the Steam Broiler	Wuxi Taihu Boiler Co Ltd
General Operation Process of	Fluidizing > Igniting > Fuel Feeding
Water Consumption per hour	1 m3/hr
Boiler Effluent in drainage	Blow-down valve > underground pipe> nearest drainage
Type of Fuel	Furnace Oil
Source of Fuel	Local Oil Refinery
Transportation	By merchant's truck (22 wheels)
Transport frequency	3-4 times a year
Amount of storage	35,000 to 40,000 Ton per month
Storage Type	With Oil tank

	
Boiler Room	

3.15 Employee Welfare Plan

The employees will be entitled to their labor rights and social security benefits in accordance with applicable regulations. Additionally, the company will provide its own welfare plans, which may include provisions for staff housing, transportation, uniforms, healthcare, social compensations, and other benefits.

Leave allowance	Entitlement of having marriage leave for (3) days and condolence leave for (7) days.
Annual Bonus	Increase salary annually and annual bonus will be received
Meal Allowance	The company has provided daily meal to all employees and meals charges for who could not take the meals at workplace. Since June 2022, Employee have been supported by rice (6) pyi and oil monthly. Provided daily snack and extra earn of MMK (500) for overtime working employee and extra earn of MMK (1000) for who works overtime on Saturday.
Transportation	Transportation allowance is provided.
Health care	Providing a clinic in the workplace. contract with SSB (Social Security Board) clinic and doing annual medical examination of employee.
Worksite safety	Organized Worksite Safety committee and assigned a Safety Manager to perform. Follow under the guideline of Factories and General Labor Laws Inspection Department. Worksite Safety and Health Care Committee inspect weekly and monthly. Provide safety equipment according to different workplace. Inspect safety equipment whether using systematically in different workplace.

Social Welfare programs in RVK Pharmaceutical Factory are as follows:

- Group Life Insurance is arranged for key employees.
- Group Accidental Insurance for Key staff
- Provision of a medical officer/doctor and a medical/health-care center at the Pharmaceutical Factory.
- First aid medical kit boxes for health and workplace security measures
- Ferry Transportation for employees
- Sports Facilities are provided.
- Outdoor Fitness equipment is provided.
- Digging of tube wells for water supply to staff housing facilities
- Nursery day care arranged for the working parents
- Three days leave with full pay for any newly-wedded employee
- Seven days leave with full pay for death of family members of employees
- Delivering words of encouragement and necessary materials for social or health/illness of employees
- Maternity Leave of 98 days to the employee in times of giving birth
- Paternity leave of 15 days to the employee (husband) in times of wife giving birth
- Capacity Building for enhancement of managerial skills and training workshops for employees
- Provision of relevant training courses for employees given by Government ministries
- Annual Staff party and lottery/award events for employees of the RVK [Pharmaceutical Factory and RVK Myanmar Company]
- Awards and certificates for outstanding employees Quarterly
- Scholarship programs for employees' family and nearby three villages (total around 40 students every year)
- Providing rice and oil for all employees
- Yearly Medical Check Up for all employees
- Yearly Children's Day Activities for employees' children

	
	
Staff Dormitory	Canteen

3.16 Fire Safety Plan

It is principally based on the Preparation for Fire Hazard Prevention. The objective of fire prevention is to protect human life and property from fire. RVK will be regularly assessed for fire risk to identify sources of ignition and location of fuels for **Fire Safety.**

As per the Chapter VII, Formation of the Reserve Fire Brigade of Myanmar Fire Services Law, each factory needs to have the fire unit which is to be founded accordingly, to the classification of building and the level of production. The following systems need to be installed throughout the farm and factory, including the fire emergency plan.

a) Fire prevention
b) Fire Protection
c) Fire Alarm System
d) Fire Fighting Training and Demonstration Schedule for all employees to understand
e) Fire Security System
f) Effective Communication (Telephone and Public Address system)

As for Fire prevention, the four most important functions are;

a) Own Fire emergency plan to be drawn and post FIRE ORDER for the factory.
b) Good Housekeeping includes keeping the work area, corridors and escape routes clear, safe storage of flammable materials (textiles, chemicals, papers etc.) / liquids, systematic waste disposal, smoking free work area etc.

c) Fire safety equipment such as portable dry chemical Fire extinguishers, Fire Hydrants and hoses, fire alarm call points, Heat and smoke vents, etc.

d) Trainings on instructions for all occupants and employees, of their individual and collective responsibilities for general safety of the factory and people, about the fire equipment and frequent, random fire drills carried out on **"ALARM-RESCUE-EVACUATION-FIRE CONTROL."**

For the prevention of fire hazards, the factory has constructed its buildings with steel structures and brick walls and has equipped each subsection with a comprehensive array of modern fire extinguishers, sandbags, and sand pits, alongside essential tools such as shovels, pickaxes, hooks, and flats. Smoking on the project premises is strictly prohibited. RVK commits to complying with instructions from Township Fire Services Stations and adhering to Minimum Standards Requirement of Fire Safety.

3.17 Planning Budget for CSR and Environmental Management

The RVK Myanmar Co., Ltd. plans to commit 3% of its annual profit after tax to Myanmar's Corporate Social Responsibility Program for any usage that the State sees fit and environment-related management works. It inevitably has to continue, support, and maintain some of the CSR works and activities in the nearby community of the factory, as it has a good reputation for CSR activities in other countries and in Myanmar.

The company to be established will fulfill its corporate social responsibilities in the following programs.

- (25%) of subscribed money to rural development such as road maintenance, educational support for village schools and village library development in the area
- (25%) will be budgeted for community welfare, health and sport support to the nearby villages
- (25%) for donations and religious support to the village's monasteries, religious facilities and Myanmar traditional festivals.
- (25%) will be used for environmental impact monitoring, mitigation and management.

Besides the CSR Program, the company. also aims to accomplish

- Good relations with the government units
- Creation of sustainable friendly neighbourhood by supporting for the welfare of the community in the project area as per the village committee and authority.
- Employee Welfare and Benefits for staff and workers is also an important program of the Company. RVK Myanmar provides welfare facilities to the employees to keep their motivation levels high and to increase their productivity and efficiency at work. Employee benefits are arranged well for all the staff to feel safe and secure by their work and livelihood.

CHAPTER 4 - DESCRIPTION OF THE SURROUNDING ENVIRONMENTAL AND SOCIAL CONDITIONS

4.1 Methodology for Data Collection and Analysis

In compliance with the Environmental Conservation Law (2012), Environmental Conservation Rules (2014), and EIA Procedure (2015), the proponent will be required to conduct and prepare an Environmental Impact Assessment (EIA) and Environmental Management Plans (EMPs) to address environmental, social, and economic issues and concerns associated with the proposed development. The EIA study was undertaken using a holistic approach, encompassing all aspects of the EIA process. The methodologies adopted for conducting this EIA are as follows:

Desk Research

For the Environmental Impact Assessment (EIA), extensive desk research was conducted to establish a comprehensive environmental information database. This involved sourcing information from various reliable materials including textbooks, articles, maps, online resources, photographs, GIS datasets, past EIA reports, and secondary data obtained from the General Administration Data provided by the Township Administration Department.

Community Engagement

To ensure a thorough understanding of the potential ecological and socio-economic impacts of the proposed project, extensive public consultations were held. Local village and ward authorities, religious leaders, village councils, and members of the local communities were actively engaged. This inclusive approach allowed for a wide range of perspectives to be considered, empowering the local community to contribute their comments and express any concerns they may have regarding the project. This participatory process is integral to the impact assessment, providing valuable insights that inform decision-making.

Field Research

Two-seasoned fieldwork activities have been carried on operation period to verify and complement information gathered from desk studies. The fieldwork covered all relevant components of ecological, socio-economic and health components of the environments.

Air Quality

Survey Method:

The sampling and analysis of ambient air quality were conducted in accordance with guidelines recommended by the United States Environmental Protection Agency (U.S. EPA). State-of-the-art equipment, the HAZSCANNER air monitoring station, was employed for comprehensive data collection. This monitoring station offers an automatic sampling rate, enabling the measurement of air quality data every minute. It directly reads and records on-site measurements for key parameters, including sulfur dioxide (SO2), nitrogen dioxide (NO2), nitrogen monoxide (NO), carbon monoxide (CO), particulate matter with a diameter of 10 micrometers or less (PM10), and particulate matter with a diameter of 2.5 micrometers or less (PM2.5).

Gas emissions from the boiler were measured by Green Myanmar Environmental Services Co., Ltd. at the selected site using the Kane 988 Combustion Analyzer. This handheld analyzer is specifically designed for domestic and industrial boiler flue gas measurement and analysis.

It operates effectively on various combustion facilities, including boilers, generators, and furnace types. The analyzer can display 8 parameters simultaneously, providing measurements and calculations of efficiency and pollution.

Survey Period:

The air quality assessment comprised two-seasoned fieldwork activities conducted by an expert team from the ALARM Ecological Laboratory. The primary objective was to establish the existing baseline ambient air quality status. This assessment spanned a continuous 24-hour period during the operation phase, capturing variations that may occur throughout the day and night. The team employed rigorous protocols to ensure accuracy and reliability in data collection. Measurements to determine the boiler stack emissions were carried out for a short duration, specifically a one-hour sample interval.

Survey Location:

The air quality assessment covered strategic locations within and around the proposed project area, specifically targeting sampling points near potential emission sources such as the project site compound and nearby operational activities inside the factory. The survey team systematically collected air samples from these identified locations to ensure a comprehensive representation of air quality in areas directly impacted by the project's operations. Additionally, measurements of the boiler stack emissions were conducted at the selected site of the factory, specifically targeting the stack emission of the furnace.

Data Analysis and Reporting:

Upon completion of the survey, the collected data underwent comprehensive analysis using statistical methods and air quality indices to interpret the findings. The results are presented in this chapter.

Noise Level

Survey Method:

The GM1356 Digital Sound Level Meter was utilized for measuring noise levels. This instrument was positioned at a standardized height of 1.2 meters. It automatically measured the A-weighted loudness equivalent level every 10 minutes, with data recorded on a memory card for further analysis. The GM1356 Digital Sound Level Meter was selected for its precision in capturing noise levels, employing A-weighted measurements that align with human hearing sensitivity, thus providing a comprehensive understanding of the noise environment.

Survey Period:

The measurement of noise levels was conducted as a two-time activity during the operation phase, ensuring a thorough assessment at a specific point in the project timeline. The survey team, comprising two individuals from the GES survey team, undertook 24-hour noise readings inside the project compound during both day and night periods. This approach allowed for the capture of variations in noise levels across different times of the day.

Survey Location:

The noise level assessment was conducted within the project compound and nearby operational activities, including areas where potential noise sources exist, such as the operational area and transportation routes.

Data Analysis and Reporting:

Upon completion of the noise level assessment, the results were compiled into this chapter for analysis and reporting.

Water Quality

Survey Method:

Water quality assessment involves the collection of samples using sterilized containers, strictly following recognized standard procedures. To maintain sample integrity, all samples are stored in iced boxes during transportation to the laboratories. The analysis is conducted by two reputable laboratories - ISO Tech Lab and ALARM Ecological Lab.

Survey Period:

The water quality survey is planned as a one-time activity during the operation phase. This approach ensures a comprehensive assessment at a specific point in the project timeline. The collected samples are analyzed promptly in the laboratory to provide timely and relevant data.

Survey Location:

Water samples collected from protable water for production, and wastewater treatment plant in the vicinity of the proposed project area. The collection process is carried out by two trained individuals from the survey team.

Parameters Analyzed:

The water samples are analyzed for key parameters, including but not limited to, pH levels, dissolved oxygen (DO), biochemical oxygen demand (BOD), chemical oxygen demand (COD), nitrate, ammoni, phosphate, total phosphorous, oil and grease, total nitrogen, phenol and cadminum. These parameters are critical indicators of water quality and potential environmental impact.

Reporting:

Upon completion of the water quality survey, the results are compiled into a detailed report in this chapter.

Soil Quality

Survey Method:

The soil quality assessment will utilize a hand-held excavator, such as a garden trowel or hand shovel, which will be inserted vertically into the soil at the desired depth, typically around 5-10 centimeters for shallow sampling or deeper as required. To prevent contamination, the topsoil (approximately 20~30 cm) will be removed by the sampler before collecting the actual sample. The collected soil samples will be carefully placed in cleaned plastic bags to maintain their integrity. Additionally, to minimize potential reactions, all samples will be stored in boxes and shielded from sunlight.

Survey Period:

The soil quality assessment will be conducted during the operation phase as a part of the overall environmental impact assessment. Two individuals from the GES survey team will

collect soil samples inside the project area. This one-time activity ensures a comprehensive evaluation of soil quality specific to the project's operational period.

Survey Location:

Sampling points will be strategically chosen within the project area, including locations influenced by potential sources of soil disturbance or contamination.

Parameters Analyzed:

The laboratory analysis of soil samples will encompass key parameters, such as soil texture, pH levels, nutrient content, and the presence of contaminants. These parameters offer insights into soil fertility, potential agricultural use, and any adverse impacts on the soil ecosystem.

Reporting:

Upon completion of the soil quality survey, the results are compiled into a detailed report in this chapter.

4.2 Study Area and Limit

The location of the Pharmaceutical Manufacturing factory of RVK Myanmar Co., Ltd. in this study is at Block No. 662-Ka (N 14 to N 47), Block No. 655 (N 1 to N 10), Kan Gyi Kone village tract, Mandalay-Lashio Road, Pyin Oo Lwin Township, Mandalay Region, Myanmar.

The project site of Myanmar Pharmaceutical Factory is situated at 21°56'43.59"N and 96°24'22.74"E, in the Kan Gyi Kone Village Tract, near Pyin Oo Lwin, 54.5 km from Mandalay City and total elevation is 3,538 ft. (1,078 m) above sea level surrounded by Eastern Range of pollution free Mountain area. This can be easily accessed from the Mandalay-Lashio Road and no direct access to the Railway transport. The site is 12 kilometers from downtown of Pyin Oo Lwin.

The study area for this project is roughly defined to encompass the area within a 2-kilometer radius of the proposed project site, which will be large enough to address the potential environmental and socio-economic impacts of the project's operation. Within this radius, there are three communities, namely Aung Chan Tha (2.08 km away), Nyan Nyin Tha village (1.24 km away) and Kan Gyi Kone Village Tract called Ward No.16 (1.45 km away), located beside Anisakan Airport. The Sitha Dam is located 1.35 km away from the project site and serves as one of the water sources for operation.

- Spatial Limits: The study focuses on the specific 5-acre parcel of land allocated for the pharmaceutical manufacturing project. Boundaries are defined by agricultural lands, a natural plateau, anisakan air port and the project's proximity to the Mandalay-Lashio Road.
- Operational Limits: The study considers the operations related to manufacturing of pharmaceutical products. Environmental impact assessments encompass potential issues such as air pollution, water pollution, noise pollution, waste pollution, occupational health and safety, and socio-economic impacts.
- Organizational Limits: The study is conducted by Green Enviro Services Ltd., with a specific focus on environmental issues related to the pharmaceutical factory. The Green Enviro Survey Team conducts a reconnaissance study and collects baseline environmental data using appropriate measuring devices.

- Geographical Limits: The project site is situated at 21°56'43.59"N and 96°24'22.74"E, in Block No. 662-Ka (N 14 to N 47), Block No. 655 (N 1 to N 10), Kan Gyi Kone village tract, Mandalay-Lashio Road, Pyin Oo Lwin Township, Mandalay Region, Myanmar.

4.3 Area of Influence (AOI)

In conducting the Environmental Impact Assessment (EIA) for the proposed pharmaceutical manufacturing project, the AOI has been meticulously defined, spanning a 2 km radius from the project site's center. This deliberate choice facilitates a thorough evaluation of potential environmental and socio-economic impacts during both the operation and decommissioning phases.

The communities directly affected, identified as Project Affected People, encompass residents of namely Aung Chan Tha (2.08 km away), Nyan Nyin Tha village (1.24 km away) and Kan Gyi Kone Village Tract called Ward No.16 (1.45 km away) all within a 2-kilometer radius from the proposed project area. The impact assessment considers factors such as involuntary resettlement, local economy, employment opportunities, livelihoods, existing social structures, and potential conflicts of interest within these communities.

The AOI includes:

- Air Quality during Operation Phase: A 1 km radius from the project site edge defines the Area of Influence (AOI) for measuring air quality impacts during the operational phase. This distance considers prevailing wind patterns, emission types, and relevant regulatory requirements to comprehensively assess the geographic area potentially affected by air quality changes arising from operational activities within the site.
- Noise during the Operation Phase: The noise quality AOI for operation extends 200 m beyond the project perimeter, covering noise generated within compound during the operation phase.
- Water Quality in the Operation Phase: A 1 km radius around the project site boundary has been designated as the Area of Influence (AOI) for assessing potential water quality impacts during the operational phase. This encompasses potential ramifications on water quality arising from operational activities such as waste disposal, wastewater discharge.
- Biodiversity in the Project Site Area: A 1 km radius from the project site boundary is considered to assess potential impacts on the local ecosystem, particularly biodiversity.
- Socio-economic Conditions: The Socio-economic Conditions Area of Influence (AOI) extends 2 kilometers from the project site, encompassing Nyan Nyin Tha village (1.24 km away) and Kan Gyi Kone Village Tract called Ward No.16 (1.45 km away). This comprehensive assessment investigates the complex interplay between the factory and these communities, analyzing potential impacts on involuntary resettlement, the local economy, employment and livelihood opportunities, existing social structures, and potential conflicts of interest.

Figure 10. Study Limit of Proposed Project

4.4 Alternatives

Alternative, in relation to the proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to:

- The property to which or location it is proposed to undertake the activity
- The design or layout of the activity
- The technology to be used in the activity
- The operational aspects of the activity and
- The option of not implementing the activity

The assessment of alternatives should, as a minimum, include the following:

- The consideration of the no-go alternative as a baseline scenario
- A comparison of the reasonable and feasible alternatives and
- Providing a methodology for the elimination of an alternative

Alternatives are different means of meeting the general purpose and need of a proposed activity. The comparison of alternatives is then considered to help determine the best method of achieving the projects. Objectives while minimizing environmental impacts.

Alternatives to be considered in the study:

- Design Alternative
- Scale Alternative
- Scheduling Alternative
- No-Go Alternative

4.4.1. Design Alternative

Design alternatives for the production of pharmaceuticals involve considering various architectural and engineering designs to optimize the manufacturing process.

4.4.1.1 Production Process

Batch Manufacturing

Batch manufacturing is a production process that is manufacturing the same product quantity or batch all in one timeframe. This approach involves flowing steps of treatment of raw materials with their turn-over when a limited number of products are produced.

Advantages:

- Flexibility: Batch manufacture accommodates product-related changes as well as adjusting production plan flexibly. Some batches of products may be produced as single or double batches to match the length of production line, which also makes it easier to adjust production scale or adopt product variations.
- Quality Control: The quality of produced batches can be better monitored and controlled as most of the production takes place independently. Any issues or

deviations can be addressed as they arise within the batch, and therefore can help to minimize the impact of the issues in the entire manufacturing process.

- Customization: The technology of batch manufacturing is suitable enough for products that do need to be customized or are subject to various formulations. Different batches can be customized for varied consumer expectations and marketing demands.
- Resource Optimization: Resources can be more effectively used, both in terms of equipment and labor. After completion of a batch the equipment can be cleaned and reconfigured to make the next batch. This minimizes downtime resulting in the maximization of overall equipment effectiveness.
- Research and Development: Batch manufacturing is a good thing because it aids and stimulates research and development. Experimentations with small batches can be conducted to test the validity and the production capacity before moving into the larger production volumes.
- Cost Control: Through the control of the amount of production and the time of the batch, it is possible to have a better governance of the production costs. The companies can fit different batches sizes that optimize the efficiency and satisfy the market.

Disadvantages:

- Time-Consuming: Batch manufacturing is a time-consuming process, and when compared to continuous manufacturing, it is time-consuming. There may be a downtime between batches spent on cleaning, setting up, and validating.
- Equipment Utilization: Some devices wouldn't be used at the beginning and ending stages of batch manufacturing, creating an inefficiency and increase in production costs per unit.
- Inventory Holding Costs: Since products are manufactured in batches, there may be a need to hold inventory between batches. This has the effect of tying up working capital and perhaps even results in the extra storage costs.
- Scale-Up Challenges: From small batches to larger volumes, production can be considered a challenge. Problems like matching the equipment, process stability, and consistency need to be managed.
- Potential for Variability: Batch-to-batch variability may arise due to variations in raw materials, process conditions and performance of equipment or devices. Such variability cannot do without exercises of vigilant quality control.
- Higher Labor Requirements: Batch manufacture typically requires additional manual operations for setup, cleaning, and monitoring activities between batches, which may translate to increased personnel requirements.

Continuous Manufacturing

Continuous manufacturing refers to the case where products are produced in a continuous process without an interruption and materials are constantly fed into the production line. In contrast to batch production, it is of a continuous type, in that it is accompanied by a

continuous flow of raw materials through the production process, a continuous output of finished drugs.

Advantages:

- Increased Efficiency: Continuous manufacturing tends to be more efficient than batch manufacturing. There is minimal downtime between production runs, leading to higher overall equipment utilization and production capacity.
- Consistent Quality: This is due to the fact that the system is a continuous one, thus it provides the usual product quality. Ongoing monitoring and control systems put in place ensure that the product specifications are met with consistency at each production process step.
- Reduced Labor Requirements: Continuous manufacturing systems often require less manual intervention than batch processes. This can lead to reduced labor requirements and lower labor costs.
- Real-time Monitoring and Control: Continuous manufacturing permits real-time detection of the crucial factors. The possible deviations or issues can be spotted and corrected immediately, which forms a solid foundation for better process control and quality assurance.
- Rapid Scale-Up: Continuous manufacturing is usually more quantifiable than batch manufacturing. As the continuous process constant the flow rates of materials, it is easier to increase the volume of production.

Disadvantages:

- Complex Implementation: Implementing continuous manufacturing systems can be complex and may require significant capital investment.
- Variability Challenges: Achieving consistent quality in continuous manufacturing can be challenging if there are variations in raw material properties, processing conditions, or equipment performance.
- Material Compatibility: Some products may not be well-suited for continuous manufacturing due to issues such as the stability of certain formulations or the compatibility of materials with continuous processing equipment.
- Maintenance Challenges: Continuous manufacturing equipment may require specialized maintenance and cleaning procedures, and interruptions for maintenance may impact the continuous flow of production.
- Adaptation for Small Batch Sizes: Continuous manufacturing is often optimized for large-scale production, and adapting it for small batch sizes may not be as straightforward. This can be a limitation in industries where smaller production volumes are common.

The preferred alternative: Continuous Manufacturing

The selection of a preferred alternative for continuous manufacturing within the pharmaceutical industry is contingent upon a multitude of factors, encompassing the inherent characteristics of pharmaceutical products, production prerequisites, regulatory stipulations, and technological advancements. The diverse nature of pharmaceutical formulations

necessitates a nuanced approach to determining the optimal continuous manufacturing method.

Continuous Direct Compression stands out as a favorable alternative, particularly suitable for the production of oral solid dosage forms. This method involves the unbroken compression of granulated powders into tablets, bypassing intermediary steps such as wet granulation. The efficiency and streamlined nature of this process contribute to the consistent quality of the resulting tablets.

For the manufacture of oral solid dosage forms, including specialized formulations like beta-lactam, Continuous Granulation and Tableting emerges as preferred options. This involves the integration of continuous granulation processes, such as twin-screw granulation, with continuous tableting, ensuring a seamless and efficient production flow. The method aims to reduce processing time and enhance overall efficiency.

In the realm of liquid pharmaceuticals, Continuous Mixing and Filling is a prominent alternative. This process involves the continuous mixing of liquid ingredients followed by uninterrupted filling into bottles or vials. Its advantages lie in ensuring homogeneity in liquid formulations and precise dosing during the filling process, making it particularly suitable for oral liquids and ophthalmic solutions.

Continuous Blending and Encapsulation are favored for the production of oral powder formulations. This continuous process involves blending powdered ingredients seamlessly followed by encapsulation. The method ensures uniform blends and accurate dosing for oral powder products.

Addressing the unique requirements of powder for injection, Continuous Mixing and Lyophilization is a preferred alternative. This involves the continuous mixing of powder ingredients, followed by continuous lyophilization (freeze-drying) to produce sterile powder for injection. The process maintains consistency and sterility in the final product.

For aseptic solutions such as ophthalmic products and small/large volume parenteral solutions, Continuous Aseptic Filling is a paramount choice. This continuous process guarantees sterility and precise filling of individual doses, critical for maintaining product integrity.

While continuous manufacturing presents advantages in terms of efficiency, quality control, and adaptability, a thorough assessment of products, regulatory requirements, and facility capabilities is imperative before the implementation of continuous manufacturing processes. This careful consideration ensures the alignment of the chosen alternatives with the dynamic and stringent demands of the pharmaceutical industry.

4.4.1.2 Equipment and Automation

Level of Automation

The degree of automation means the level of the process or the system which is automated starting from manual operation with very low automation to the level where the system is fully automated with little to no human intervention. There are three primary levels of automation: manual, semi-automated, and full-automated.

Manual

Manual systems involve human operators performing tasks without significant automation. Most processes are reliant on manual input, control, and monitoring.

Advantages:

- Initial cost may be lower due to reduced automation components.
- Flexibility for handling variations in tasks.
- Simplicity in operation and maintenance.

Disadvantages:

- Lower efficiency and productivity compared to automated systems.
- Greater potential for errors and inconsistencies.
- Limited scalability for handling increased workloads.

Semi-Automated

Semi-automated systems involve a combination of human intervention and automated processes. Certain tasks are automated to enhance efficiency and precision.

Advantages:

- Improved efficiency and reduced labor requirements.
- Enhanced precision and accuracy in tasks.
- Better scalability compared to manual systems.

Disadvantages:

- Initial costs are higher than manual systems.
- Complexity increases, requiring skilled operators.
- Some tasks may still be prone to human error.

Fully Automated

Fully automated systems operate with minimal or no human intervention. Most processes are automated, relying on sensors, control systems, and robotics.

Advantages:

- Maximum efficiency and productivity.
- Consistency in tasks, reducing variability.
- Lower labor costs and reduced dependency on human skills.

Disadvantages:

- High initial investment in automation technology.
- Limited flexibility to adapt to changes without reprogramming.
- Maintenance and repair may require specialized skills.

The preferred alternative: Semi-Automated

Pharmaceutical industry quality, perfection, consistency, and strict compliance present essential parameters for advancement in production. The strategy here is to blend automation with the native human expertise to achieve the equilibrium. The delicate nature of the pharmaceutical process calls for selective automation of the operations to be optimized and ensure compliance with the required standards.

Certain processes within pharmaceutical production, particularly those entailing intricate formulations and rigorous quality control measures, stand to derive notable benefits from heightened levels of automation. The integration of advanced automation technologies in such processes serves to guarantee precision in execution and steadfast adherence to the prevailing regulatory standards.

Conversely, in sectors of pharmaceutical production where flexibility and adaptability assume pivotal roles, a strategic inclination toward a semi-automated approach emerges as a favorable choice. This approach intentionally preserves room for human intervention and expertise, acknowledging the nuanced and dynamic aspects of certain production facets. By maintaining a balance between automated processes and human involvement, the semi-automated approach ensures a responsive and agile manufacturing environment, well-suited to address the evolving needs and challenges inherent in pharmaceutical production.

4.4.1.3 Ventilation System

HVAC System

HVAC system (Heating, Ventilation, and Air Conditioning) is an extensive ventilation system that maintains the temperature, humidity, as well as air quality within a controlled environment. It has a key role in the design and operation of controlled facility that is critical for pharmaceutics production. HVAC systems are created to cope with a condition of comfort and sterility that involves controlling several parameters such as temperature, humidity, and air movement.

Advantage:

- Temperature and Humidity Control: HVAC systems provide precise control over temperature and humidity levels, crucial for pharmaceutical processes where specific environmental conditions are required.
- Air Quality and Filtration: Advanced filtration systems in HVAC ensure high air quality by removing particulate matter and contaminants, contributing to a clean and controlled production environment.
- Regulatory Compliance: HVAC systems, when designed and maintained properly, contribute to compliance with regulatory standards, ensuring that pharmaceutical products meet quality and safety requirements.
- Personnel Comfort: HVAC systems create a comfortable working environment for personnel, promoting productivity and well-being, particularly in facilities where operators spend extended periods.
- Versatility: HVAC systems are versatile and can be adapted to different production needs, making them suitable for a variety of pharmaceutical processes.

- Energy Efficiency: Modern HVAC systems incorporate energy-efficient technologies, helping pharmaceutical facilities minimize energy consumption and reduce operational costs.

Disadvantages:

- Initial Cost: The installation of sophisticated HVAC systems involves a significant initial investment, which can be a barrier for smaller pharmaceutical manufacturers.
- Maintenance Complexity: HVAC systems require regular maintenance to ensure optimal performance. The complexity of some systems may necessitate skilled personnel for troubleshooting and repairs.
- Space Requirements: HVAC systems may require substantial space within a facility, impacting the overall layout and potentially reducing available production space.
- Energy Consumption: Despite advancements in energy efficiency, HVAC systems can still consume a notable amount of energy, contributing to operational costs and environmental impact.
- Limited Adaptability to Rapid Changes: Some HVAC systems may have limitations in adapting quickly to sudden changes in production demands or environmental requirements, requiring careful planning for dynamic processes.
- Risk of Cross-Contamination: In certain configurations, there may be a risk of cross-contamination between different zones within a facility if the HVAC system is not designed or maintained appropriately.

Positive Pressure Ventilation System

Positive pressure ventilation systems are designed to maintain a higher air pressure inside specific controlled environments, such as cleanrooms or critical production areas, compared to the surrounding spaces. This configuration prevents the entry of contaminants from outside and is particularly important in maintaining sterility and preventing the ingress of airborne particles into critical zones.

Advantages:

- Contamination Prevention: Positive pressure systems create an environment where air flows out of the controlled zone, minimizing the risk of contaminants entering critical areas. This is crucial for maintaining sterility in pharmaceutical production. E
- Enhanced Cleanroom Integrity: Positive pressure ventilation reinforces the integrity of cleanrooms by preventing unfiltered air from infiltrating controlled spaces, ensuring that the air quality meets stringent requirements.
- Personnel Protection: This system protects personnel working in cleanrooms from potential exposure to contaminants, enhancing the safety and well-being of operators involved in pharmaceutical manufacturing.
- Product Quality Assurance: By reducing the likelihood of external contaminants entering the production area, positive pressure systems contribute to the assurance of product quality in pharmaceutical manufacturing.

- Stringent Regulatory Compliance: Positive pressure ventilation aligns with regulatory standards for cleanroom environments, which are essential for compliance with pharmaceutical industry regulations and quality assurance.
- Airflow Control: Positive pressure systems provide precise control over the direction of airflow, ensuring that air moves from cleaner to less clean areas, preventing the dispersion of contaminants.

Disadvantages:

- Initial Cost: Implementing a positive pressure system involves a significant initial investment, including the installation of specialized equipment and infrastructure, which may increase the overall cost of facility setup.
- Maintenance Complexity: Positive pressure systems require regular maintenance to sustain their effectiveness. The complexity of the system may necessitate skilled maintenance personnel, potentially adding to operational costs.
- Dependency on Design: The effectiveness of positive pressure systems is heavily dependent on the initial design and construction of the facility. Any flaws in design or construction may compromise the system's ability to maintain the required pressure differentials.
- Energy Consumption: Maintaining positive pressure requires constant airflow, which can contribute to higher energy consumption. The continuous operation of ventilation systems may lead to increased energy costs.
- Limited Adaptability to External Factors: Positive pressure systems may face challenges in adapting to external factors such as changes in weather conditions or fluctuations in outdoor air quality, potentially impacting their efficiency.
- Complexity in Facility Design: Incorporating positive pressure ventilation systems necessitates careful planning and design, which may limit flexibility in facility layout and require additional considerations during construction.

Laminar Airflow System

Laminar airflow systems create a unidirectional, parallel flow of highly filtered air in specific areas where cleanliness is of utmost importance. This system helps minimize the presence of airborne particles by directing the air in a single direction, typically from the ceiling to the floor. Laminar airflow systems are commonly employed in critical zones of pharmaceutical production, such as filling lines or areas with sensitive equipment.

Advantages:

- Unidirectional Airflow: Laminar airflow systems create a controlled environment with unidirectional airflow, minimizing the presence of airborne contaminants and ensuring a clean and sterile work area.
- High Particle Removal Efficiency: Laminar airflow systems typically use High-Efficiency Particulate Air (HEPA) or Ultra-Low Penetration Air (ULPA) filters, providing high particle removal efficiency and maintaining a low level of airborne particulate matter.

- Reduced Risk of Cross-Contamination: The unidirectional airflow in laminar systems reduces the risk of cross-contamination between different zones or workstations, enhancing the overall quality and safety of pharmaceutical production.
- Critical Zone Protection: Laminar airflow is particularly effective in protecting critical zones, such as filling lines and areas with sensitive equipment, where maintaining a sterile environment is imperative.
- Enhanced Product Quality: By minimizing the presence of airborne particles, laminar airflow contributes to the assurance of product quality, especially in the production of sterile pharmaceuticals where even microscopic contaminants can be critical.
- Versatility in Applications: Laminar airflow systems are versatile and can be tailored to specific applications within pharmaceutical production, adapting to various cleanliness requirements and critical processes.

Disadvantages:

- High Initial Cost: The installation of laminar airflow systems involves a substantial initial cost, including the purchase of specialized equipment such as HEPA or ULPA filters and the construction of cleanroom infrastructure.
- Maintenance Requirements: Laminar airflow systems require regular maintenance to ensure the continued efficiency of filters and components. Maintenance may include filter replacement and monitoring, adding to operational costs.
- Dependency on Facility Design: The effectiveness of laminar airflow systems is highly dependent on the initial design and construction of the facility. Any shortcomings in design may impact the system's ability to maintain the required level of cleanliness.
- Energy Consumption: Operating laminar airflow systems requires continuous energy input to maintain the unidirectional airflow. This can contribute to higher energy consumption and operational costs.
- Restricted Work Area: Laminar airflow systems may limit the flexibility of the workspace within a cleanroom, as the unidirectional airflow must be maintained to ensure the desired level of cleanliness.
- Limited Adaptability to External Factors: External factors, such as changes in environmental conditions or fluctuations in outdoor air quality, may pose challenges to the adaptability of laminar airflow systems, potentially affecting their efficiency.

The preferred alternative: HVAC System

The Cleanroom HVAC system, tailored for environments where stringent cleanliness standards are imperative, represents a paradigmatic alternative calibrated to meet the exacting demands of pharmaceutical production. Central to its configuration is the integration of High-Efficiency Particulate Air (HEPA) or Ultra-Low Penetration Air (ULPA) filters, ensuring the removal of particles to an exacting size criterion. This system further embodies controlled laminar airflow patterns within cleanrooms, minimizing turbulence and obviating the accumulation of particulate matter. The meticulous control over temperature and humidity levels, coupled with the maintenance of differential air pressures between zones, fortifies the system's efficacy in upholding the requisite cleanliness classifications.

A salient feature of the Cleanroom HVAC system lies in its continuous monitoring and validation mechanisms, constituting an advanced infrastructure for perpetual assessment and verification of system performance. Such attributes substantiate compliance with regulatory benchmarks, thereby underscoring its capacity to assiduously adhere to pharmaceutical industry regulations and ensconce quality assurance imperatives.

In addition to its regulatory alignment, the Cleanroom HVAC system offers unparalleled advantages. Its preeminence lies in furnishing an environment of heightened cleanliness, integral to pharmaceutical production, where contamination risks must be mitigated to the utmost degree. The system's capacity to maintain sterility in critical production areas further elevates its significance, ensuring the production of pharmaceutical products of uncompromised quality and sterility.

Moreover, the Cleanroom HVAC system is not only customized for pharmaceutical processes but is also characterized by adaptability to evolving production demands. Its intrinsic flexibility enables responsiveness to varying cleanliness requirements, thereby substantiating its position as a dynamic and reliable HVAC alternative in the pharmaceutical manufacturing landscape.

While the Cleanroom HVAC system stands as a preferred alternative, its selection mandates a judicious synthesis of considerations germane to the pharmaceutical production context, encompassing facility design nuances, regulatory stipulations, and the intricate dynamics of the production processes. The overarching goal is the creation of an environment that not only ensures regulatory compliance but also safeguards product quality and fosters the well-being of both products and personnel.

4.4.2 Scale Alternative

The scale alternative refers to activities that can be adapted to different sizes or magnitudes, allowing for flexibility in implementation. In the context of the proposed project, the scale alternative involves the ability to adjust the scale of operations based on specific needs.

In the realm of pharmaceutical manufacturing, the concept of scale alternative encompasses the capability to adjust operational parameters to cater to diverse requirements. This flexibility assumes particular significance given the varied nature of pharmaceutical products slated for production.

Consider, for instance, the Oral Solid Dosage Form (Tablet and Capsule) segment, projecting a monthly output of 60 million units. The scale alternative, in this context, involves exploring production capabilities tailored to varying quantities, whether smaller or larger. This adaptability enables manufacturers to dynamically respond to market demands, altering the scale of tablet and capsule production as dictated by fluctuations in demand or shifting market dynamics.

Similarly, the Oral Solid (Beta Lactam) category, with an envisaged production volume of 4 million units per month, necessitates a scale alternative that allows recalibration of production capacities to align with evolving market needs. This entails the ability to swiftly adjust the production scale of Beta Lactam tablets and capsules, responding to factors such as regulatory requirements or changes in market demand.

In the instance of Oral Powder (Sachet) production targeting 1.5 million units per month, the scale alternative manifests through the facility's proficiency in efficiently adjusting production

volumes. This adaptability ensures that the manufacturing process remains responsive to fluctuations in demand for oral powder sachets, thereby promoting operational efficiency.

For Oral Liquid (100 ML/Bottle) production, aiming at 90,000 bottles per month, the scale alternative involves the adept modulation of the manufacturing process to accommodate diverse production volumes. This adaptability ensures that the production facility can cater to varying requirements for oral liquid pharmaceuticals, optimizing the utilization of resources.

In the domain of Ophthalmic (Tube) production set at 60,000 tubes per month, the scale alternative encompasses the facility's capacity to scale up or down the production volume. This flexibility is crucial for responding to market dynamics or unforeseen factors impacting the demand for ophthalmic tubes.

The Powder for Injection (Vial) category, with a monthly target of 39,612 vials, underscores the scale alternative as the ability to dynamically adjust production volumes. This ensures the facility's efficiency in meeting market demands for powder for injection in vials while optimizing production resources.

For Large Volume Parenteral Solution (Plastic Bottle) and Small Volume Parenteral Solution (Ampoule) production, projected at 200,000 bottles and 350,000 ampoules per month respectively, the scale alternative requires adeptness in adapting production capacities based on market requirements. This adaptability is essential for optimizing the production process for parenteral solutions across varying volumes.

The scale alternative in pharmaceutical production underscores the significance of operational flexibility, allowing manufacturing facilities to dynamically adjust production volumes across diverse pharmaceutical categories. This adaptive capacity ensures not only responsiveness to market demands but also an optimized utilization of resources in the pharmaceutical production process.

4.4.3 Scheduling Alternative

The scheduling alternative in pharmaceutical production, also recognized as sequencing or phasing alternatives, entails the strategic rearrangement or rescheduling of distinct components within an activity to occur at times when their impact is minimized. This approach is fundamentally geared towards optimizing the timing of various elements within an activity to alleviate its overall impact.

In the context of pharmaceutical production, the scheduling alternative becomes pivotal in orchestrating the intricate processes involved in manufacturing various pharmaceutical products. This involves carefully planning and organizing the sequence of tasks, production stages, and resource utilization to streamline the overall production timeline and enhance efficiency.

For instance, in the production of Oral Solid Dosage Forms, including tablets and capsules, the scheduling alternative may involve aligning the manufacturing processes in a way that minimizes downtime between different stages, ensuring a continuous and efficient workflow. Similarly, for the production of Oral Liquid pharmaceuticals, precise scheduling can help coordinate the formulation, filling, and packaging stages to optimize resource utilization and reduce overall production time.

In the realm of pharmaceutical manufacturing, adherence to regulatory timelines for product development and approval is critical. The scheduling alternative becomes a crucial tool for aligning research, development, and production activities in a way that ensures compliance with regulatory requirements and facilitates timely market entry.

Moreover, in scenarios where different pharmaceutical products are produced concurrently, the scheduling alternative becomes instrumental in managing shared resources, such as production lines and personnel, to prevent bottlenecks and optimize overall productivity.

The scheduling alternative is not only applicable to the manufacturing floor but also extends to supply chain management, ensuring the timely procurement of raw materials, coordination of transportation logistics, and synchronization with distribution timelines.

In summary, the scheduling alternative in pharmaceutical production serves as a dynamic and strategic tool for optimizing the timing and sequence of activities. Its application extends across various facets of the production process, contributing to enhanced efficiency, regulatory compliance, and overall operational excellence in the pharmaceutical manufacturing landscape.

3.5.4 No-go Alternative

The no-go alternative within the domain of pharmaceutical production, also denoted as the non-option or no-action alternative, delineates a scenario wherein the proposed course of action is not implemented, and the existing status quo remains undisturbed. This alternative assumes particular prominence, especially when the anticipated project carries significant environmental risks.

Within the pharmaceutical production sphere, the no-go alternative emerges as a plausible consideration, notably during the deliberation of expanding operations. In this specific context, the no-go alternative entails the decision to abstain from proceeding with the envisaged expansion, opting to uphold the current operational capacity and scale. These alternative gains relevance when the potential impacts on the environment, society, or economy associated with the expansion are taken into account.

While the no-go alternative stands as a valid and conservative option, it may not consistently align with the principle of inherently prioritizing environmental friendliness. The decision to forgo the proposed expansion necessitates thorough evaluation, encompassing not only the potential environmental risks but also the forfeited benefits linked to the expansion.

In contemplating the no-go alternative, a critical aspect involves thoughtful consideration of the ramifications tied to maintaining the current operational status. This entails an assessment of economic repercussions, potential effects on employment, and the broader societal and environmental dimensions linked to sustaining the existing operational scale.

In scenarios where expansion could contribute positively to the local economy, generate employment opportunities, or elevate the technological prowess of the pharmaceutical facility, opting for the no-go alternative may entail relinquishing these potential benefits.

Ultimately, the decision to embrace or discard the no-go alternative within the landscape of pharmaceutical production necessitates a comprehensive evaluation of the trade-offs between environmental conservation and the potential positive impacts associated with the proposed expansion. Meticulous contemplation of these factors becomes imperative to arrive at an

informed decision that aligns with both environmental stewardship and the broader socio-economic context.

4.5 Physical Environment

4.5.1 Locality (Situation) of Pyin Oo Lwin Township

The poposed pharmaceutical factory situated at Kan Gyi Kone village tract near Anisakan Airport in the Pyin Oo Lwin Township which is a scenic hill town in Mandalay Division, Myanmar, located in the Shan Highland, some 54.5 kilometers east of Mandalay. Pyin Oo Lwin Township, situated in Central Myanmar lies on the eastern part of Mandalay Region. Its average elevation is 3,538 feet above sea level. The area of Pyin Oo Lwin Township is 488,794 acres or 763.74 square miles. It is situated between the latitudes of 21° 48′ and 22° 1 2 ′ North and the longitudes of 96° 12′ and 96° 45′ East.
The bordering Townships are Shan (North) and Naung Cho Township in the East and North, Kyauk Se Townships in the South, Mandalay Region, Pathein Gyi Township and Madaya Township in the west. Total area of Pyin Oo Lwin Township is (763.74) square miles and area of Pyin Oo Lwin City is (39.53) square miles.

4.5.2 Topography and Land categories

Pwin Oo Lwin is above 3,538 feet of sea level and situated at the mountain range which has a lot of hills and hillocks. The factory is located at the part of the mountain range which lies in the direction from North East to South West.

The Soils near Pyin Oo Lwin are acidic (less than pH 5) and need lime or dolomite to prepare for some plantations and a pH less than 5 with low available phosphorus and thus shortages of many other nutrients.

Pyin Oo Lwin Township has just few rivers, creeks and they are flowing from North to South. The famous river is Dote Hta Wati and crossing near Pyin Oo Lwin from North to South. The water resources from Dout Hta Wati River are freshwater that can be used as drinking water and also for agricultural use. In summer, the water level of Dote Hta Wati is too low about 6 feet to cross by ships and boats. Pwe Gaun Fall, Dat Taw Gyaint Water Fall, Peik Chin Myaung, Kan Taw Gyi, Kan Taw Lay are the main drainage ways of water.

4.5.3 Geology of Study Area

Physiography

Physiographically, there are two parts in area, the western low land area and the eastern high land area which is about 3500 feet in height. The highest peak, Kyaingtaung (4174 feet) is located at the outside of eastern boundary of study area. It is mainly occupied by calcareous siltstones units of Kyaingtaung formation.

According to Figure (10), the study Kangyigon area should be classification into four geomorphology and geomorphic terrain units. They are first step structural terrace (Dattaw gorge level), second step structural terrace (Anisakan- Kangyigone level), Third step structural terrace (Nyannyintar level) and Forth Step Structural terrace (KyaingTaung Level). The western low land area is combined of first step and Second step of structural terraces and the high land area is composed of the Third and Fourth step of structural terraces.

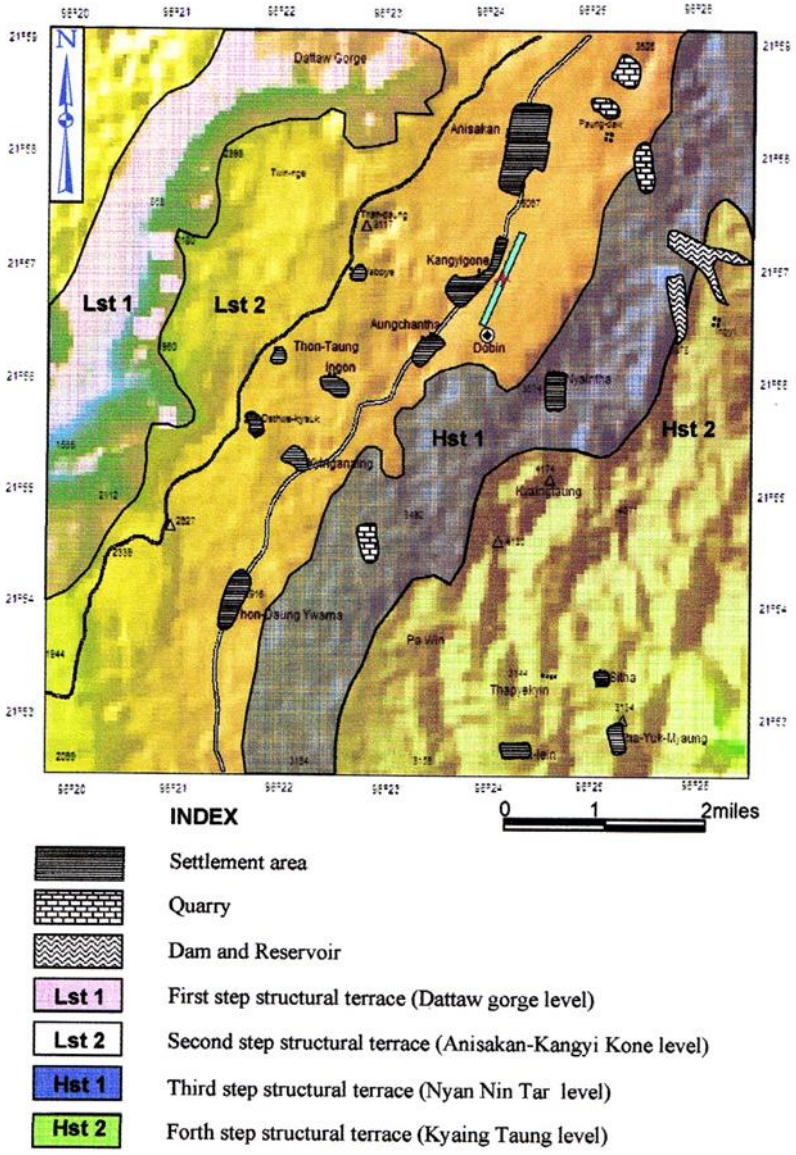


Figure 11. Geomorphology and geomorphic terrain units

Regional Geology

The study area, a fairly rugged trrain shaped by various geological processes, especially folding, faulting, denudation and Karstic process. The elevation is about 3500 feet in the eastern part and less than 500 feet in the lower part. The elevation declines westward to the Mandalay-Pyinoolowin car road. All the structural elements trend approximately North-South. The Ordovician to Devonian strata in the study area is consituted of the Sithaformation (Middle Ordovician), theKyaintaung formation. (Late Ordovician), the Nyaungbaw formation (Silurian), the Zebingyi formation (Early Devonian), and the Maymyo Dolomite formation (Middle Devonian). The regional geological map including study area is shown in Figure (11) and the stratigraphy of study are is described in Table (34).

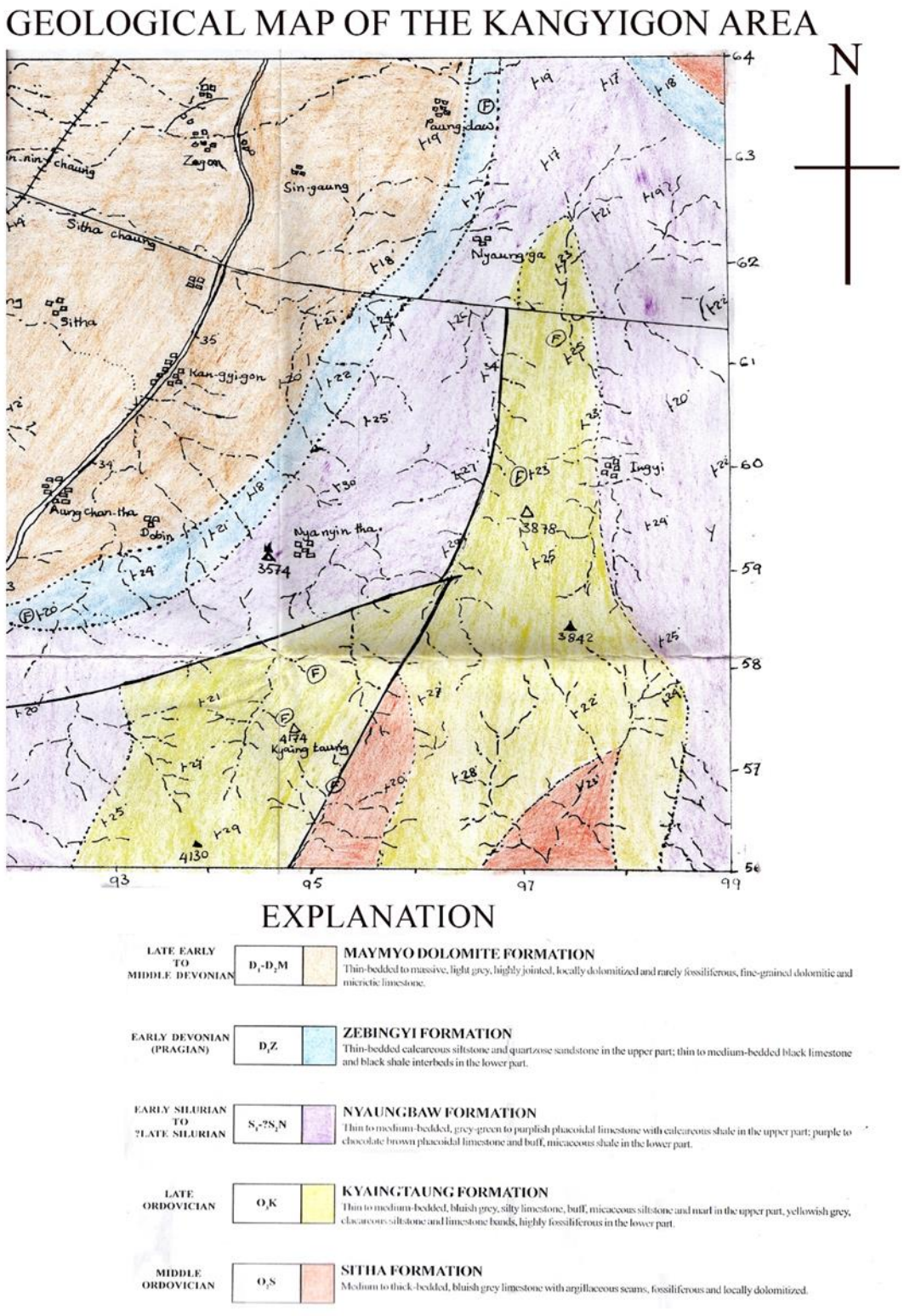


Figure 12. Regional geological map

Table 34. Stratigraphy of Study Area

Formation	Age	Description
May Myo Dolomite	Late Early to Middle Devonian	Thin-bedded to massive, light grey, highly, jointed, locally dolomitized and rarely

		fossiliferous, fine-grained dolomitic and micrictic limestone.
Zebingyi	Early Devonian	Thin-bedded calcareous sistone and quartzose sandstone in the upper part, thin to medium-bedded black limestone and black shale interbeds in the lower part.
Nyaungbaw	Early Silurian to Late Silurian	Thin to medium bedded, grey-green to purplish phacoidal limestone with calcaeous shale in the upper part; purple to chocolate brown phacoidal limestone and buff, mieacerous shale in the lower part.
Kyingtaung	Late Ordovician	Thin to medium bedded, bluish grey, silty limestone, buff, mieaceous siltstones and marl in the upper part, yellowish grey, calcareous siltstone and limestone bands, highly fossiliferous in the lower part.
Sitha	Middle Ordovician	Medium to thick bedded bluish grey limestone with argillaceous seams fossiliterous and locally dolomitized.

Rock Units and their Lithology

(1) Sitha Formation

The Sitha Formation is found in the South-Western part of the study area. This unit is composed of medium to thick bedded, massive, bluish grey limestone containing planty of irregular silt partings and lenses. These limestones are locally highly jointed, and fissures filled with silt particles. Coarsely crystallized secondary caliteveinlets show crisscross pattern. Solution zone between two bedding planes is quite distinct. No fossils are found in Sitha limestone of their area. Their trending generally N-S and dipping generally east ward.

(2) Kyaingtaung Formation

The Kyaingtaung Formation is mainly composed of buff, micaceous siltstone and fine-grained micaceous limestone. It is very fossiliferous. The lower part of this formation is mainly composed of thin to medium bedded, yellow to greenish grey calcareous siltstone and shale containing abundant bryozoans, brachiopods and crinoid stems. Weathered surface shows black stains.

The upper part of this formation is composed of bluish grey to grey silty limestone. It is also composed of buff to purple micaceous siltstone and marls with occasional bands of silty limestone lenses. Most of the buff siltstones are friable. This silt stones and marls contain bryozoans, brachiopods and crinoid stems. As a whole, the content of marl and limestone less than siltstone. The formation is tending nearly N-S and is well exposed at the Kyaungtaung Peak. (4174 feet).

(3) Nyaungbaw formation

The Nyaungbaw Formation is composed of thick bedded, grey-green limestone containing phacoidal structure with white shale. The lower part of this formation is mainly composed of medium to thick-bedded, grey-green, purple to reddish brown aregillaceouslimestones and white to buff silty shale and marls containing graptolite. The upper part of this formation is composed of essentially of medium bedded, grey to grey green nodular limestones

intercalated with thin-bedded, purplish shales. The phocoidal structure is characteristics feature of the Nyaungbaw Formation and it can be easily distinguished from other units. It this area, the Nyaungbaw Formation is generally trending North-South and dipping toward east 20 to 30 degrees.

(4) Zebingyi Formation

The Zebingyi formation is exposed as in a narrow belt between western low land and eastern high land. It is composed of black shale and black limestone in the lower part and buff, purple shale with quartzose sandstone in the upper part. This unit is very fossiliferous. It is generally trading nearly N-S and dipping toward east about 20 degrees.

(5) Maymyo dolomite formation

Maymyo dolomite formation is widely distributed in the western part of this area. It is composed of thin to medium bedded, light grey the grey, fine-grained limestone. It is locally dolomitized and highly brecciated, well-jointed. Fossile are very rare in their unit. It is generally trending N-S and dipping toward east at 22 degrees.

4.5.4 Climate

Based on the data from the Township Administration, Pyin Oo Lwin Township experiences three distinct seasons annually. The average rainfall for approximately 101 days totals 67.15 inches. The highest average temperature, reaching 31°C, occurs during the summer season, while the lowest average temperature, dropping to 6°C, is observed during winter in the year 2017.

January, November, and December typically offer pleasant weather conditions with moderate average temperatures, usually on the cooler side. The months of May through October, on the other hand, constitute the rainy season, characterized by significant rainfall. Among these months, October stands out as the wettest period.

In terms of humidity, the month with the highest average humidity in the morning is October, at 77%, while the lowest is recorded in March, at 48%. The average annual humidity percentage is approximately 67%. As Pyin Oo Lwin Township is a mountainous upland region, 'Mountainous Red Earth' is also found commonly in the Township. The natural vegetation of Pyin Oo Lwin Township is depending upon the temperature, rainfall, altitudes and soil.

Table 35. Temperature and Rainfall

Sr	Year	Rainfall		Temperature	
		Day of Raining	Total Rainfall	Summer	Winter
				MAX °C	MIN °C
1	2012	91	53.25	31	7
2	2013	92	96.14	27	8
3	2014	89	57.5	32	3
4	2015	83	46.27	33	3
5	2016	100	56.42	35	3
6	2017	101	67.15	31	6
7	2018	14	1.02	32	5
8	2019	16	8.89	35.5	3.5

Data Source: Pyin Oo Lwin Township Administration.

4.5.4.1 Air Quality

The wind rose diagram showing wind direction and wind speed measure with HAZSCANNER on project site during air quality measures which is shown in figure (12).

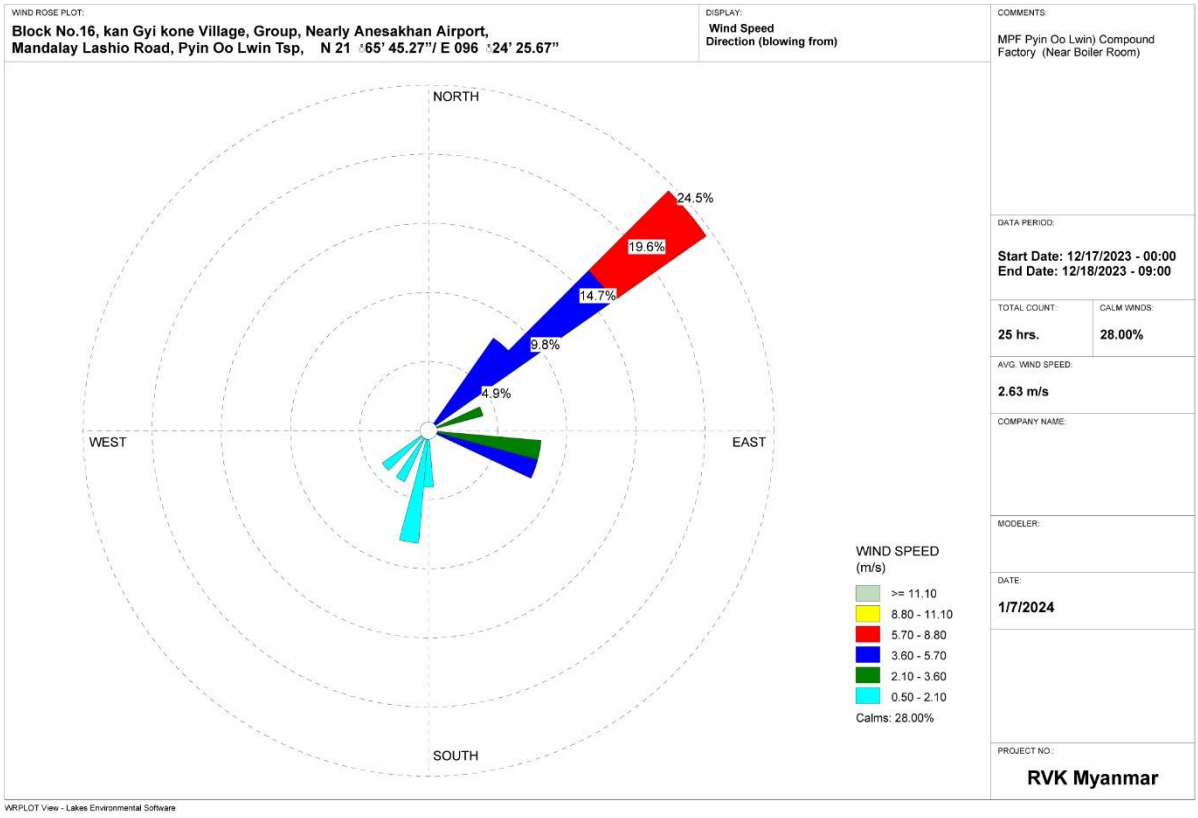


Figure 13. Wind rose diagram

To determine the existing baseline ambient air quality status within the project site, 24-hours air pollutants level, which include dust (PM10 and PM 2.5) and gases (CO, CO2, SO2, NO2, CH4 and VOC etc.) were measured at the selected site in two seasons (May and December) using the HAZSCANNER air monitoring station. To reveal the existing status of baseline air quality, the average ambient air qualities measured were compared with National Environmental Quality (Emission) Guideline. All this leads to mitigate the potential impact on the environment including general pollution along with implementation of the suitable control measures and to prepare the purpose of the environmental monitoring plan. Additionally, 1-hour air testing are taken in grinding and granulation sections of the working area inside the factory.

Table 36. Coordinate Point of Air Station

	First Time	Date (Start-End)	Second Time	Date (Start-End)
Ambient Air Test	21°56'45.25"N 96°24'25.98"E	25-26 May 2017	21°56'45.27"N 96°24'25.67"E	17-18 December 2023
Operation Area Air Test (mixing and grinding room)	-	-	21°56'45.91"N 96°24'21.66"E	18 December 2023
Stack Emission Test	-	-	21°56'44.94"N 96°24'25.50"E	29 August 2023

Source: Air Analysis Result of ALARM Ecological Laboratory

Figure 14. Air Test Sample Points

Table 37. Result of Air Quality (1st Time)

No.	Parameter	Results	Unit	Avg.Period		Guideline value	Avg.Period	Remarks
1	Nitrogen dioxide	228.92	µg/m³ µg/m³	1	year hour	*40 µg/m³ *200 µg/m³	1-year 1-hour	Above the limit
2	Particulate matter PM10	42.64	µg/m³ µg/m³	24	year hours	*20 µg/m³ *50 µg/m³	1-year 24-hour	Normal
3	Particulate matter PM2. 5	33.02	µg/m³ µg/m³	24	year hours	*10 µg/m³ *25 µg/m³	1-year 24-hour	Above the limit
4	Sulphur dioxide	385.83	µg/m³ µg/m³	10	hours mins	*20 µg/m³ *500 µg/m³	24-hour 10 minutes	Normal
5	Ammonia (NH3)	0.074	ppm ppm	24	hour Hours	NG	-	-
6	Carbon dioxide	314.14	ppm ppm	24	hour hours	NG	-	-
7	Carbon monoxide	50	ppb ppb	24	hour hours	NG	-	-
8	Hydrocarbon	11.45	ppm ppm	24	hour hours	NG	-	-
9	Methane	554.77	ppm ppm	24	hour hours	NG	-	-
10	Atomic Radiation	19.39	CPM CPM	24	hour hours	NG	-	-
11	Volatile Organic Carbon (VOC)	0.0	ppm ppm	24	hour hours	NG	-	-

*National Environmental Quality (Emission) Guideline, 2015. NG - No Guideline

Source: Air Analysis Result of ALARM Ecological Laboratory

Table 38. Relative Humidity and Temperature Value on 1st Time

No.	Parameter	Average Period	Unit	Results	Remarks
1	Temperature	24-hours	ºC	26.08	Present condition
2	Wind Speed	24-hours	Kph	1.21	Present condition
3	Wind Direction	24-hours	Deg	176.76	Present condition
4	Relative Humidity	24-hours	RH%	76.73	Present condition

Source: Air Analysis Result of ALARM Ecological Laboratory

To determine operational phase emission levels, various parameter was measured over a 24-hour period nearby generator house and factory on May 25 and 26, 2017. The nearby generator room and factory area exhibit concerning levels of air pollutants, with nitrogen dioxide (NO2) measuring at 228.92 µg/m3, exceeding the recommended limits. Additionally, particulate matter PM2.5 is above the limit at 33.02 µg/m3. However, particulate matter PM10 remains within normal levels at 42.64 µg/m3. Sulphur dioxide (SO2) is at 385.83 µg/m3, within acceptable levels. Ammonia (NH3), carbon dioxide (CO2), carbon monoxide (CO), hydrocarbon, methane, atomic radiation, and volatile organic carbon (VOC) levels are all within normal ranges.

The elevated levels of nitrogen and particulate matter 2.5 (PM2.5) near a boiler house fueled by furnace oil can be attributed to various factors. Firstly, incomplete combustion of furnace oil may lead to higher emissions of nitrogen dioxide (NO2), and particulate matter. Additionally, the sulfur content in furnace oil can contribute to the formation of sulfur dioxide (SO2) and sulfate particulate matter, exacerbating PM2.5 levels. Poor maintenance of the boiler system can further diminish its efficiency, resulting in increased emissions.

Table 39. Result of Air Quality (2nd Time)

No.	Parameter	Results	Unit	Avg.Period		Guideline value	Avg.Period	Remarks
1	Nitrogen dioxide	4.30	µg/m³ µg/m³	 1	year hour	*40 µg/m³ *200 µg/m³	1-year 1-hour	Normal
2	Particulate matter PM_{10}	27.18	µg/m³ µg/m³	 24	year hours	*20 µg/m³ *50 µg/m³	1-year 24-hour	Normal
3	Particulate matter $PM_{2.5}$	13.11	µg/m³ µg/m³	 24	year hours	*10 µg/m³ *25 µg/m³	1-year 24-hour	Normal
4	Sulphur dioxide	55.86	µg/m³ µg/m³	 10	hours mins	*20 µg/m³ *500 µg/m³	24-hour 10 minutes	Normal
5	Ammonia (NH3)	1.216	ppm ppm	 24	hour Hours	 NG	 -	 -
6	Carbon dioxide	97.85	ppm ppm	 24	hour hours	 NG	 -	 -
7	Carbon monoxide	0.0369	ppb ppb	 24	hour hours	 NG	 -	 -
8	Hydrocarbon	20.78	ppm ppm	 24	hour hours	 NG	 -	 -
9	Methane	29.85	ppm ppm	 24	hour hours	 NG	 -	 -
10	Ozone	2.041	µg/m³ µg/m³	 8	hour hours	 *100 µg/m³	 -	 -

11	Volatile Organic Carbon (VOC)	1.013	ppm ppm	24	hour hours	20-150 Mg/Nm³	-	-

*National Environmental Quality (Emission) Guideline, 2015. NG - No Guideline

Source: Air Analysis Result of ALARM Ecological Laboratory

Table 40. Relative Humidity and Temperature Value on 2nd Time

No.	Parameter	Average Period	Unit	Results	Remarks
1	Temperature	24-hours	ºC	16.68	Present condition
2	Wind Speed	24-hours	Kph	1.491	Present condition
3	Wind Direction	24-hours	Deg	170.45	Present condition
4	Relative Humidity	24-hours	RH%	70.78	Present condition

Source: Air Analysis Result of ALARM Ecological Laboratory

To determine operational phase emission levels, various parameter was measured over a 24-hour period nearby production area and boiler house on December 17 and 18, 2023. The measured air quality parameters were assessed against specific guidelines to determine compliance. Nitrogen dioxide (NO2), particulate matter PM10 and PM2.5, sulfur dioxide (SO2), and ozone levels were all within their respective guideline limits. Additionally, the Volatile Organic Carbon (VOC) measurement fell within the acceptable range. Overall, the measured values for these parameters indicate satisfactory air quality conditions in accordance with the provided guidelines.

Table 41. Result of Air Quality (Mixing and Grinding Room)

No.	Parameter	Results	Unit	Avg.Period		Guideline value	Avg.Period	Remarks
1	Nitrogen dioxide	3.76	µg/m³ µg/m³	1	year hour	*40 µg/m³ *200 µg/m³	1-year 1-hour	Normal
2	Particulate matter PM_{10}	5.11	µg/m³ µg/m³	1	year hour	*20 µg/m³ *50 µg/m³	1-year 24-hours	Normal
3	Particulate matter $PM_{2.5}$	1.91	µg/m³ µg/m³	1	year hour	*10 µg/m³ *25 µg/m³	1-year 24-hours	Normal
4	Sulphur dioxide	139.80	µg/m³ µg/m³	10	hours mins	*20 µg/m³ *500 µg/m³	24-hours 10 minutes	Normal
5	Ammonia (NH3)	4.9	ppm ppm	1	hour Hours	NG	-	-
6	Carbon dioxide	80.08	ppm ppm	1	hour hours	NG	-	-
7	Carbon monoxide	1.59	ppb ppb	1	hour hours	NG	-	-
8	Hydrocarbon	18.17	ppm ppm	1	hour hours	NG	-	-
9	Methane	0	ppm ppm	1	hour hours	NG	-	-
10	Ozone	19.6	µg/m³ µg/m³	1	hour hours	*100 µg/m³	8- hours	-
11	Volatile Organic Carbon (VOC)	0.862	ppm ppm	1	hour hours	NG	-	-

*National Environmental Quality (Emission) Guideline, 2015. NG - No Guideline

Source: Air Analysis Result

Table 42. Relative Humidity and Temperature Value on Grinding Room

No.	Parameter	Average Period	Unit	Results	Remarks
1	Temperature	1-hour	ºC	23.53	Present condition
2	Wind Speed	1-hour	Kph	0	Present condition
3	Wind Direction	1-hour	Deg	35.06	Present condition
4	Relative Humidity	1-hour	RH%	48.83	Present condition

Source: Air Analysis Result

The air quality measurements in operation area of grinding room indicate generally low levels of pollutants. Nitrogen dioxide (NO2), particulate matter PM10 and PM2.5, sulphur dioxide (SO2), ammonia (NH3), carbon dioxide (CO2), carbon monoxide (CO), hydrocarbon, methane, atomic radiation, and volatile organic carbon (VOC) levels are all within normal ranges.

Air Testing nearby boiler house

Operation Area Testing

To evaluate the existing environmental conditions of the factory, gas emissions from the boiler were measured by Green Myanmar Environmental Services Co., Ltd. at the selected site using the Kane 988 Combustion Analyzer to monitor the stack emission of the furnace. The KANE 988 handheld analyzer is easy to use for domestic and industrial boiler flue gas measurement and analysis. It operates on all combustion facilities, such as boilers, generators, and furnace types, and can display 8 parameters simultaneously, showing measurements and calculations of efficiency and pollution. Measurements to determine the boiler stack emissions were carried out for a short duration, specifically a one-hour sample interval.

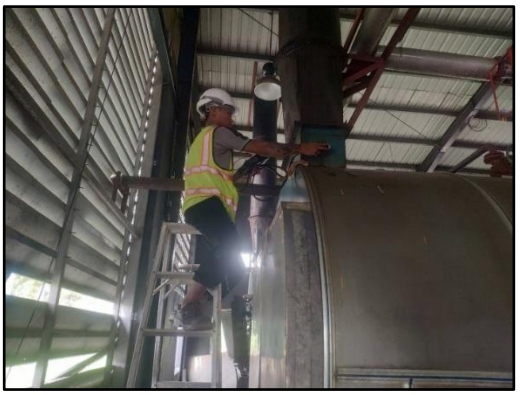
Table 43. Results of Generator Stack Gas Emission

Parameters	Units	Results				1 hr avg	NEQ(E)G Guideline Value
		15 min	30 min	45 min	60 min		

GAS	O_2	mol%	13.74	12.32	15.72	13.13	13.72	-
	CO	mol%	3260	1847	1774	1900	2195.25	-
	CO_2	mg/Nm³	7.05	8.46	5.15	7.80	7.115	-
	NO_2	mg/Nm³	352	16	20	48	109	460
	SO_2	mg/Nm³	459	72	124	73	182	2000

Source: Air Analysis Result of Green Myanmar Environmental Services Co., Ltd.

According to the above table, the results do not exceed the Nation Environmental Quality (Emission) Guidelines of Small Combustion Facilities.



4.5.4.2 Noise Quality

Noise readings were obtained utilizing a GM1356 Digital Sound Level Meter. Instrumentation provides two different exponential time weightings 'fast' (with a nominal exponential-time constant of 125 milliseconds) and 'slow' (nominal exponential time constant of 1 second). Fast, is generally the preferred time-weighting, especially for statistical data and for variable noise levels.

The noise level measurement is conducted twice during the operation phase. The GES survey team carries out 24-hour noise readings outside the factory, covering both day and night periods to determine the noise levels of the surrounding environment. Additionally, 1-hour noise readings are taken in grinding and granulation room of the working area inside the factory.

Source	Location 1st Time	Date (Start-End)	Location 2nd Time	Date (Start-End)
Noise Test nearby factory	21°56'44.14"N 96°24'22.72"E	5-6 Septemner 2016	21°56'45.20"N 96°24'25.80"E	17-18 December 2023
Operation Area (Mixing and grinding room)	-	-	21°56'45.87"N 96°24'21.78"E	18 December 2023

Source: Noise Analysis Result

Figure 15. Noise Level Testing Points

Noise Measurement Period

The Noise level was measured for 24 hours continuously during Operation Phase (5 to 6 September 2016) and Operation Phase (17 to 18 December 2023). Daytime and nighttime under survey indicate 7:00-22:00 and 22:00-7:00. [NEQG (2015)]

Noise Measurement Result

Table 44. Result of Sound Level Measurement 1st Time

Receptor		One Hour LAeq(dBA) Day Time 07:00-22:00	Night Time 22:00-07:00
Proposed Site	Pharmaceutical Factory	56.6	58.1
IFC Guideline	Industrial; Commercial	70	70
Japanese Guideline	Industrial; Commercial	75/70	65/60
NEQG Guideline	Industrial; Commercial	70	70

Data Source: Survey Team

The initial testing was conducted at the center of the production area, near the ventilation units, revealing noise levels of 56.6 dBA during the daytime and 58.1 dBA during the nighttime. These levels fall below the IFC guideline for industrial and commercial areas, which recommends a maximum of 70 dBA for both day and night periods. Similarly, the NEQG guideline also aligns with the IFC recommendation of 70 dBA for both day and night periods in industrial and commercial areas.

Table 45. Result of Sound Level Measurement 2nd Time

Receptor		One Hour LA_{eq}(dBA) Day Time 07:00-22:00	Night Time 22:00-07:00
Proposed Site	Factory	53.3	49.1
IFC Guideline	Industrial; Commercial	70	70

NEQG Guideline	Industrial; Commercial	70	70

Data Source: Survey Team

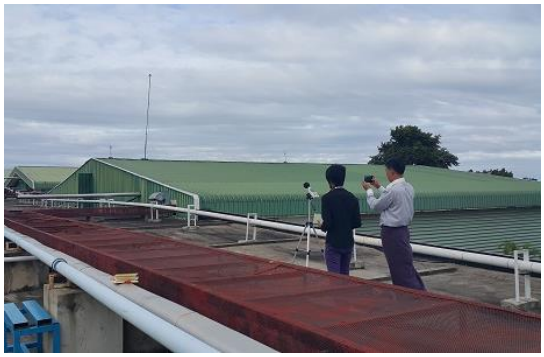
The second time testing was conducted at the infront of the production area nearby boiler house, revealing noise levels of 53.3 dBA during the daytime and 49.1 dBA during the nighttime. These levels fall below the IFC guideline for industrial and commercial areas, which recommends a maximum of 70 dBA for both day and night periods. Similarly, the NEQG guideline also aligns with the IFC recommendation of 70 dBA for both day and night periods in industrial and commercial areas.

Table 46. Sound Level Measurement Result of production area

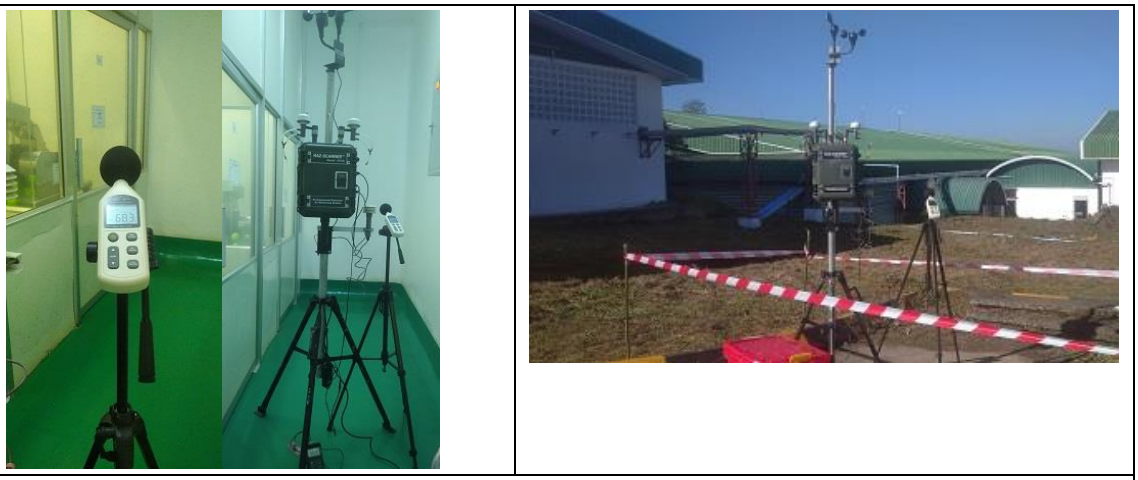
Receptor		Indoor/Outdoor	
		L_{Aeq} dB(A)	L_{A10} dB(A)
Factory	Grinding Room	68.4	71.8
Factory	Granulation Room	75.2	78
NIOSH Guideline	Industrial; Commercial 8-hour	85	85
WHO Guideline	Industrial; Commercial 24-hour	70	110

Data Source: Survey Team

Noise samples were collected over a 3-hour period in the Grinding Room and Granulation Room using the GM1356 Digital Sound Level Meter. The noise levels for L_{Aeq} and L_{A10} fall within the 85-decibel range of NIOSH guidelines for noise aim to protect workers from occupational noise exposure.



First Time Testing



Second Time Testing

4.5.4.3 Soil Quality

Soil types and Soil classification

There are three types of soil can be observed in study area. They are:

1. Aluvium
2. Soil from low land area
3. Soil from high land area

Alluvium

The alluvial soil is distributed mostly hill slope and stream bends around study area. Mainly composed of high plastic silt and clays with organic matter.

Soil from low land area.

The soil representing of the low land area is composed of yellowish brown colour, fine-grained, silty clayand limelyclay type soil with plant remains. It may be the top soil and completely weathering product of remains of underlying lithology which is MaymyodolomiteFormaiton. Its residual soil, terrarosa, is 2 to 3 meters. thick.

Soil from high land area

The soil covering on the high land area is composed of yellow brown to dark grey, low plastic clay, limely clay and silty and sandy with trace of organic materials. This is the product of limestone and silt stone exposures mainly from Zebingyi Formation, Nyaungbaw Formation and Kyaingtaung formation.

The classification of these soil is included in pedocal. Those soil are highly plasticity low permeability and they can maintain water situation in their units.

Soil Test

Baseline data on existing soil quality condition were collected on 7 September 2016 and measured at the Land Use Division of Department of Agriculture, Ministry of Agriculture and Irrigation. During the operations phase, it can be monitored occasionally by the factory management or environment authorities concerned, whether there are hazardous residues in water or soil resulting from the spill if any, from the manufacture procedures of the factory.

Table 47. Soil Sample points

	Sample 1	Sample 2
Latitude	21°56'44.23"N	21°56'46.14"N
Longitude	96°24'20.88"E	96°24'27.47"E

Data Source: Survey Team

Figure 16. Soil Testing Points

Table 48. Soil Quality Examination of Breeder Farm (a)

Sr. No	Sample plot	pH	Orgnic Carbon	Water Soluble $SO_4^{=}$	Water Soluble CL^-
1	MPF 77	Moderately acid	Medium	Low	Low
2	MPF 86	Strongly alkaline	Very low	Not detected	Low

Data Source: Land Use Division of Department of Agriculture, Ministry of Agriculture and Irrigation
(Copies of the Soil Test Data are provided in the attachments.)

Table 49. Soil Quality Examination of Breeder Farm (b)

Sr. No	Sample plot	Moisture %	pH soil:water 1:2.5	Orgnic Carbon %	Humus %	Fe ppm	Exchangeable Cations meq/100gm		Water Soluble	
							H^+	AL^{+++}	CL^-	$SO_4^{=}$
1	MPF 77	5.46	5.98	2.06	3.54	69.00	0.07	0.05	0.28	0.28
2	MPF 86	4.72	7.56	0.81	1.39	56.00	0.09	Not detected	0.24	0.28

Data Source: Land Use Division of Department of Agriculture, Ministry of Agriculture and Irrigation
(Copies of the Soil Test Data are provided in the attachments.)

Soil Sample Collecting

4.5.4.4 Hydrology

Although the study area is mountainous, water resources are sufficient for land use cultivation. Both surface and subsurface water present in the study area. Because of covering thin alluvial and topographic condition groundwater in the study area is limited.

The ground water comes from meteoric water. In the study area the annual rainfall is enough for the study area. Three kinds of water potential may be divided depending lithology, Structural geology and topography (Figure 3). They are as follows:

1. Low Potential
2. Medium potential
3. High Potential

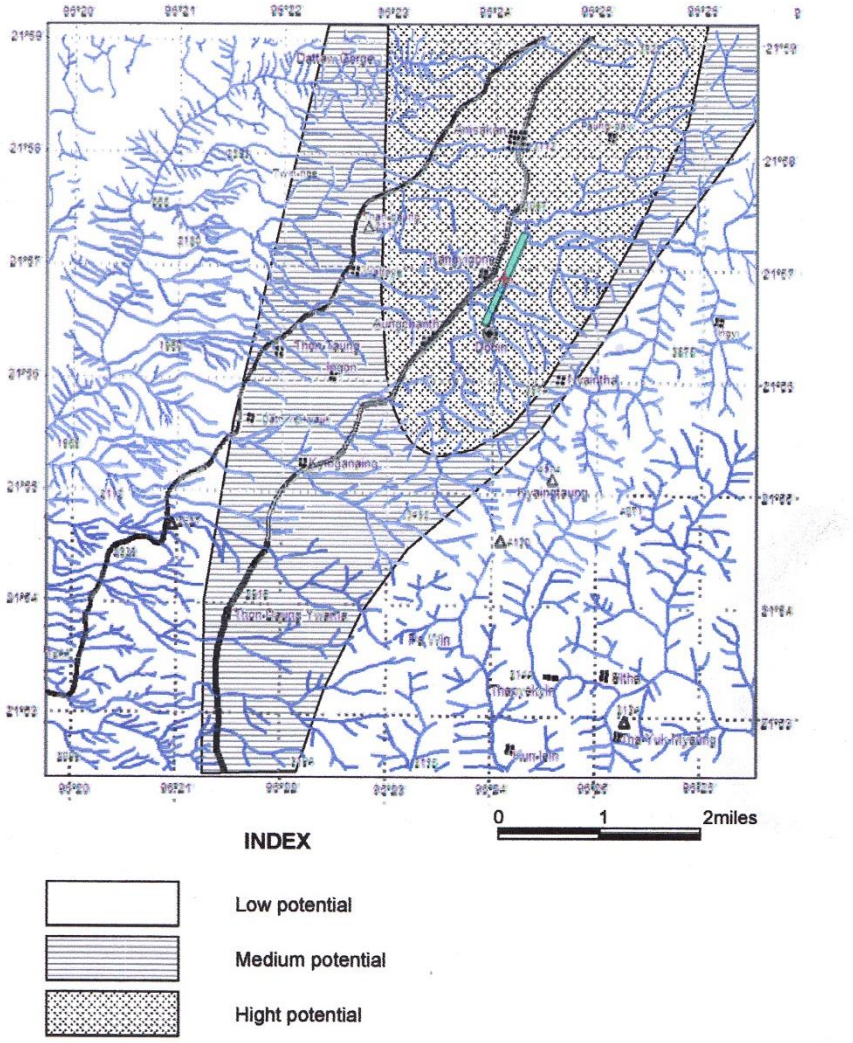


Figure 17. Groundwater potential of Aniskan-Kangyikone area

Water Quality

Baseline data on the quality of portable water from the water treatment plant and wastewater from the wastewater treatment plant at the project site were collected on September 5, 2016, and December 18, 2023. The measurements were conducted at ISO TECH Laboratory and ALARM Geological Laboratory in accordance with the WHO Guidelines for Drinking Water Standards and the NEQG standard for wastewater.

Table 50. Water Sample Location

	Portable water	Wastewater
Location point	21°56'37.98"N	21°56'51.51"N
	96°24'24.34"E	96°24'20.51"E

Data Source: Survey Team

Figure 18. Water sample collecting points

Table 51. Water Quality Examination (Portable water)

Results of Water Analysis			WHO Drinking Water Guideline (Geneva - 1993)
pH	7.6		6.5 – 8.5
Colour (True)	Nil	TCU	15 TCU
Turbidity	3	NTU	5 NTU
Conductivity	276	micro S/cm	
Total Hardness	98	mg/l as $CaCO_3$	500 mg/l as $CaCO_3$
Calcium Hardness	66	mg/l as $CaCO_3$	
Magnesium Hardness	32	mg/l as $CaCO_3$	
Total Alkalinity	132	mg/l as $CaCO_3$	
Phenolphthalein Alkalinity	Nil	mg/l as $CaCO_3$	
Carbonate ($CaCO_3$)	Nil	mg/l as $CaCO_3$	
Bicarbonate (HCO_3)	132	mg/l as $CaCO_3$	
Iron	0.3	mg/l	0.3 mg/l

Chloride (as CL)	15	mg/l	250 mg/l
Sodium Chloride (as NaCL)	25	mg/l	
Sulphate (as SO_4)	12	mg/l	200 mg/l
Total solids	143	mg/l	1500 mg/l
Total Suspended Solids	5	mg/l	
Total Dissolved Solids	138	mg/l	1000 mg/l
Manganese	Nil	mg/l	0.05 mg/l
Phosphate	Nil	mg/l	
Phenolphthalein Acidity	2	mg/l	
Methyl Orange Acidity	Nil	mg/l	
Salinity	0.1	ppt	

Data Source: ISO TECH Laboratory
(Copies of the Water Test Data are provided in the attachments.)

The portable water generally meets acceptable standards. pH level is within the recommended range. Turbidity and color are minimal. Conductivity, hardness, chloride, sulphate, and iron content are all within acceptable limits. Total solids and total dissolved solids are also below maximum allowed levels. Other parameters like magnesium hardness, total alkalinity, bicarbonate, and sodium chloride are within acceptable ranges.

Table 52. Water Quality Examination (Waste Water)

Sr.	Quality Parameters	Results	Units	Emission Standard	Remarks
1.	pH	7.6	S.U	6.0-9.0	Normal
2.	TSS	0	mg/L	≤ 50	Normal
3.	Ammonia	<0.2	mg/L	30	Normal
4.	Chloride	19.9	mg/L	-	
5.	BOD	18	mg/L	≤ 50	Normal
6.	COD	31	mg/L	≤ 250	Normal
7.	Total Phosphorous	1.2	mg/L	≤ 2	Normal
8.	Oil & Grease	5	mg/L	≤ 10	Normal
9.	Total Nitrogen	0.6	mg/L	≤ 10	Normal
10.	Cadmium	ND		≤0.1	LOD=0.01 mg/L
11.	Phenol	<0.1	mg/L	≤0.5	Normal
12.	Mercury	0.001	mg/L	≤0.01	Normal

Data Source: ALARM Ecological Laboratory
(Copies of the Water Test Data are provided in the attachments.)

The water quality analysis reveals that all parameters fall within normal ranges according to specified standards. Key parameters such as pH, Total Suspended Solids (TSS), Ammonia, BOD, COD, Total Phosphorous, Oil & Grease, Total Nitrogen, Phenol, and Mercury are all within acceptable limits.


Wastewater collecting

4.6 Socio-economic Environment

4.6.1 Population Characteristics

Demographic aspect data is based on the data of the Pyin Oo Lwin Township Administration, at the project site location, assuming that the impact (if any may occur) would not reach other townships further from the factory. The total population of Pyin Oo Lwin Township is 178,677 with an annual population increase of 1.14% and Male and Female ratio is (1:1.1).

Table 53. Population

Sr.	Particulars	Over 18 years old			Under 18 Years old			Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
1	Urban	39180	44656	83836	13653	14505	28158	52833	59161	111994
2	Rural	20417	20406	40823	12979	12881	25860	33396	33287	66683
Total		59597	65062	124659	26632	27386	54018	86229	92448	178677

Data Source: Pyin Oo Lwin Township Administration.

Table 54. Progress Rate of Population and Male/Female Ratio

Sr	2015	2016	Increment	rate	Male/Female Ratio		
					Male	Female	Ratio
1	167305	178677	11372	1.14	86229	92448	1:1.1

Data Source: Pyin Oo Lwin Township Administration.

Table 55. Population (Birth / Death / Influx / Out-flux)

Sr	Origin	Birth	Death	Influx	Out-flux	Current
1	178677	123	78	85	130	178677

Data Source: Pyin Oo Lwin Township Administration.

4.6.2 Household Size

Table 56. Household sizes of Pyin Oo Lwin Township

Sr.	Particulars	No. of Houses	Households	Quarter	Village Tract	Village
1.	Urban	19114	19277	21		
2.	Rural	13773	14335		37	116
Total		32887	33612	21	37	116

Data Source: Pyin Oo Lwin Township Administration.

4.6.3 National Race and Non-National Citizens

No.	Race	Population	%
1.	Kachin	11904	7.01
2.	Kayar	49	0.02
3.	Kayin	1028	0.57
4.	Chin	907	0.50
5.	Mon	28	0.01
6.	Bumar	171765	76.00
7.	Yakhine	92	0.05
8.	Shan	15005	8.34
9.	Other	13582	7.75

Data Source: Pyin Oo Lwin Township Administration.

Table 57.Non-National Residents in Pyin Oo Lwin Township

Sr	Foreigner	Population	Population Of Township	%
1	Chinese	27	178677	0.12
2	India	77		0.14
3	Pakistan	6		0.003
4	Bangladesh	4		0.002
5	Others	8		0.004
Total		122		0.07

Data Source: Pyin Oo Lwin Township Administration.

4.6.4 Religions and Religious Places

In Pyin Oo Lwin Township, most people are Buddhists in majority and other religions in minorities thrive together in good harmony, participating in each other's religious affairs together.

Table 58. Religion

Sr.	Township	Buddhist	Christian	Hindu	Muslim	Nat	Others	Total
1.	Pyin Oo Lwin	151577	10243	3167	13616	-	44	178677

Data Source: Pyin Oo Lwin Township Administration.

Table 59. Buddhist Religious Building

Sr	Township	Pagoda	Monastery (Monk)	Monastery (Nun)	Religious Centre
1	Pyin Oo Lwin	698	224	27	37

Data Source: Pyin Oo Lwin Township Administration.

Table 60. Total Number of Monk and Nun

Sr	Township	Monk	Postulant	Nun
1	Pyin Oo Lwin	1858	1771	763

Data Source: Pyin Oo Lwin Township Administration.

Table 61. Famous Pagoda

Sr	Name	Location
1	Ma Har Shwe Myin Tin	Ya Ka Ka (1)
2	U Khan Nhee	Ya Ka Ka (2)
3	Zi Na Man Aung	Ya Ka Ka (5)
4	Naung Kan Gyi	Naung Kan Gyi
5	Ma Har Ant Htoo Kan Thar	Yay Nge (Ya Ka Ka-11)

Data Source: Pyin Oo Lwin Township Administration.

Table 62. Famous Monastery

Sr	Name	Location
1	Kan Oo Kyaung	Ya Ka Ka (2)
2	Myot Lal Shwe Sie Kong	Ya Ka Ka (4)
3	Pu Nga Kar Yi Ke Lal	Ya Ka Ka (4)
4	Yandar Man Aung	Ya Ka Ka (1)
5	Ma Har Ga Dar Yone	Ya Ka Ka (7)

Data Source: Pyin Oo Lwin Township Administration.

Table 63. Other Religious Building

Sr	Name	Christian		Islam		Hindu		Chinese	
		Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
1	Pyin Oo Lwin	14	11	6	5	21	7	4	-

Data Source: Pyin Oo Lwin Township Administration.

Cultural Heritage

According to the information provided from village administration concerning cultural heritage sites that there have no cultural heritage sites in project area, relevant to the EIA of this project will be considered within 2 km radius of the factory.

4.6.4 Economy

Review of the economy in Pyin Oo Lwin Township is by the economic activities of its residents. The economy of Pyin Oo Lwin Township is based on the agriculture sector and Services providing which is fairly developed. Pyin Oo Lwin is located on Mandalay – Lashio Main Road and easily access. The main products of Pyin Oo Lwin Township are Sunflower, Damson, Strawberry, and Sweater which are mainly sell to Mandalay and Yangon Region.

Table 64. Land Use in Pyin Oo Lwin Township

No.	Type of Land	Acre
1.	Total Net Arable Land	36211
	- Paddy Land	5636
	- Farm Land	27841
	- Cultivated Land	1586
	- Orchard Land	1148
	- Hillside cultivation	-

2.	Total Net Vacant Land	3354
3.	Field	-
4.	Industrial Zone Land	884
5.	Town/Village and Others	40154
6.	Forest Conservation Area	198704
7.	Wild Forest	150378
8.	Wild Land	325
9.	Non-Arable and Uncultivated Land	58784
	Total	**488794**

Data Source: Pyin Oo Lwin Township Administration.

Table 65. Major Crops

Sr.	Name	Year 2015-2016		Year 2015-2016			
		Season	**Acre**	**Planted**	**Harvest**	**Rate**	**Production (in bushels)**
1.	Paddy	Summer	-	-	-	-	-
		Rainy	7656	7469	-	71.74	535814
2.	Beans	Rainy	1220	1269	-	37.55	47651
		Winter	-	-	-	-	-
3.	Sesame	Rainy	-	-	-	-	-
		Winter	75	75	-	5.85	439
4.	Sunflower	Rainy	955	828	-	17	14076
5.	Black Gram	-	-	-	-	-	-
6.	Green Gram	Rainy	-	25	-	12.25	356
		Winter	-	-	-	-	-
7.	Pigeon Pea	-	317	322	-	11.58	3729
8.	Cotton	-	610	269	-	410	110290
9.	Sugar Cane	-	-	-	-	-	-
10.	Corn	-	1660	1832	-	55.02	100797

Data Source: Pyin Oo Lwin Township Administration.

4.6.5 Infrastructure

Electricity Supply

Table 66. Electricity Utilization

Sr	Name	Require amount (KW)	Receive amount (KW)	Utilization Amount (KW)	Require/ Surplus amount (KW)
1.	Pyin Oo Lwin	33.22	29.35	33.22	-3.87

Data Source: Pyin Oo Lwin Township Administration.

Table 67. Sub Station

Sr	Name	Owner	Production (KW)
1.	Ah Nee Sakan	Government	118,755,810
2.	21 Mile	Government	15,510,983
Total			134,266,763

Data Source: Pyin Oo Lwin Township Administration.

Communication

Table 68. Communication

Sr	Name	Post	Quantity						
			Telegraph	Auto Phone	IP Star	Cord Less	Mobile	Manual Phone	Applied Internet
1	Pyin Oo Lwin	7	2	3042			105000		401

Data Source: Pyin Oo Lwin Township Administration.

Transportation

Table 69. Airport

Sr	Name	Location	Remark
1.	Pyin Oo Lwin	1	

Data Source: Pyin Oo Lwin Township Administration.

Table 70. Railway Road and Stations

Sr	Name	Town Area		Distant (Mile)	Railway Stations	
		From	To		Big	Small
1	Pyin Oo Lwin	Zee Pyin Gyi	Wat Won	38	1	5

Data Source: PyinOo Lwin Township Administration.

Table 71. Road

Sr	Name	Bus Gates		Distant (Mile)
		From	To	
1	Pyin Oo Lwin – Mandalay	Pyin Oo Lwin	Mandalay	42
2	Pyin Oo Lwin – Lasho	Pyin Oo Lwin	Lasho	167
3	Pyin Oo Lwin – Moegoat	Pyin Oo Lwin	Moe Goat	83/6

Data Source: PyinOo Lwin Township Administration.

4.6.6 Education Level

Pyin Oo Lwin was an important educational center during the colonial times, with the GEHSs (Government English High Schools), such as St. Mary's, St. Michael's, St. Albert's, St. Joseph's Convent, and Colgate, all based in the town. British settlers and colonial administrators sent their children to be educated here, including both the European and Anglo-Burmese children. The town was also the location of the various schools for military education, open to all ethnicities.

It is today the home to the Defence Services Academy (DSA) and the Defence Services Technological Academy (DSTA). There is a large military presence in the town. Nowadays there are some private boarding high schools such as Soe San, Sar Pan Eain etc., famous for disciplines and good matriculation results.

In the Pyin Oo Lwin Township, there is only one university namely Yadanarpone at Pyin Sar. Population by education level, based on the demography data of Pyin Oo Lwin Township in the year 2015-16, is mentioned in Table (72), from monasteries and pre-schools and up to the High school, the average teacher-student ratio in Pyin Oo Lwin which is a fairly good indicator as of Myanmar Standard, but it seems necessary to enforce some more teachers in

the High schools and Middle Schools. The result of the Matriculation Examination is an average of 42.40% which is fairly good.

Table 72. List of University and Schools in Pyin Oo Lwin Township

Sr	Particular	Quantity	Student	Teacher	Ratio
1	University	1	2018	141	1:14
2	High School	9	16895	534	1:32
3	Middle School	12	8874	311	1:29
4	Primary School	127	14366	799	1:18
5	Pre-School	1	23	2	1:12
6	Monastic School	7	854	56	1:15

Data Source: Pyin Oo Lwin Township Administration.

Table 73. Enrolment rate of School Age Child

Sr.	Township	5 years old			Enrolment			Enrolment Rate
		Male	Female	Total	Male	Female	Total	
1	Pyin Oo Lwin	2138	1906	4044	2132	1801	3933	97%

Data Source: Pyin Oo Lwin Township Administration.

Table 74. The Rate of Passing Matriculation

No	Township	Year 2014-2015				Year 2015-2016		
		Enroll	Apply	Success	%	Enroll	Apply	%
1	Pyin Oo Lwin	6755	6158	2611	42.40	6071	5443	

Data Source: Pyin Oo Lwin Township Administration.

Table 75. Literacy Rate

Sr	Population	+15 Year Old	Literacy	%
1	178677	148743	148743	100

Data Source: Pyin Oo Lwin Township Administration.

4.6.7 Health Condition

The health condition of the people in the study area that covers Pyin Oo Lwin Township is gathered through the study of patterns of disease, environmental sanitation and information from health staff in health facility.

Table 76. Health Facilities

Sr	Township	Hospital		Dispensary		Rural Health Dept
		Government	Private	Government	Private	Government
				Malaria	HIV/AIDS	
1	Pyin Oo Lwin	3	4	1	1	6

Data Source: Pyin Oo Lwin Township Administration.

Table 77. Health Care

Sr	Township	Population	Doctor		Nurse		Asst-Health Officer	
			Doctor	Ratio	Nurse	Ratio	Asst-Health officer	Ratio
1.	Pyin Oo Lwin	178677	106	1:1817	143	1:1347	6	1:32111

Data Source: Pyin Oo Lwin Township Administration.

Table 78. Diseases

Sr.	Township	Types of Disease									
		Malaria		Diarrhea		TB		Dysentery		Hepatitis	
		Occur	Dead	Occur	Dead	Occur	Dead	Occur	Dead	Occur	Dead
1	Pyin Oo Lwin	109	-	2017	-	96	-	700	-	1030	2

Data Source: Pyin Oo Lwin Township Administration.

According to the information from health workers, it is known that common diseases among the residents are

- Seasonal Influenza and common cold
- Occasional Diarrhea, Cough, Respiratory Infection and other hygiene problems.

In general, public awareness of the importance of health is noted as good.

4.6.8 Livelihood

In the study area, the principal livelihood of its people is found to be farmers, traders and casual worker. Population by types of livelihoods in 2015-16 can be seen in Table (79).

Table 79. Livelihood and Population by Occupation in Pyin Oo Lwin Township

No.	Types	Population
1.	Government employee	6,610
2.	Services	23,576
3.	Agricultural	16,840
4.	Animal husbandry	133
5.	Trading	708
6.	Technical	3,666
7.	Casual Workers	45,897
8.	Others	45,681
Total		**133,110**

Data Source: PyinOo Lwin Township Administration.

Table 80. Per Capita Income

Sr	Township	2013-2014	2014-15	2015-16
1	Pyin Oo Lwin	457,649	484,243	629,880

Data Source: PyinOo Lwin Township Administration.

Table 81. Number of Jobless

Sr	Township	Population in available to work	Number of Workers in jobs	Number of jobless	Jobless %
1	Pyin Oo Lwin	1379030	34970	846	0.6

Data Source: PyinOo Lwin Township Administration.

Table 82. Poverty

Sr	Population	Population in Poverty	Rate
1	178,677	27,072	15.20

Data Source: PyinOo Lwin Township Administration.

4.6.9 Social Setting in the project area

Population

In Kan Gyi Kone Village Tract called Ward (16) include two villages namely Kan Gyi Kone and Si Tha. In Kan Gyi Kone and Si Tha, there are a total of 2015 residents, with 1593 individuals over 18 years old and 422 under 18. In Nyan Nyin Tha, there are 570 residents, with 466 over 18 and 104 under 18. In Nyan Nyin Tha, there are 2348 residents, with 1867 over 18 and 481 under 18.

Table 83. Total Population of Villages

Sr.	Particulars	Over 18 years old			Under 18 Years old			Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
1	Kan Gyi Kone and Si Tha	735	858	1593	212	210	422	947	1068	2015
2	Nyan Nyin Tha	237	229	466	50	54	104	287	283	570
3.	Aung Chan Tha	863	1004	1867	253	228	481	1116	1232	2348

Data Source: Ward and Village Administration.

Household Size

Table 84. Household sizes of Villages

Sr.	Particulars	No. of Houses	Households
1.	Kan Gyi Kone and Si Tha	387	420
2.	Nyan Nyin Tha	156	168
3.	Aung Chan Tha	990	589

Data Source: Ward and Village Administration.

Housing Condition

In Kan Gyi Kone village, housing structures predominantly consist of one-story reinforced concrete (RC) buildings numbering 140, with brick nogging structures totaling 121. Additionally, there are 13 wooden houses and 113 bamboo houses with thatched roofs. Meanwhile, in Nyan Nyin Tha village, housing varies with the majority being three-story RC buildings (2), followed by two-story RC buildings (19). Furthermore, there are 93 one-story brick nogging houses, along with 2 two-story wooden houses and 3 one-story wooden houses. Additionally, there are 2 two-story bamboo houses with thatched roofs, and 56 one-story bamboo houses with thatched roofs.

National Race

Table 85. National Residents in Villages

	Kachin	Kayar	Kayin	Chin	Bamar	Mon	Rakhine	Shan	Other	Total
Ward 16	-	-	-	-	2015	-	-	-	-	2015
Nyan Nyin Tha					193			420	32	570
Aung Chan Tha	30	-	-	4	1080	-	-	270	964	2348

Data Source: Ward and Village Administration.

Table 86.Religion

	Buddhist	Christian	Hindu	Muslim	Nat	Others	Total
Ward 16	2015	-	-	-	-	-	2015
Nyan Nyin Tha	566	4	-	-	-	-	570
Aung Chan Tha	1350	34	20			936	2348

Data Source: Ward and Village Administration.

Table 87. Religious Building

	Pagoda	Monastery	Monk	Novice	Total Monk	Nunneries
Ward 16	1	2	9	2	11	3
Nyan Nyin Tha	6	17	32	-	32	-
Aung Chan Tha	5	20	38	250	288	12

Data Source: Ward and Village Administration.

Economy

Table 88. Land Use in Villages

No.	Type of Land	Kan Gyi Kone Acre	Nyan Nyin Tha Acre	Aung Chan Tha Acre
1.	Total Net Arable Land	445		
	- Paddy Land	99	84.43	59.38
	- Farm Land	246	69.10	171.10
	- Alluvial Soil (Kaing Kyun)	-	-	-
	- Garden Land	9	1.44	15.21
2.	Total Net Vacant Land	-		
3.	Non-Arable and Uncultivated Land	42		
	Total	**387**	**154.97**	**245.69**

Data Source: Ward and Village Administration.

Livelihood

Table 89. Livelihood and Population by Occupation in Kan Gyi Kone Village Tract and Nyan Nyin Tha Village

No.	Types	Kan Gyi Kone	Nyan Nyin Tha
1.	Agricultural Farmer	113	
	Animal husbandry	3	1
2.	Employee	19	8
3.	Trading and service	42	
4.	Casual Workers	106	
5	Other	1057	560

Data Source: Ward and Village Administration.

Table 90. Labor status

Sr		Population in available to work	Number of Workers in jobs	Number of jobless
1	Kan Gyi Kone	1340	1265	75

Data Source: Ward (16) Administration

Education

In Kan Gyi Kone village track, there is a middle school, while Nyan Nyin Tha village has a primary school. High school students from both villages attend classes at Aung Chan Thar village nearby. In Aung Chan Tha village, there is a state high school and a primary school.

Health Condition

In Kan Gyi Kone village tract and Nyan Nyin Tha village, there is a lack of village-level health clinics and facilities, and no health workers or medical personnel are available. Villagers are required to seek healthcare services in Aung Chan Thar village. The common diseases prevalent in both villages include seasonal Influenza and the common cold, along with occasional occurrences of diarrhea, cough, respiratory infections, and other hygiene-related issues.

4.7 Biophysical Environment

The applying areas (26.4 acres) of the project, are located in the Pyin Oo Lwin Township that devoid of out of bound security area, or agriculture land or the Regional Projects area though the Pyin Oo Lwin is reserved as the bird sanctuary area.

The Proposed Factory area is not densely forested but scanty with very few natural trees, wild grass and devoid of Perennial orchards and well-established institutions or buildings but agriculture land and one village in the South of the factory, Anee Sa Khan Airport in the west and Department Medical Research in the North between the factory and the Mandalay-Lashio Highway.

According to the data of Township Administration, Natural Forest Trees such as Teak, Pyin Ga Toe, Pe Tauk, Thit Yar, Ingyin, Ta Ma Lan, Ing, Ka Nyin, Thit Ae, Yinmar, Ya Ma Nay, Hnaw, Kadi and Htauk Kyant are found in the Pyin Oo Lwin Township.

Numerous species of deer, primate species, predators (lion, tiger, jackal and leopard), elephant, wind boar, raccoon, various types of monkeys and more than 300 species of birds were said to be common to the region. It also comprises of terrestrial biota and aquatic biota, as presented in the following Tables.

Table 91. Types of Biota found around Mandalay Region

No.	Name of Biota	Scientific Name
I	**Terrestrial Biota**	
1.	**Flora**	
	Bamboo	*Bambusa sp.*
	Aukchinsa	*Diospyrosehretiodes*
	Banana	*Musa Paradisiaca*
	Banyan	*Ficusbenjamina*
	Catechu (Shar)	*Acacia catechu (or) Mimosa catechu*
	Coconut	*Coco nifera*
	Dahat	*Tectonahamiltoniana*
	Drum stick	*Moringaoleifera*
	Elephant grass	*Eleusineindica*
	Freater galangal	*Alpinia galangal*
	Gantkaw	*Mesuaferrea*
	Guava	*Psidiumquajava*

	Hhmyinwa	*Dendrocalamusstrictus*
	Jackfruit	*Arthocarpusintegra*
	Mango	*Mangiferaindica*
	Neem	*Azadirachtaindica.*
	Noni	*Morindaangustifolia*
	Papaya	*Carica papaya*
	Padauk	*Pterocarpusmetrocarpus*
	Plum	*Zizyphusjujuba*
	Star flower	*Mimusopselengi.*
	Ttanaung	*Acacialeucophloea*
	Tamarind	*Tamarindusindica.*
	Tazaung	*Euphorbianeriifolia, E. nirculia, E. tirucalli*
	Than	*Terminalia oliveri*
	Thinwin	*Millettia pendula*
	Toddy Palm	*Borassusflabellifer.*
2.	**Fauna**	
	Beetle	*Coleoptera*
	Barking deer	*Muntiacusmuntjak*
	Butterfly	*Lepidoptera*
	Centipede	*Cermatia forceps*
	Chameleon	*Calotesjabatus*
	Cricket	*Anisomorpha femorata*
	Dove	*Colombia livia*
	Dragonfly	*Ordonata*
	Gacko	*Hemidactylusturcicus*
	Macaque	*(Macacamulatta)*
	Eld's deer	*Cervuseldi*
	Sambar deer	*Cervus unicolor*
	Rhesus macaque	*Macacamulatta*
	Hoolock gibbon	*Hylobateshoolock*
	Jungle cat	*Felischaus*
	Asiatic jackal	*Canis aureus indicus*
	Leopard	*Pantherapardusfuscus*
	Goat	*Capra falcorenii*
	Grasshopper	*Orthopera*
	Lizard	*Mabouyamultifaciata*
	Rat	*Rattusrattus*
	Scorpion	*Vijovisspinigreus*
	Sparrow	*Lonhuraleucosgasstroides*
	Black stork	*Ciconianigra*
	Woolly-necked stock	*Ciconia bicolor*
	Hooded tree pie	*Crypsirinacucullata*
	White-throated babbler	*Turdoidesgularis*
	Burmese python	*Python molurusbivittatus*
	Yellow tortoise	*Testuoelongata*
	Soft-shelled turtle	*Trionyx*spp
	Toad	*Bufomelanotictus*
II	**Aquatic Biota**	
1.	**Flora**	

	Asparagus	*Asparagus officinalis*
	Nipah palm	*Nipa fruticans*
	Reed	*Saccharumspontaneum*
	Water crest	*Ipomoea aquatica*
	Water hyacinth	*Eichhomiacrassipes*
2.	**Fauna**	
	Catfish	*Clariasbatracus*
	Eel	*Pterocarpusalbus*
	Frog	*Bufosp*
	Mollusks	*Mollusca (Gastropoda)*
	Shellfish	*Bivalvea*
	Snail	*Gastropoda*
	Perch Fish	*Trichogastersp*
	Prawn	*Parapenaeopsissculptilis*

Source: Data collected by Daw Moe Pyar Han, Botanist and Dr. Aye Aye Than, Zoologist

Table 92. Checklist of animals in study area

Scientific name	Common name	Feeding	Reproduction method	Pop.	Habitat/ Land
Kingdom - Animalia **Phylu - Arthropoda** **Class - Insecta**					
Orthetrom branchiale	Dragonfly	Insectivorous	Oviparous	++	Wooded grass,
Appendix I	Butterfly	Phytophagous	Oviparous	+++	Bush, Wooded, grass
Apis mellifera	Honey bee	Phytophagous	Oviparous	++	Bush, Wooded, grass
***Anopheles* sp.**	Mosquito	Haematophagou	Oviparous	++	Bush, grass
Macrotermis bellicosus	Termites	Hervivores	Oviparous	+	Wooded, grass
Pandinus imperator	Scorpion	Insectivorous	Viviparious	+	Wooded, grass
***Gatrocantha* sp.**	Spider	Insectivorous	Oviparous	+	Wooded, grass
Phylum - Chordata **Class - Amphibia**					
Bufo malanostictus	Bufo	Insectivorous	Oviparous	+	Bush and grass
Phylum - Chordata **Class - Reptilia**					
Hemidactylus	Wall-lizard	Insectivorous	Oviparous	++	Wooded
Mabuia	Skink	Insectivorous	Oviparous	++	Ground
Calotes versicolor	Garden Lizard	Insectivorous	Oviparous	+	Wooded
Phylum - Chordata **Class - Aves**					

Appendix II	Birds	Insectivorous, Herbivores, Carnivorous	Oviparous	+++	Wooded, Bush, Grass, Ground
Phylum - Chordata **Class - Mammalia**					
Fundmbulus	Squirrel	Nuts, seed, fruits	Viviparous	++	Wooded
Rattus rattus	Common Rat	Grain and seeds	Viviparous	++	Wooded, Bush, Grass

Key: + = Present, ++ = Common, +++ = Abundant

Source: Data collected by Professor Dr. Kan Shein (Rtd), Department of Zoology, Dagon University.

Table 93. List of butterfly species (Appendix I)

No.	Family	Scientific Name	Reproduction method	Pop.
1	Papilionidae	*Papilio demoleus*	Oviparous	+++
2		*P. hipponous pitmani*	Oviparous	+
3		*P. polytes romulus*	Oviparous	++
4		*P. paris paris*	Oviparous	++
5	Pieridae	*Delias pasithoe*	Oviparous	+++
6		*D. acalis*	Oviparous	+
7		*D. descombi*	Oviparous	++
8		*D. hyparete*	Oviparous	+++
9		*Pieris brassicae*	Oviparous	+++
10		*P. rapae*	Oviparous	++
11		*P. canidia*	Oviparous	++
12		*Cepora nadina*	Oviparous	+
13		*Appias lynada*	Oviparous	+
14		*Hebomoia glaucippe*	Oviparous	+
15		*Castopsilia pomona*	Oviparous	++
16		*Eurema brigitta*	Oviparous	++
17		*E. adaiona*	Oviparous	+
18		*E. laceta*	Oviparous	+
19		*E. andesoni*	Oviparous	++
20		*E. sarisodalis*	Oviparous	+
21	Nymphalidae	*Danaus genutia genutia*	Oviparous	+
22		*D. liminiace liminiace*	Oviparous	+
23		*D. septentrionalis*	Oviparous	+
24		*Melanitis zitenius*	Oviparous	+
25		*Mycalesis phedima*	Oviparous	+
26		*M. francisca*	Oviparous	++
27		*M. perseiodes*	Oviparous	+
28		*Ypthima baldus baldus*	Oviparous	+
29		*Elyminas casiphone*	Oviparous	++
30		*Ariadne ariadne*	Oviparous	++

31		*Hypolimnas misippus*	Oviparous	+
32		*Neptis sappho astola*	Oviparous	+
33		*N. hyplas*	Oviparous	+
34		*N. clinia*	Oviparous	+
35		*N. nata*	Oviparous	+
36		*Athyma perius*	Oviparous	+
37		*Diagora persimilis*	Oviparous	+
38	Lycaenidae	*Jamides alecto*	Oviparous	+
39		*Lampides boeticus*	Oviparous	+
40		*Bothrina chennellii*	Oviparous	+
41		*Everes lacturnus*	Oviparous	+
42		*Zizina otis*	Oviparous	+
43	Lycaenidae	*Zizeeria karsandra*	Oviparous	+
44		*Z. maha*	Oviparous	+

Key: + = Present, ++ = Common, +++ = Abundant

Source: Data collected by Professor Dr. Kan Shein (Rtd), Department of Zoology, Dagon University.

Table 94. List of bird species (Appendix-II)

No.	Scientific Species	Common name	Local name	Reproduction method	Pop.
1	*Columba livia*	Rock Pigeon	kho	Oviparous	++
2	*Spilopelia chinensis*	Spotted Dove	gyo-le-pyauk	Oviparous	++
3	*Treron sphenura*	Wedge-tailed Green Pigeon	-	Oviparous	+
4	*Alcedo atthis*	Common Kingfisher	pain-nyin	Oviparous	+
5	*Halcyon smyrnensis*	White-throated Kingfisher	pain-nyin-yin-phyu	Oviparous	+
6	*Coracias benghalensis*	Indian Roller	hnget-kha	Oviparous	+
7	*Upupa epops*	Common Hoopoe	bi-daung-bo	Oviparous	+
8	*Megalaima lineata*	Lineated Barbet	phoe-kaung	Oviparous	+
9	*Megalaima asiatica*	Blue-throated Barbet	koe-ka-laung	Oviparous	+
10	*Pericrocotus speciosus*	Scarlet Minivet	nyet-min-thar	Oviparous	+
11	*Oriolus tenuirostris*	Slender-billed Oriole	net-wah	Oviparous	+
12	*Oriolus xanthornus*	Black-hooded Oriole	net-wah	Oviparous	+
13	*Hypothymis azurea*	Black-naped Monarah	sar-mae	Oviparous	++
14	*Dicrurus leucophaeus*	Ashy Drango	lin-me-swae	Oviparous	++
15	*Dicrurus andamanensis*	Andaman Drango	-	Oviparous	++
16	*Corvus splendens*	House Crow	kyi-gan	Oviparous	++
17	*Urocissa erythroryncha*	Red-billed blue Magpie	-	Oviparous	+
18	*Aegithina tiphia*	Common Iora	shwe-pyi-soe	Oviparous	+
19	*Laninus collurioides*	Burmese Shrike	hnget-be-lu	Oviparous	+
20	*Lanius schach*	Long-tailed Shrike	hnet-balu	Oviparous	+
21	*Aethopyga gouldiae*	MRS Gould's Sunbird	wutt-ye-soak	Oviparous	++
22	*Lonchura punctulata*	Scaly-brested Munia	sar-wa-ti	Oviparous	+
23	*Passer montanus*	Eurasian Tree Sparrow	pa-shu-sa	Oviparous	+
24	*Acridotheres tristis*	Common Myna	zayet	Oviparous	++
25	*Copsychus saularis*	Oriental Magpie Robin	tha-beik-lwe	Oviparous	++

26	*Saxicola caprata*	Pied Bushchat	hnget-kha	Oviparous	+
27	*Ficedula hodgsonii*	Slaty-backed Flycatcher	sa-phyu	Oviparous	+
28	*Muscicapa dauurica*	Asia Brown Flycatcher	sa-phyu	Oviparous	+
29	*Pycnonotus jocosus*	Red-whiskered Bulbul	but-ka-lon	Oviparous	++
30	*Pycnonotus cafer*	Red-vented Bulbul	but-phin-ni	Oviparous	+++
31	*Pycnonotus flaviventris*	Black-crested Bulbul	but	Oviparous	+++
32	*Hypsipetes leucocephalus*	Black Bulbul	but	Oviparous	+

Key: + = Present, ++ = Common, +++ = Abundant

Source: Data collected by Professor Dr. Kan Shein (Rtd), Department of Zoology, Dagon University.

CHAPTER 5 – IDENTIFICATION AND ASSESSMENT OF POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

5.1 Methodology and Approach

In compliance with the Environmental Conservation Law (2012), Environmental Conservation Rules (2014) and EIA Procedure (2015), the proponent will be required to carry out and prepare an EIA-EMP to address environmental, social, and economic issues and concerns associated with the proposed development.

The EIA-EMP study was undertaken with a holistic approach encompassing all different aspects of the EIA process. The methodologies adopted for conducting this EIA are as follows:

Desk Research

Desk research was used to establish an environmental information database for the EIA. Consulted materials include textbooks, articles, maps, the internet, photographs, GIS datasets, past EIA/IEE/EMP reports and baseline report of the area conducted between 2017 and 2019.

Public Consultation

Experts in relevant fields, Local Authorities, Religious Leaders, Village Council, local communities have been consulted for their opinions on issues relating to the potential ecological and socio-economic impacts of the proposed project. This provided an opportunity for stakeholders and the public at large to engage in the process and to make comments or express their concerns regarding the proposed project development. This component of the public participation process is fundamental to the impact assessment process and is an important informant in decision-making. An EIA, will be developed that will address environmental management statements for all phases of the project.

Field Research

Fieldwork activities have been carried out prior to the operation period to verify and complement the information gathered from desk studies. The fieldwork covered all relevant components of the ecological, socio-economic, and health components of the environments.

Laboratory Analysis

The Geo-technical survey is conducted by Green Enviro Services Ltd., during which soil samples collected in the field are analyzed in the laboratory by the Land Use Division of the Department of Agriculture, Ministry of Agriculture and Irrigation.

Water samples collected from portable water sources and wastewater samples from treatment ponds are gathered and analyzed in the laboratory by the ISO TECH Laboratory and the ALARM Ecological Laboratory.

The Green Enviro Noise Survey Team is tasked with visiting the Proposed Project Sites to conduct environmental noise readings during both day and night periods to assess the noise level of the surrounding area during the operational phase.

The ALARM Ecological Laboratory team measures the air quality at the proposed project sites to establish the existing baseline ambient air quality status within a 24-hour period during two seasons.

Additionally, the team from Green Myanmar Co., Ltd. measures boiler stack emissions at the proposed project site to determine the existing ambient air quality status during the operational phase.

5.2 Identification of Environmental Impact

Impact assessment must take account of the nature, scale, and duration of the impact on the environment, whether such effects are positive (beneficial) or negative (detrimental). Each impact is also assessed according to the project stages, from planning through construction to the operational phase. Mitigation measures are proposed to address these potential impacts. In order to evaluate and classify the impacts, a rating system has been used accordingly. The following scoring criteria have been used:

Criteria	Class	Score
Magnitude (M)	Insignificant	1
	Low	2
	Moderate	3
	High	4
	Very high	5
Extent (E)	Site	1
	Surrounding area within 2km from project area	2
	Local between 2km to 50km	3
	Regional between 50km to 200km	4
	Provincial - impact of provincial significance	5
Duration (D)	Very short term - during construction (0-1 years)	1
	Short term (2-5 years)	2
	Medium term (6-15 yeas)	3
	Life of operation	4
	Post Closure	5
Probability (P)	Very improbable	1
	Improbable (very low likelihood that the impact will occur)	2
	Medium Probable (distinct possibility that the impact will occur)	3
	Highly Probable (most likely that the impact will occur)	4
	Definite (the impact will occur)	5

Significance assessment

Significance= (extent + duration + magnitude) x probability

Significance is determined by considering the impact's extent, duration, magnitude, and probability of occurrence. The final value is categorized into the following categories:

Score	Category	Significance of Environmental Impact
> 60	Very high	Permanent and irreversible change to natural, cultural, social, or socio-economic. Society would probably view these impacts as catastrophic.
45-59	High	Society would probably view these impacts in a serious light. A project redesign/alteration measure may be required to reduce the

		environmental impact. Mitigation measures will be required in the construction and operational phases to reduce the significance of the environmental impact to acceptable levels.
30-44	Moderate	Moderate impacts have the potential to negatively affect the environment. Mitigation measures are necessary to reduce the significance of the environmental impact.
15-29	Low	Low or no impact on the environment. Impacts are usually short-term and are unlikely to pose a significant threat to the environment.
< 15	Very low	Insignificant

An impacts analysis was made to investigate its relevancy to the project as well as see the degree of impacts so that a management plan can be drafted at a later stage. In line with the EIA Procedures of ECD/MONREC (2015), with the direction on impacts analysis, the following impact assessment criteria were identified by the team and deemed suitable. The assessment of all potentially identified impacts for the proposed operation of RVK Myanmar Co., Ltd. was conducted based on the following criteria:

(a) cumulative effects;

(b) the nature of the effects;

(c) the extent and duration of the effects;

(d) the probability of the effects occurring;

(e) the degree to which the effects can be reversed;

(f) the degree to which the effects may cause irreplaceable loss of resources; and

(g) the degree to which the effects can be mitigated;

The Key potential Environmental Impacts will be identified in 3 stages.

1. Pre-Construction and Construction phase
2. Operations phase and
3. Decommission phase

In most studies conducted by the Green Enviro Survey Team, the Environmental Management Plan (EMP), Initial Environmental Examination (IEE), or Environmental Impact Assessment (EIA) had to be based on either the Pre-construction and/or Construction Phase and/or Operations Phase, depending on the project's status. However, in this study, the Pre-construction phase and Construction phase will not be included, as the site is leased from the existing project and handed over from MEHL.

Table 95. Potential Impact on the Operation Phase, and Decommission Phase

Environmental Parameters	Issues	Operation Phase	Decommissioning Phase
Air pollution	Smoke emissions due to incomplete combustion of the boiler	✔	✔

	Dust and particulate matter from factory operation	✔	-
	Fugitive dust and exhaust gas emissions from the movement of vehicles	✔	✔
Noise Pollution	Noise from Emergency Generators	-	✔
	Noise from factory operation	✔	-
Water pollution	Discharge of suspended sediments in discharge waters during the rainy season	-	✔
	Waste water from Lab	✔	-
	Waste water from factory operation	✔	-
Land Conversion	Major topographical and land cover changes due to the clearing of existing vegetation and buildings	-	-
Soil Contamination	accidental spillage of diesel and petrol from vehicles and from the emergency generator, boiler, and storage area	✔	✔
Biodiversity	Vegetation clearing will have an impact on terrestrial biodiversity resources.	-	-
Occupational Health and Safety	Physical hazards such as lifting, carrying, repetitive work, and work posture injuries	✔	✔

5.3 Potential Impact Assessment

RVK Myanmar Co., Ltd. has the intention of developing a pharmaceutical factory in the Kan Gyi Kone village tract located in the vicinity of Pwin Oo Lwin City in Mandalay Region. The pharmaceutical factory will be a specialized high-tech manufacturing unit, utilizing the most advanced technology and equipment. This facility aims to be more economical while minimizing environmental and social impacts. It is dedicated to the Manufacturing and Marketing of Pharmaceutical Products.

Various potential impacts are anticipated during operations of different significance. Impacts expected and assessed as part of this study are health and safety implications, dust and gaseous emissions, water usage and wastewater disposal, and solid waste disposal. Following the assessment, none of these impacts are regarded as having a significant impact to the extent that the intended activity cannot proceed, given that the follow-up studies, mitigations, and recommendations proposed be implemented and monitored.

5.3.1 Construction Phase

In most of the studies by the Green Enviro Survey Team, the IEE or EIA had to be based on the Pre-construction and/ or Construction Phase and/ or Operations Phase, depending on the status of the project**.** In this study, it will not include the Pre-construction phase construction phase, as the site is leased from the existing project and handed over from MEHL, where clearing of forests, felling of trees, and evacuation of plantations are not necessary anymore. It needs just to be renovated the existing building, removing scantily growing wild grass and shrubs on the land plot.

5.3.2 Operation Phase

In pharmaceutical factory operations, various aspects of production contribute significantly to environmental impact, encompassing energy consumption, raw material utilization (including chemicals, active pharmaceutical ingredients, and packaging materials), fuel consumption for boiler, water consumption for cleaning and processing, and resource utilization for machinery maintenance. These activities are inherently associated with the following environmental challenges:

- Pollution (Air, Noise, Odor)
- Generation of Solid and Hazardous Waste
- Water Consumption and Wastewater Discharge

5.3.2.1 Air Pollution

a) Air Pollution by dust and Particulates

As pharmaceutical manufacturing processes often involve various activities such as material handling, mixing, grinding, and packaging, they can generate dust and particulate matter. These airborne particles can include various pollutants, such as chemicals, pharmaceutical ingredients, and contaminants from raw materials and production processes.

Dust generation is a potential concern in the operational activities of a pharmaceutical plant. Throughout various processes and activities within the plant, the emission of dust particles may occur. These processes and activities include:

- Mixing: The mixing process may result in the generation of dust particles as pharmaceutical ingredients are compounded.
- Compounding: The mixture of various parts that are used to produce the pharmaceutical formulations may cause dust to form.
- Formulation: The formulating process, which is the process of mixing together different drugs and other components, may also form dust particles.
- Raw Material Storage: Dust can be radiated during the handling and storage of raw materials within the pharmaceutical facility.
- Packing: The packaging of pharmaceutical products has the potential to generate dust, particularly when handling and processing packaging materials.

The emission of dust in pharmaceutical industries can result in a number of hazards to both workers and the environment. These impacts are directly influenced by the properties of the dust, the exact techniques and processes, and the countermeasures in place.

Dust emissions, including Particulate Matter PM_{10} and $PM_{2.5}$, were measured over a 24-hour period, averaged in May 2017 for 1st time, to establish baseline data during the operation time of the factory nearby the boiler house. The observed average values for PM_{10} and $PM_{2.5}$ were 42.64 μg/m³ and 33.02 μg/m³, respectively. When compared to the National Environmental Quality (emission) Guidelines, it was found that the ambient air quality for $PM_{2.5}$ slightly exceeded the standard values. Emissions from the boiler house and stack, which serve as key emission sources within the facility, may release particulate matter into the air during combustion, heating, and material handling processes.

In December 2023, a second round of air testing was conducted in the vicinity of the boiler house and operational areas, specifically the mixing and grinding zones. The observed average concentrations for PM10 and PM2.5 near the boiler house were 27.18 μg/m³ and 13.11 μg/m³, respectively. In the operational area, the average values were notably lower, with PM10 at 5.11 μg/m³ and PM2.5 at 1.91 μg/m³. Upon comparison with the National Environmental Quality Guidelines, it was determined that the ambient air quality for both PM10 and PM2.5 remained well within the acceptable limits.

The significance assigned to this impact was considered to be low with mitigation measures in place. Planned improvements include the installation of dust collection systems, filtration systems, regular maintenance and inspection of equipment, the implementation of good manufacturing practices (GMP), and proper ventilation and airflow management within the manufacturing facility.

b) Odors

In pharmaceutical manufacturing, the use of 273 raw materials encompasses various chemical categories that have the potential to generate odors. Among these, certain substances stand out for their aromatic properties. Essential oils such as Eucalyptus Oil, Pine Oil, Terpinolene, and Oleic Acid contribute distinct fragrances to pharmaceutical formulations. Phenolic compounds like Dichlorometaxylenol and Chlorocresol also possess notable odor characteristics. Additionally, solvents play a crucial role in pharmaceutical processes, and some of these solvents are known for their distinctive smells. Examples include Acetone, Ethyl Alcohol (Alcohol 95%), Isopropyl Alcohol, and Dichloromethane. The warehouse of raw materials will be a significant source of odors in pharmaceutical manufacturing due to the presence of various aromatic substances and solvents. Proper storage and handling procedures will be essential to minimizing odor emissions from these materials.

The significance assigned to this impact was considered to be *low* with mitigation, as all the planned improvements will be undertaken on the existing plant site for storing raw materials in enclosed packages, containers and bags, maintaining good housekeeping practices, implementing spillage management practices, designing process buildings with effective extract ventilation systems, and implementing good manufacturing practices.

c) Greenhouse gas

RVK secures an electricity supply ranging from 120,000 to 180,000 units per month through a 3.1 MW Energy Service Contract (ESC). In addition, RVK operates two backup generators,

each with a capacity of 500 kW, requiring an estimated 40 gallons of diesel fuel monthly for emergency use.

Diesel generator emissions

Diesel generator emissions encompass CO_2, CO, NOx, unburned hydrocarbons (HC), and particulate matter (PM) or soot particles, collectively referred to as diesel fumes.

CO_2: A byproduct of petrochemical fuel combustion, CO_2 emissions rise with fuel consumption, contributing to global warming. Diesel generators' efficient fuel use results in relatively lower CO_2 emissions.

CO: Generated when fuel burns incompletely in low oxygen settings, CO can be toxic when inhaled. Diesel generators emit lower CO levels than gasoline engines due to more complete combustion.

NOx: Including compounds like NO, NO_2, etc., NOx forms at high temperatures when nitrogen and oxygen combine. Diesel generators tend to emit more NOx due to higher combustion temperatures, accelerated by the absence of ignition devices.

HC: Arising from incomplete combustion due to insufficient air, diesel generators emit less HC compared to gasoline engines.

PM (Soot): The main particulate matter emitted by diesel generators is soot, which is produced during incomplete combustion at low temperatures. Diesel generators emit more PM than gasoline engines due to combustion intricacies, including uneven fuel-air mixing and rapid combustion.

In summary, diesel generator emissions involve a complex mix of gases and particles influenced by combustion efficiency, temperature, and process intricacies. Diesel generators have pros and cons compared to gasoline engines in terms of emissions, where combustion efficiency and temperature regulation play crucial roles.

Emission of pollutants that result from the combustion of fossil fuels in non-road generators

Myanmar Pharmaceutical Factory operates two backup generators, each with a capacity of 500 kW, to provide electricity for its operations. Collectively, these generators require an annual fuel supply of 480 gallons (1.8176kL)."

GHGs from Generators

GHG emissions from generator use during the operational stage were estimated based on the Department of the Environment and Energy Efficiency's Technical Guidelines for the Estimation of GHG Emissions by Facilities in Australia, October 2017, using anticipated fuel consumption.

$$E_{ij} = \frac{Q_i \times EC_i \times EF_{ijoxec}}{1000}$$

Where:

E_{ij} is the emissions of gas type (j), (carbon dioxide, methane or nitrous oxide), from fuel type (i) (CO_2-e tonnes).

Q_i is the quantity of fuel type (i) (Kilolitres) combusted for stationary energy purposes

EC_i is the energy content factor of fuel type (i) (gigajoules per kilolitre) for stationary energy purposes. IF Q_i is measured in gigajoules, then EC_i is 1.

EF_{ijoxec} is the emission factor for each gas type (j) (which includes the effect of an oxidation factor) for fuel type (i) (kilograms CO_2-e per gigajoule)

CO_2 equivalent emissions for Myanmar Pharmaceutical Factory from two generators

Table 96. CO2 equivalent emissions for Myanmar Pharmaceutical Factory from two generators

Generator Capacity (kW)		Annual Fuel use (kL)	Emission of Carbon dioxide (CO_2) t CO_2-e	Emission of Methane (CH_4) t CO_2-e	Emission of Nitrous oxide (N2O) t CO_2-e	Total CO_2 equivalent (tonnes) t CO_2-e
Generator	500	1.817	4.9	0.007	0.014	4.921

The table above shows the calculated equivalent greenhouse gas (GHG) emissions for the Myanmar Pharmaceutical Factory operates two backup generators. The emissions are expressed in terms of carbon dioxide equivalent (CO_2-e) tonnes, which account for the combined impact of carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) emissions primarily based on their respective global warming potentials (GWPs).

GHGs from a steam boiler

The Myanmar Pharmaceutical Factory incorporates a steam boiler powered by furnace oil, consuming an annual quantity of 24,000 gallons (equivalent to 90.8259 metric tonnes). This combustion of fuels in stationary (non-transport) combustion sources results in the following greenhouse gas (GHG) emissions: carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O).

Calculations for Greenhouse gas emissions from stationary combustion follow the default calculations provided by the 2006 Intergovernmental Panel on Climate Change (IPCC) guidelines for National Greenhouse Gas Inventories 2.11.

$$Emission_{GHG,fuel} = Fuel\ Consumption_{fuel} * Emission\ Factor_{GHG,fuel}$$

Where:

$Emission_{GHG,fuel}$ is emissions of a given GHG by type of fuel (kg GHG).

Fuel $Consumption_{fuel}$ is amount of fuel combusted (TJ).

Emission $Factor_{GHG,fuel}$ is default emission factor of a given GHG by type of fuel (kg gas/TJ). For CO_2, it includes the carbon oxidation factor, assumed to be 1.

The steam boiler's fuel consumption amounts to 90.8259 metric tonnes per year. Converting the fuel consumption from metric tonnes to TJ is 0.374 TJ/year. The emission factors for CO_2, CH_4, and N_2O are 74,100 kg CO_2/TJ, 3 kg CH_4/TJ, and 0.6 kg N_2O/TJ, respectively. These values are derived from the default data provided by the IPCC.

The table below calculates GHG emissions for each greenhouse gas.

Table 97. Calculation of Greenhouse Gas Emissions for Steam Boiler

Source	Annual Fuel Use (MT)	Annual Fuel Use (TJ)	CO_2 Emission (t CO_2)	Methane Emission (t CH_4)	Nitrous oxide Emission (t N_2O)
Steam Boiler	90.8259	0.374	27.7134	0.0011	0.00022

To calculate the total emissions by Greenhouse gas from the source category, the emissions as calculated in the above Equation are summed over all fuels:

$$Emission_{GHG} = \sum_{fuels} Emission_{GHG,fuel}$$

The following table illustrates the conversion of greenhouse gas emissions into their equivalent carbon dioxide (CO_2-e) emissions by multiplying each greenhouse gas emission by its respective Global Warming Potential (GWP) values.

Table 98. Conversion of Greenhouse Gas Emissions to CO2-e Emissions Using Global Warming Potentials (GWP)

Greenhouse Gas	Original Emission (t/year)	GWP	CO_2-e Emission (t CO_2-e/year)
CO_2	27.7134	1	27.7134
CH_4	0.0011	28	0.0308
N_2O	0.00022	265	0.0583
Total			27.8025

Therefore, the total CO_2 equivalent emissions from the Myanmar Pharmaceutical Factory's two generators and steam boiler would be 32.7235 t CO_2-e per year.

The combined greenhouse gas emissions from the Pharmaceutical Factory's two generators and steam boiler amount to 32.7235 tonnes of CO_2 equivalent per year. This figure underscores the importance of evaluating emissions comprehensively, considering not only carbon dioxide but also the combined impact of other greenhouse gases like methane and nitrous oxide, all expressed in CO_2 equivalent terms.

5.3.2.2 Noise Pollution

Any manufacturing facility is known to inevitably generate a certain amount of noise and vibration, the extent of which can vary based on the types and quantities of machinery, equipment, and products involved in the manufacturing processes.

Pharmaceutical manufacturing often involves the use of various machinery and equipment, such as mixers, grinders, compressors, ventilation, and packaging machines. The operation of these machines can generate significant levels of noise, particularly during high-speed or heavy-duty operations.

Noise samples were collected using the GM1356 Digital Sound Level Meter for a duration of 24 hours in the noise-sensitive area. The average noise levels recorded during the day and night periods were 53.3 dB and 49.1 dB, respectively, falling within the range of 50-70 decibels,

which is considered acceptable. Additionally, noise measurements were conducted for 3 hours during operations in both the Grinding Room and Granulation Room. The average noise levels observed were 68.4 dB and 75.2 dB, respectively, within the range of 85 decibels. It's noteworthy that the average noise level should not exceed 85 decibels (dB) over an 8-hour workday. Should workers be exposed to noise levels exceeding 85 dB, it is imperative to provide them with appropriate hearing protection to safeguard their hearing health.

The significance of this impact is typically considered *low* with mitigation measures such as regular machine maintenance, adherence to Good Manufacturing Practices (GMP), providing proper PPE and continuous monitoring can collectively help maintain a safe and healthy working environment for employees while preventing the development of more severe noise-related health hazards over time.

5.3.2.3 Water Consumption

The pharmaceutical factory has an annual water requirement of 24,000,000 gallons. To meet this demand, the factory utilizes water from both its dedicated tube well and the Sither Dam.

The study area, despite being mountainous, is characterized by sufficient water resources for land use cultivation. Both surface and subsurface water are present, with groundwater being somewhat limited due to the thin alluvial cover and topographic conditions. The groundwater in the study area primarily originates from meteoric water, and the annual rainfall is deemed adequate.

The hydrogeological zoning of the study area, which comprises Low Potential, Medium potential, and High potential is a result of lithology, topography, and structural geology (Chapter-4, Figure (16), shows this). The survey outcomes demonstrate that the water-residing capability of the study area is classified as High Potential.

This classification implies that the study area has a favorable water supply capacity, which is crucial for supporting various land uses and cultivation practices. The identification of high-water potential is a positive indicator for sustainable water availability in the region.

But Pyin Oo Lwin, where the study area is located, isn't classified as a semi-arid region, it has experienced water stress in recent years. Pyin Oo Lwin faced a significant drought in 2020, receiving only half its usual rainfall. This led to concerns about water scarcity and potential rationing. Pyin Oo Lwin's normal precipitation ranges from 50 to 57 inches per year, but it only recorded half of that amount in 2020. The Department of Irrigation and Water Management said climate change has resulted in increased temperatures in Pyin Oo Lwin since 2010. Deforestation and the sale and development of forested lands and property have led to smaller forested areas in the district.

Several factors underscore the water-related challenges faced by Pyin Oo Lwin. Firstly, the town encountered a significant drought in 2020, during which it received merely half of its typical annual rainfall.

Moreover, the recent drought is not an isolated event but is compounded by broader issues contributing to heightened water stress in the region. The intertwining factors of deforestation and the pervasive impacts of climate change exacerbate the challenges faced by Pyin Oo Lwin in maintaining a sustainable and secure water supply.

A critical concern arises from the annual water requirement of RVK Myanmar Pharmaceutical Factory, set at 24,000,000 gallons. The extraction of 24,000,000 gallons annually raises apprehensions about potential over-extraction.

Additionally, the influence of climate change, marked by rising temperatures and accelerated deforestation, contributes significantly to the overarching issue of water scarcity. These environmental shifts affect not only surface water reservoirs but also impact subsurface aquifers, compounding the challenges faced by Pyin Oo Lwin in maintaining a stable and sustainable water supply.

The significance of this impact can be mitigated to a low level with measures such as implementing advanced water recycling and reuse systems, utilizing alternative water sources like rainwater harvesting, supporting community-wide sustainable practices such as reforestation initiatives, and adhering to Good Manufacturing Practices (GMP).

5.3.2.4 Water Pollution

Wastewater generated in pharmaceutical production originates from cleaning and sanitization processes, production operations, quality control and testing activities, and general facility use. Cleaning and sanitization of equipment and production areas produce wastewater containing detergents, solvents, and residues. Production processes involving water as a solvent or reaction medium lead to wastewater from washing reaction vessels and equipment. Quality control and testing procedures use water for analytical purposes, resulting in wastewater from equipment cleaning and test sample disposal. Additionally, domestic activities like handwashing, restroom usage, and common area cleaning contribute to wastewater generation within the facility.

The discharge of liquid waste without proper treatment, comprising process water, cleaning effluents, and run-off effluents, can be a cause of water pollution. The chemicals and pollutants existing in wastewater may harm nearby water bodies, resulting in damage to the aquatic ecosystem and vulnerable impact on the wider environment.

The consumption of a large amount of water in manufacturing plants may lead to water waste, which can cause of resource depletion.

The significance of this impact can be mitigated to a low level through various measures. Firstly, implementing treatment methods and systems to effectively treat wastewater allows for its repurposing for gardening purposes, thereby reducing reliance on fresh water sources and minimizing environmental impact. Additionally, the implementation of water recycling systems enables the reuse of water within the facility, further reducing water consumption and waste. Utilizing alternative water sources, such as rainwater harvesting, contributes to sustainable water management practices. Lastly, adhering to Good Manufacturing Practices (GMP) ensures that production processes are conducted in an environmentally responsible manner.

5.3.2.5 Eutrophication Problem

Eutrophication is a process akin to the enrichment in a large number of nutrients, most obviously, nitrogen and phosphorus, in water bodies. Some chemicals relevant to pharmaceutical manufacturing that contain phosphorus and nitrogen may be used during the manufacturing processes. These substances are emitted by industries and excreted by living

organisms, and when not disposed of properly, they end up in the water bodies through wastewater discharges.

Algae Bloom: Water quality is deteriorated with nutrient overloading resulting in algal growth. Algae grow on nutrients and in as much as there is a principal source, their growth becomes extensive and they form thick mats on the water surface.

Oxygen Depletion: Decomposition of excessive algae reduces oxygen levels, causing hypoxia of the water. This can be very harmful for the aquatic life as many species of fish need oxygen to breathe.

The test results for wastewater show the concentration of Total Phosphorus at the level of 1.2 mg/L and of Total Nitrogen at 0.6 mg/L. However, these amounts are just within the normal range despite the possibility of eutrophication linked to industrial processes of manufacturing pharmaceuticals.

Eutrophication is a process by which the rate of addition of nutrients excessively to the water body mainly due to nitrogen and phosphorus is increased. From this concern, it is evident that these nutrients, while found in the manufacturing process of drugs, could pose a potential danger. Even though this is normal for now, it is important to monitor the readings as well as taking precautions in disposal since the future issues cannot be ruled out.

The significance of this impact can be mitigated by implementing effective wastewater treatment processes to eliminate or reduce nutrients before discharging effluent water into the environment.

5.3.2.6 Waste Pollution

(a) Solid Waste

In operational activities, various waste types are produced, each requiring specific management strategies. These waste types include packaging materials such as empty containers and shipper boxes, glassware like vials and laboratory equipment, product waste including damaged or expired products, cleaning materials such as wipes and disposable mop heads, personal protective equipment (PPE) like disposable gloves and masks, filters and filtration media used to remove impurities, laboratory waste comprising disposable glassware and contaminated materials, biological waste, animal house waste, office waste consisting of paper, plastic, and metal clippings, and domestic and kitchen waste from staff quarters and the canteen. Each waste type necessitates careful handling and disposal methods to ensure environmental sustainability and regulatory compliance.

The filters and filtration media used in pharmaceutical manufacturing play a critical role in maintaining product quality and safety by removing impurities and ensuring compliance with regulatory standards. However, due to the nature of pharmaceutical production processes, these filters and media may become contaminated with active pharmaceutical ingredients (APIs), solvents, or other substances. As a result, their disposal requires careful consideration to prevent environmental contamination and ensure compliance with waste management regulations.

Typically, pharmaceutical factories must adhere to specific guidelines for the disposal of these materials, which may involve specialized treatment or incineration to mitigate potential risks.

The significance of this impact can be mitigated by implementing appropriate disposal measures and adhering to regulatory guidelines. By doing so, pharmaceutical manufacturers can minimize the environmental impact of their operations and ensure responsible waste management practices.

(b) Hazardous Waste

Hazardous waste generated from pharmaceutical manufacturing facilities encompasses a range of materials and substances that pose risks to both human health and the environment. This includes chemical waste such as unused or expired reagents and solvents, pharmaceutical waste, including expired or off-specification products containing active ingredients, and laboratory waste consisting of glassware, plasticware, and chemical residues. Additionally, biological waste containing cultures or specimens and packaging waste may also be classified as hazardous. Spent filters and filtration media used in production processes may contribute to hazardous waste if they are contaminated with toxic substances or pharmaceutical residues.

The significance of mitigating the impact of hazardous waste generated from pharmaceutical manufacturing can be achieved through practices in handling, storage, transportation, treatment, and disposal. Compliance with regulatory requirements and adherence to best management practices are critical to ensuring the safe and responsible management of hazardous waste in pharmaceutical facilities.

5.3.2.7 Soil Contamination

Soil contamination originating from pharmaceutical factories can stem from various activities and processes within the facility. Accidental spills or leaks of chemicals, solvents, or pharmaceutical products during manufacturing, handling, storage, or transportation processes can introduce contaminants directly into the soil on-site. Improper handling, storage, or disposal of pharmaceutical waste, including expired products, cleaning agents, laboratory chemicals, and packaging materials, poses another risk for soil contamination if not managed appropriately. Additionally, effluent from pharmaceutical production processes may contain pollutants such as heavy metals, organic compounds, and pharmaceutical residues. If discharged untreated or inadequately treated, this wastewater can contaminate soil in the vicinity of discharge points. Furthermore, improper storage and handling practices for chemicals, raw materials, and waste materials within the facility can lead to spills, leaks, or direct contact with soil, further contributing to contamination.

The significance of this impact can be mitigated to a low level through strict protocols for waste management, effluent treatment, and chemical handling.

5.3.2.8 Occupational Health and Safety

Respiratory Hazards:

In pharmaceutical factories, respiratory hazards pose a significant risk to workers due to exposure to airborne particles, vapors, and gases. During various manufacturing processes and chemical handling tasks, employees may inhale hazardous substances that can irritate the respiratory tract or cause long-term health issues.

The significance of this impact can be mitigated to a low level by implementing measures such as adequate ventilation systems, respiratory protection equipment like masks or

respirators, and regular monitoring of air quality to ensure the safety of workers' respiratory health.

Infections and Allergic Reactions:

In pharmaceutical factories, workers are at risk of infections and allergic reactions due to exposure to biological agents used in research or production. Additionally, some employees may develop allergic reactions to certain biological materials, leading to symptoms ranging from mild skin irritation to severe respiratory distress.

The significance of this impact can be mitigated by implementing strict hygiene protocols, providing appropriate personal protective equipment (PPE) such as gloves and lab coats, and offering vaccinations or medical screenings as necessary to protect workers' health.

Chemical Exposure:

Chemical exposure refers to the contact or interaction of workers with hazardous chemicals or substances used in pharmaceutical manufacturing processes. These chemicals can include active pharmaceutical ingredients (APIs), solvents, cleaning agents, and other chemical compounds. Exposure to hazardous chemicals can occur through inhalation, skin contact, ingestion, or absorption through the eyes or mucous membranes. Chemical exposure can lead to various health effects, including skin irritation, respiratory problems, systemic toxicity, and long-term health issues such as cancer or reproductive disorders.

The significance of this impact can be mitigated by implementing strict safety protocols, providing appropriate personal protective equipment (PPE) such as gloves, goggles, or respirators, and conducting regular training and education programs to ensure that workers are aware of the potential hazards and how to safely handle and dispose of hazardous materials.

Exposure to Biological Agents:

Exposure to biological agents refers to contact or interaction with living organisms or biological materials used in pharmaceutical research or production processes. Exposure to biological agents can occur through inhalation, ingestion, skin contact, or accidental inoculation. Biological agents pose risks of infection or allergic reactions to workers, and exposure can lead to symptoms ranging from mild skin irritation to severe respiratory distress or systemic infections.

The significance of this impact can be mitigated by implementing strict safety protocols, providing appropriate personal protective equipment (PPE) such as gloves, goggles, or respirators, and conducting regular training and education programs to ensure that workers are aware of the potential hazards and how to safely handle and dispose of hazardous materials.

Physical Hazards:

Physical hazards are prevalent in pharmaceutical factories and pose risks such as machinery accidents, ergonomic strain, slips, trips, and falls. Employees may be at risk of injuries while operating machinery or handling equipment, especially if proper safety precautions are not followed. Additionally, ergonomic strain can occur due to repetitive tasks or improper workstation setup, leading to musculoskeletal disorders such as back pain or carpal tunnel syndrome.

The significance of this impact can be mitigated by implementing safety training programs, enforcing strict safety protocols, maintaining a clean and organized work environment to minimize the risk of accidents and injuries.

Exposure to Noise:

Exposure to noise is a common occupational hazard for employees in pharmaceutical factories, especially those working in areas with loud machinery or equipment. Prolonged exposure to high levels of noise can lead to hearing damage, including temporary or permanent hearing loss. Additionally, excessive noise levels can contribute to other health issues such as stress, fatigue, and reduced concentration, impacting workers' overall well-being and productivity.

The significance of this impact can be mitigated by implementing engineering controls such as managing work schedules, providing hearing protection devices like earplugs or earmuffs, and conducting regular noise assessments to identify and address areas of concern.

Electric Shock and Equipment Safety:

Electric shock and equipment safety failures pose significant risks to workers in pharmaceutical factories, particularly those involved in the maintenance or operation of electrical machinery and equipment. Improper handling or maintenance of electrical systems can lead to electric shock, burns, or other serious injuries. Additionally, equipment malfunctions or failures can result in accidents such as fires or explosions, posing further risks to workers' safety.

The significance of this impact can be mitigated by ensuring that electrical systems and equipment are properly installed, inspected, and maintained by qualified professionals. Providing appropriate training on electrical safety procedures and ensuring the use of appropriate personal protective equipment (PPE) when working with or near electrical systems are essential measures to enhance safety.

5.3.2.9 Fire Hazard

Pharmaceutical factories face various potential fire hazards inherent to their operations. These hazards primarily stem from the presence of flammable chemicals used in manufacturing processes, as well as electrical equipment, and heating machinery. Improper storage, handling, or disposal of flammable substances can escalate the risk of fire incidents, while electrical malfunctions or overloaded circuits pose additional threats. Laboratories within these facilities may utilize open flames or heating sources, presenting a fire hazard if not managed carefully. Similarly, machinery operations can generate heat, increasing the likelihood of ignition due to friction or mechanical failures. Moreover, smoking or open flames in restricted areas can exacerbate fire risks, particularly where flammable materials are present.

The significance of this impact can be mitigated by enforcing stringent fire safety protocols, conducting regular equipment maintenance, training employees on fire prevention measures, and adhering to fire regulations. Installing fire detection and suppression systems, such as smoke detectors, fire alarms, sprinklers, and extinguishers, is crucial for early fire detection and effective response, minimizing potential damage and ensuring personnel safety.

5.3.2.10 Community Health and Safety

Air Pollution:

Pharmaceutical manufacturing processes may release pollutants into the air, potentially impacting the surrounding community. Emissions of volatile organic compounds (VOCs), particulate matter, and other hazardous chemicals can contribute to air pollution. Exposure to these pollutants can pose risks to respiratory health and the overall well-being of the community.

The significance assigned to this impact was considered to be low with mitigation measures in place. Planned improvements including installation of dust collection systems, filtration system, regular maintenance and inspection of equipment, the implementation of good manufacturing practices (GMP), and proper ventilation and airflow management within the manufacturing facility.

Water Pollution:

Pharmaceutical factories may discharge wastewater containing pharmaceutical residues, heavy metals, or other contaminants, which can pollute water bodies. This discharge can adversely affect water quality and aquatic ecosystems, posing risks to both environmental and community health.

The significance of this impact can be mitigated to a low level by implementing treatment methods and systems to effectively treat wastewater. By treating the wastewater, it can be repurposed for gardening purposes, reducing the reliance on fresh water sources and minimizing environmental impact.

Hazardous Waste Generation:

Pharmaceutical factories generate various types of hazardous waste, including chemical residues, solvents, packaging materials, and expired products. Improper handling, storage, or disposal of these wastes can pose risks to human health and the environment.

The significance of mitigating the impact of hazardous waste generated from pharmaceutical manufacturing can be achieved through practices in handling, storage, transportation, treatment, and disposal. Compliance with regulatory requirements and adherence to best management practices are critical to ensuring the safe and responsible management of hazardous waste in pharmaceutical facilities.

Project Activities and Their Significant Impacts during the Operation Phase

Table 99. Evaluation and Perdition of Significant Impact for Operation Phase

Potential Impacts	Activity and Impact Sources	Components	Magnitude	Extent	Duration	Probability	Significance Score	Significance of Environmental Impact
Impact on Air Quality								
Air Pollution	Storage and handling of raw materials	Dust, Odorous VOCs, PM 10 PM 2.5	4	1	4	3	27	Low
	Production processes such as griding and granulation	Release of dust	4	1	4	4	36	Moderate
	Packaging and filling in bags	Release of dust	4	1	4	4	36	Moderate
	Boiler Operation	Particulate Matters, CO, SO_2, No_x	3	2	4	3	27	Low
	Generator operation and vehicle movements	CO, SO_2, No_x	3	2	4	3	27	Low
Impact of odor								
Odor Impact	Storage room of raw materials and chemical	Volatile Organic Compound (VOC) and Odor	3	1	4	3	24	Low
	Temporary sites for waste disposal for kitchen and domestic waste	Odor	2	1	4	3	21	Low
Impact of Noise								
Noise Impact	Manufacturing Facility and equipment	Noise	3	1	4	3	24	Low
	Emergency Used of the Generator	Noise	2	1	4	3	21	Low
	Boiler Operation	Noise	2	1	4	3	21	Low

	Noise from vehicles movement	Noise	2	1	4	2	21	Low
Impact on Ground Water Consumption								
Water consumption of Ground Water	Use of Water for the Boiler	ground water	3	2	4	3	27	Low
	Use of Water for the production, general office use, domestic purposes, canteen, and toilet facilities	ground water and surface water	4	3	4	4	44	Moderate
Impact of Wastewater Effluents								
Effluent discharge	Effluent discharge from the boiler	Iron, turbidity, and Organic Matter in wastewater	3	1	4	3	24	Low
	Discharged wastewater from the production process	Residual active pharmaceutical ingredients (APIs), Organic solvents, Chemical Byproducts	4	1	4	4	36	Moderate
	Discharged wastewater from the cleaning and sanitizing	detergents, solvents, and residues from pharmaceutical products	4	1	4	4	36	Moderate
	Discharged wastewater from offices, the canteen, and toilet facilities	Oil and grease, Organic Matter in wastewater	3	2	4	4	36	Moderate
Impact of Solid Waste								
Waste disposal	Product waste such as damaged, rejected, returned, expired products, spilled materials, dust from cleaning and filter	Hazardous waste	4	1	4	4	36	Moderate

	Packaging materials such as empty containers, packaging inserts and shipper boxes.	Production waste	4	1	4	3	27	Low
	Filters and filtration materials	Production waste	4	1	4	4	36	Moderate
	Laboratory Waste such as disposable glassware, plasticware, and other laboratory consumables, as well as contaminated materials such as gloves, pipette tips, and sample vials	Hazardous waste	4	1	4	4	36	Moderate
	Microbiological waste and Biological Lab waste	Hazardous waste	4	1	4	4	36	Moderate
	Solid waste such as paper, plastic, food waste, and other offices waste	domestic waste	3	1	4	3	24	Low
Impact on Soil								
Soil contamination	accidental spills of raw materials and chemicals during deliveries	hazardous	3	2	4	3	27	Low
Occupational Health and Safety								
Exposure of dust and hazardous materials	Handling of raw materials from process use purpose	dust, PM, Odor and Volatile Organic Compound (VOC_s)	3	1	4	4	32	Moderate
Exposure of chemical and biological agent	Contact or interaction of workers with hazardous chemicals or substances	hazardous	3	1	4	4	32	Moderate

Occupational Noise to employees and workers	Operation area of factory	Noise	3	1	4	3	24	Low
	Operation of the Diesel Generator	Noise	2	1	4	3	21	Low
	Operation of the Boiler	Noise	2	1	4	3	21	Low
Physical hazards	Machinery accidents, ergonomic strain, and slips, trips, and falls	Injure	4	1	4	3	27	Low
	Electric Shock and Equipment	Injure	4	1	4	3	27	Low
Community Health and Safety								
Air Pollution	Release pollutants into the air	Dust, Odorous VOCs, PM_{10} $PM_{2.5}$	3	1	4	3	24	Low
Water Pollution	Discharged wastewater from the factory operation, office, canteen, and toilet facilities	Oil and grease, Organic and inorganic matter in wastewater	4	1	4	3	27	Low
Hazardous Waste	Chemical residues, solvents, packaging materials, and expired products	Hazardous waste	4	1	4	3	27	Low

5.3.3 Decommissioning Phase

Decommissioning phase impacts include loss of direct and indirect employment, demolition waste, noise pollution, dust and exhaust emissions, and occupational health and safety hazards. The potential impacts of the decommissioning phase are

(i) Air Pollution
(ii) Noise Pollution
(iii) Soil and Water Pollution
(iv) Waste Pollution
(v) Impact on Human

5.3.3.1 Air Pollution

Demolition of the factory building and related infrastructure of the proposed factory may generate emissions of fugitive dust caused by a combination of on-site excavation, movement of earth materials, and transportation of demolition waste. A secondary source of gas emissions may include exhaust from diesel engines in earth-moving equipment and vehicles. This impact will affect demolition staff and workers, as well as the neighboring factories and residents. However, the decommissioning phase has a short-term impact and can be mitigated with appropriate mitigation measures by the contractor and the proponent of RVK Myanmar Co., Ltd.

5.3.3.2 Noise Pollution

During the decommissioning phase, noise and vibration may be caused by the operation of pile drivers, earth moving and excavation equipment, cranes, and the transportation of equipment, materials, and decommissioning work. Activities likely to produce noise during this phase include the cutting and demolition of structures. The demolition works will lead to significant deterioration of the environment within the project site and the surrounding environment. So, the anticipated noise impact shall be mitigated with appropriate facilities.

5.3.3.3 Soil and Water Pollution

The water quality of the nearby drainage systems can be affected by solid waste and wastewater drainage from the factory, and also solid waste can also damage soil quality if not properly handled. In addition, even generally non-toxic chemicals such as chlorides, sodium, sulphate, and ammonia, which may be released as a result of the leaching of demolition waste, are known to lead to the degradation of groundwater quality. Soil quality impacts will be caused during the decommissioning phase, as excavation activities such as digging and filling may impact soil quality. The accidental spillage of diesel, petrol, oil, and other hazardous waste from decommissioning activities may impact soil quality. Oil spill equipment and adequate secondary containment should be provided and managed to reduce soil degradation.

5.3.3.4 Waste Pollution

The demolition of the project buildings and related infrastructure will result in large quantities of solid waste. These wastes will consist of demolition debris, including concrete, metal, wood, glass, paints, adhesives, sealants, and fasteners. Other non-hazardous solid wastes may

include office, kitchen, and dormitory wastes. In addition, the sanitary wastewater from decommissioning workers can be expected to be liquid waste. Its amount depends on the number of workers involved. If the domestic wastewater from the demolition site is not properly disposed of in a nearby surface water body, the health of workers and residents from downstream area will be adversely affected due to water pollution.

5.3.3.5 Unemployment

Every project with long-term investment can bring about changes in the socio-economic conditions of the local environment. Most of the impact on the socio-economic environment may be positively associated with some adverse effects. Being closed out of the proposed project may create temporary unemployment during the decommissioning phase.

5.3.3.6 Occupational Health and Safety

During the decommissioning phase, significant physical hazards may be caused by engineering and demolishing activities, including the demolishing of buildings and the transportation of demolishing materials such as heavy equipment, machines, and other materials. Demolished workers will be exposed to the risks of accidents and injuries. Moreover, accidents and injuries to workers and local communities can be caused by heavy vehicle movement for the transport of construction materials and equipment.

5.3.3.7 Community Health and Safety

Community health and safety issues related to the construction activities are Air, Noise, and Water pollution.

Air Pollution

Air pollution is another significant concern related to construction activities that can impact both community health and safety. Construction sites can emit various air pollutants, including particulate matter (PM), volatile organic compounds (VOCs), and nitrogen oxides (NOx). These pollutants can have adverse effects on air quality and human health.

Noise Pollution

The movements of trucks transporting construction materials can produce noise to some extent for the communities living close to the project site.

Water Pollution

Water quality impacts may occur from runoff and waste and sewage generated from construction activities and from a contractor's camp erected on site for the duration of the construction phase and can significantly alter surface and ground water regimes that are used by local communities for portable water supplies and irrigation for farming in downstream areas. The health of communities can be affected by changes in water quality as well as water quantity a result of storm water discharges.

The decommissioning of RVK Myanmar's factory is unlikely, as it is planned to remain available through a long-term land lease. It is probable that production will continue as long as there is a demand for pharmaceuticals in the country, even though technology, processes, and product preferences may evolve over time. Additionally, even if the factory were to close, there would be no need to demolish the building, as both the building and land are rented from MEHL.

The significance assigned to this impact for the decommissioning phase is considered to be *low* as it is unlikely to stop work, and besides, mitigation by systematic demolition, proper storage before disposal, taking responsibility for the gradual reduction or transfer of the work force, reassembling machineries, and smooth work shutdown would also be in accordance with the subjected rules and laws of that time.

Project Activities and Their Significant Impacts During Decommissioning Phase

Table 100. Evaluation and Perdition of Significant Impact for the Decommissioning Phase

Potential Impacts	Activity and Impact Sources	Magnitude	Extent	Duration	Probability	Significance Score	Significance of Environmental Impact
Impact on Air Quality							
Air Pollution	Demolition activities demolition of the factory building and related infrastructure	3	2	1	5	30	Moderate
	Delivery of demolished materials	3	1	1	3	15	Low
	Movement of Vehicles	2	2	1	3	15	Low
	Temporary use of Diesel Generator	3	1	1	3	15	Low
Impact of Noise							
Impact of Noise Disturbance to the surround areas of the project site	Operation of heavy machinery, earth moving and excavation equipment, and cranes	4	2	1	4	28	Low
	Transportation of equipment, and materials	2	2	1	4	20	Low
Impact on Ground Water and Soil Quality							
Soil Contamination and water pollution	Oil spills from vehicles and construction machinery	3	1	1	3	15	Low
	Improper management of Demolished material on site	4	1	1	3	18	Low
	Improper discharge of solid and liquid wastes into watercourses and natural drains	4	2	1	5	35	Moderate
Impact of Solid Waste							

Solid waste generated from the decommissioning phase	Demolition of the project buildings and related infrastructure	4	2	1	3	21	Low
	Food waste and domestic waste from the temporary site of workers at the project site	2	1	1	3	15	Low
Occupational Health and Safety							
Physical hazards such as incidents and accidents leading to serious injury or fatalities	Demolishing of buildings and transportation of demolishing materials of heavy equipment, machines, and other materials	5	1	1	4	28	Low
Occupational Noise to employees and workers	Dismantling of machines and removal of buildings and ancillary structures	3	1	1	4	20	Low
Community Health and Safety							
Air pollution	Demolition activities	4	2	1	5	35	Moderate
Noise pollution	Movements of trucks transporting construction materials	2	2	1	4	20	Low
Water pollution	Waste and sewage generated from construction and demolishing activities and from a contractor's camp	4	2	2	5	40	Moderate

5.3.4 Socioeconomic Impact and Public Opinion

The socioeconomic impact of pharmaceutical production refers to the effects that the factory has on various aspects of society and the economy. These impacts can be both positive and negative and can affect communities, individuals, businesses, and governments.

The socioeconomic impact of pharmaceutical production encompasses a broad spectrum of effects on society and the economy. Positively, pharmaceutical factories create employment opportunities across various skill levels and contribute to economic growth through increased production output, import substitution and technology transfer. Furthermore, they enhance healthcare access by providing locally produced medicines, thereby improving overall health outcomes.

The Pharmaceutical Factory of RVK Myanmar Co., Ltd. will provide nearly round-about (380) nos of employment opportunities, which will have a positive impact on job creation. The proposed development would also result in a significant investment in services in the surrounding area.

However, there are also negative impacts to consider. These include environmental concerns due to pollution and waste generated during manufacturing, and health risks for workers exposed to hazardous substances.

CSR Plan

The RVK Myanmar Co., Ltd. plans to allocate 3% of its annual profit after tax to Myanmar's Corporate Social Responsibility Program, which will be utilized at the discretion of the State for various purposes, including environmental management. The company is committed to maintaining its reputation for CSR activities both in Myanmar and abroad, ensuring continued support for community development near its factory. The proposed CSR programs include allocating 25% of subscribed funds to rural development initiatives such as road maintenance and educational support, another 25% for community welfare, health, and sports programs, 25% for donations to religious institutions and support for traditional festivals, and the remaining 25% for environmental impact monitoring and management. Additionally, the company aims to foster good relations with government entities and create a sustainable and friendly neighbourhood by supporting community welfare as per the directives of the village committee and authority. Employee welfare and benefits are also prioritized, with RVK Myanmar providing facilities to ensure staff motivation, safety, and productivity. Overall, the company is committed to fulfilling its corporate social responsibilities while fostering positive relationships with its employees and the community.

Public Opinion

According to the public consultation meeting, participating in the community development and CSR works, the community around the project site accepts the project with no objections and is expecting to be employed in the project's activities, especially during the operational phases, with high hopes for improvement in community living standards and educational status as the industrial development in the neighbourhood would apparently bring in. They are expecting job opportunities for their young generation, and there was no negative effect from the factory on the environment.

Table 101. Potential Impact and Mitigation Measures

Project/ Activity Phase	Potential Environmental Impact	Significance Without-Mitigation	Mitigating & Enhancement Measures	Significance With Mitigation
Operation	**Air Pollution** **a) Dust Particulates** Dust generation is a significant concern in pharmaceutical plant operations. It occurs during mixing, compounding, formulation, raw material storage, and packing processes. These airborne particles can include various pollutants such as chemicals, pharmaceutical ingredients, and contaminants from raw materials and production processes.	Moderate	• Implement dust collection systems at key production points to capture airborne particles, reducing pollution levels. • Prioritize installation of HVAC ventilation and filtration systems to remove dust and particulates from air emissions, improving air quality. • Conduct regular equipment maintenance to minimize emissions and ensure optimal performance. • Adhere to Good Manufacturing Practices (GMP) to promote cleanliness and minimize dust generation. • Optimize ventilation systems for proper airflow and contaminant removal, maintaining a safe working environment. • Provide workers with appropriate Personal Protective Equipment (PPE) to reduce exposure to contaminants. • Monitor air quality and emissions regularly to ensure compliance with regulatory standards. • Ensure regulatory compliance to safeguard employees and the environment.	Low

	b) Odor The warehouse of raw materials and chemicals will be a significant source of odors in pharmaceutical manufacturing due to the presence of various aromatic substances and solvents.	Low	• Enclosed storage will prevent odor spread. • Immediate cleaning will be done to prevent odor development. • Effective ventilation systems will be implemented in areas where these chemicals are handled to ensure proper airflow and reduce the concentration of odors. • Chemicals with strong odors will be stored separately from those with milder or no odors to prevent cross-contamination. • Chemicals will be kept in sealed containers when not in use to minimize vapor release. • Workers will be trained on proper handling procedures, the use of personal protective equipment (PPE), and emergency response measures.	Low
	c) Greenhouse Gas Emission Greenhouse gas emissions from the use of furnace oil -type boiler, and diesel -type generator operation. Diesel generator emissions involve a complex mix of gases and particles influenced by combustion efficiency, temperature, and process intricacies.	Low	• Improving energy efficiency through regular maintenance will be done to reduce fuel consumption and greenhouse gas emissions. • Equipment operation schedules will be optimized to minimize idle time and enhance efficiency as part of efforts. • Implementing monitoring and reporting systems to track and reduce greenhouse gas emissions from equipment is part of the plan.	Low
	Noise Pollution The operation of machines can generate significant levels of noise, particularly during high-speed or heavy-duty operations.	Low	• Regular equipment maintenance to minimize noise emissions and ensure optimal performance.	Low

			• Adherence to Good Manufacturing Practices (GMP) to optimize production processes and minimize noise generation. • Provision of proper Personal Protective Equipment (PPE), such as earplugs or earmuffs, to mitigate the risk of hearing damage. • Continuous monitoring of noise levels to identify and address any areas where noise exceeds acceptable limits promptly	
	Water Consumption Water consumption of ground water and surface water for the boiler, cleaning and sanitizing, production use, general office use and domestic use etc.	Moderate	• Conduct Water Audit: Perform a comprehensive water audit to pinpoint areas for enhancing water efficiency. • Adopt Advanced Technologies: Invest in water-efficient technologies and equipment to minimize water consumption and implement closed-loop systems for water recycling within the facility. • Explore Alternative Sources: Explore options like rainwater harvesting and non-potable water sources to supplement freshwater usage and reduce dependency on traditional water sources. • Ensure Regulatory Compliance: Strictly adhere to water usage regulations and permits issued by local authorities to maintain legal compliance. • Promote Sustainability: Support community-wide sustainable initiatives like reforestation to improve water availability in the region. • Implement Monitoring Systems: Establish a robust monitoring system to continuously track water usage, quality, and	Low

			environmental impact for effective management.	
	Water Pollution Wastewater generated in pharmaceutical production originates from cleaning and sanitization processes, production operations, quality control and testing activities, and general facility use. The discharge of liquid waste without proper treatment, comprising process water, cleaning effluents, and run-off effluents, can be a cause of water pollution.	Moderate	• Install tailored treatment systems encompassing physical, chemical, and biological processes. • Employ advanced treatment technologies like membrane filtration and UV disinfection to remove contaminants (if necessary). • Conduct regular monitoring and testing of effluent quality to ensure regulatory compliance. • Implement recycling and reuse programs to minimize water consumption. • Develop spill prevention measures and response protocols to mitigate environmental risks. • Ensure adherence to regulatory standards for wastewater discharge. • Reuse treated wastewater for gardening to promote sustainability. The RVK Myanmar Co., Ltd implemented the wastewater treatment system without discharge the wastewater into drain, The treated wastewater reuse for gardening purpose.	Low
	Hazardous Waste Hazardous waste generated from pharmaceutical manufacturing facilities encompasses a range of materials and substances that pose risks to both human health and the environment. This includes chemical waste such as unused or expired reagents and solvents, pharmaceutical waste, including expired or off-specification products containing	Moderate	• Identify and segregate hazardous waste streams accurately, including chemical, pharmaceutical, laboratory, biological, and packaging waste. • Establish strict handling and storage protocols to minimize the risk of spills, leaks, and exposures, ensuring employee safety and environmental protection.	Low

	active ingredients, and laboratory waste consisting of glassware, plasticware, and chemical residues.		• Ensure secure transportation and packaging of hazardous waste using specialized containers and materials to prevent accidents and environmental contamination during transit. • Utilize effective treatment methods tailored to hazardous waste characteristics, such as chemical neutralization, incineration, and biological degradation, to mitigate environmental risks before disposal. • Monitor waste management practices regularly to ensure compliance with regulatory requirements and identify areas for improvement. • Provide comprehensive education and training programs to employees on proper waste handling, storage, and disposal procedures to foster a culture of safety and environmental stewardship. • RVK Myanmar follows a systematic waste disposal procedure, outlined in detail in the provided appendix.	
	Solid Waste In operational activities, various waste types are produced, each requiring specific management strategies. These waste types include packaging materials such as empty containers and shipper boxes, glassware like vials and laboratory equipment, product waste including damaged or expired products, cleaning materials such as wipes and disposable mop heads, personal protective equipment (PPE) like disposable	Moderate	Pharmaceutical manufacturers must adhere to specialized disposal protocols for contaminated filters and filtration media to mitigate environmental contamination risks associated with active pharmaceutical ingredients (APIs) or solvents. Compliance with waste management regulations is crucial, necessitating strict	Low

	gloves and masks, filters and filtration media used to remove impurities, laboratory waste comprising disposable glassware and contaminated materials, biological waste, animal house waste, office waste consisting of paper, plastic, and metal clippings, and domestic and kitchen waste from staff quarters and the canteen.		adherence to regulatory guidelines governing solid waste disposal. Implementing appropriate disposal measures tailored to each waste category, such as segregation, recycling, or environmentally friendly disposal methods, is essential for responsible waste management. Continuous monitoring allows for the identification of areas for improvement, enabling refinements to waste management strategies to enhance environmental sustainability and regulatory compliance. Employee training and awareness programs promote a culture of environmental responsibility, encouraging compliance with waste management protocols and proactive waste reduction initiatives.	
	Soil Contamination Soil contamination originating from pharmaceutical factories can stem from various activities and processes within the facility. Accidental spills or leaks of chemicals, solvents, or pharmaceutical products during manufacturing, handling, storage, or transportation processes can introduce contaminants directly into the soil on-site.	Low	• Site Protection: Concrete roads act as a protective barrier, reducing soil contamination risk from production activities. • Chemical Handling: Implement safe practices for chemical handling, storage, and transportation to minimize spill risks. • Spillage Prevention: Emphasize proactive measures, including strict spill response plans and employee training, to prevent spills during delivery and filling activities. • Regular Site Inspections: Conduct frequent site inspections to identify potential spill sources and vulnerabilities to soil contamination.	Low

			• Responsible Disposal: Contaminated residues, including oily waste, are carefully handled and disposed of by the City Development Committee. • Used Oil Collection: Collect and manage used oil, including generator oil, in designated metal tanks, ensuring responsible disposal to avoid environmental impact. • Training and Awareness: Continuously educate employees on spill prevention, emergency response, and environmental stewardship. • Documentation and Reporting: Establish a clear spill reporting process for swift response and damage mitigation, regardless of spill size.	
	Occupational Health and Safety **a) Respiratory hazards** In pharmaceutical factories, respiratory hazards pose a significant risk to workers due to exposure to airborne particles, vapors, and gases. During various manufacturing processes and chemical handling tasks, employees may inhale hazardous substances that can irritate the respiratory tract or cause long-term health issues.	Moderate	• Ventilation Systems: Ensure effective airflow and contaminant dilution with proper ventilation systems. • Respiratory Protection: Provide workers with appropriate respiratory equipment and ensure proper usage. • Hazardous Substance Control: Implement measures to minimize airborne emissions during manufacturing. • Training: Conduct regular education programs on respiratory hazards and protection methods. • Air Quality Monitoring: Implement a program to monitor air quality and ensure compliance with exposure limits.	Low

	b) Infections and Allergic Reactions In pharmaceutical factories, workers are at risk of infections and allergic reactions due to exposure to biological agents used in research or production. Additionally, some employees may develop allergic reactions to certain biological materials, leading to symptoms ranging from mild skin irritation to severe respiratory distress.	Low	• GMP Compliance: Strictly adhere to Good Manufacturing Practices (GMP) for safe handling and storage, mitigating contamination risks. • Training: Provide comprehensive training and awareness programs to educate employees on allergen and pathogen risks, promoting hygiene practices. • Personal Protective Equipment (PPE): Supply appropriate PPE like gloves and masks to reduce direct contact and inhalation of allergenic or pathogenic substances. • Ventilation and Containment: Ensure proper ventilation and containment systems are in place to minimize the spread of allergens or pathogens within facilities.	Low
	c) Chemical Exposure Chemical exposure refers to the contact or interaction of workers with hazardous chemicals or substances used in pharmaceutical manufacturing processes. These chemicals can include active pharmaceutical ingredients (APIs), solvents, cleaning agents, and other chemical compounds.	Moderate	• Safety Protocols: Develop and enforce strict safety protocols for handling hazardous chemicals, covering storage, handling, labeling, and disposal to minimize exposure risks. • Personal Protective Equipment (PPE): Provide appropriate PPE like gloves, goggles, and respirators, ensuring proper fitting and maintenance for all workers handling hazardous chemicals. • Engineering Controls: Implement ventilation systems, containment enclosures, and barriers to reduce exposure to hazardous chemicals in the workplace. • Hazard Communication: Clearly label hazardous chemical containers and educate	Low

			workers on associated risks and safe handling procedures. • Training and Education: Conduct regular training to raise awareness about chemical hazards, emergency procedures, and safety protocols. • Medical Surveillance: Establish a program to monitor the health of workers exposed to hazardous chemicals, providing medical evaluations and follow-up care. • Emergency Response Planning: Develop and implement emergency response plans for chemical spills or leaks, ensuring workers know how to respond safely. • Monitoring and Auditing: Regularly monitor and audit safety protocols to ensure compliance and address any deficiencies promptly.	
	d) Exposure to Biological Agents Exposure to biological agents refers to contact or interaction with living organisms or biological materials used in pharmaceutical research or production processes.	Moderate	• Safety Protocols: Develop and enforce rigorous safety protocols for handling biological agents, including containment, decontamination, and waste disposal procedures. • Personal Protective Equipment (PPE): Provide workers with appropriate PPE like gloves, goggles, face shields, and respirators, ensuring proper fitting, maintenance, and usage. • Training and Education: Conduct regular training to increase awareness of biological hazards, proper handling techniques, and emergency procedures.	Low

			• Engineering Controls: Implement ventilation systems, containment enclosures, and barriers to prevent the spread of biological agents within the workplace. • Hazard Communication: Clearly label containers of biological agents and educate workers on associated risks and safe handling practices. • Medical Surveillance: Establish a program to monitor the health of workers exposed to biological agents, offering medical evaluations and follow-up care. • Emergency Response Planning: Develop and implement plans for responding to spills or leaks involving biological agents, ensuring workers are prepared to react safely. • Monitoring and Auditing: Regularly monitor and audit safety protocols to ensure compliance and identify areas for improvement, addressing any deficiencies promptly.	
	e) Physical Hazards Physical hazards are prevalent in pharmaceutical factories and pose risks such as machinery accidents, ergonomic strain, slips, trips, and falls.	Low	• Safety Training: Provide thorough safety training covering physical hazard identification, equipment handling, and emergency response. • Strict Protocols: Enforce rigorous safety protocols, including PPE use, adherence to safe practices, and regular equipment inspections. • Hazard Signage: Clearly mark hazardous areas and equipment with appropriate	Low

			signage to alert employees and promote caution. • Housekeeping: Maintain cleanliness and organization to reduce slip, trip, and fall hazards, promptly addressing spills and removing clutter. • Incident Reporting: Establish procedures for reporting and investigating incidents, using data to identify trends and implement preventive measures. • Continuous Improvement: Regularly update safety policies based on feedback, regulatory changes, and technological advancements.	
	f) Exposure of noise Exposure to noise is a common occupational hazard for employees in pharmaceutical factories, especially those working in areas with loud machinery or equipment.	Low	• Equipment Maintenance: Regularly maintain machinery to reduce noise emissions and prevent risks. • Work Scheduling: Rotate workers in noisy areas and schedule maintenance during low-traffic times. • Personal Protective Equipment (PPE): Provide hearing protection and ensure proper fitting and training. • Monitoring: Regularly monitor noise levels and implement control measures as needed. • Training: Educate employees on noise risks and the importance of using hearing protection.	Low
	g) Electric Shock and Equipment Safety Electric shock and equipment safety failures in pharmaceutical factories present substantial risks to workers, especially those engaged in electrical machinery maintenance or operation.	Low	• Regular Inspection and Maintenance: Conduct routine inspections and maintenance of electrical systems by qualified professionals.	Low

			• Employee Training: Provide comprehensive training on electrical safety practices and emergency response procedures. • Personal Protective Equipment (PPE): Ensure the use of appropriate PPE, including insulated gloves and safety goggles, when working with electricity. • Safe Work Practices: Implement safe work practices such as de-energizing systems before maintenance and using lockout/tagout procedures. • Equipment Testing and Certification: Regularly test and certify electrical equipment to ensure compliance with safety standards. • Emergency Response Planning: Develop and practice emergency response plans for electrical incidents. • Supervision and Oversight: Provide adequate supervision of electrical work activities to ensure compliance with safety procedures.	
	Community Health and Safety **a) Air Pollution:** Pharmaceutical manufacturing processes may release pollutants into the air, potentially impacting the surrounding community.	Low	• Installation of Dust Collection Systems: Implement advanced systems to capture and remove particulate matter and pollutants generated during manufacturing. • Filtration System Improvement: Upgrade filtration systems to effectively remove hazardous chemicals from air emissions. • Regular Maintenance and Inspection: Conduct routine maintenance to ensure equipment functions properly and minimizes emissions.	Low

			• Adherence to Good Manufacturing Practices (GMP): Follow strict guidelines to minimize pollutant generation and maintain high air quality standards. • Ventilation and Airflow Management: Enhance ventilation systems to efficiently remove pollutants and prevent dispersion into the surrounding area.	
	b) Water Pollution: Pharmaceutical factories may discharge wastewater containing pharmaceutical residues, heavy metals, or other contaminants, which can pollute water bodies.	Low	• Advanced Wastewater Treatment: Install systems to remove pharmaceutical residues and contaminants from wastewater before discharge. • Monitoring and Testing: Regularly monitor treated wastewater to ensure compliance with water quality regulations. • Recycling and Reuse: Implement programs to reuse treated wastewater for non-potable purposes like irrigation. • Spill Prevention: Develop measures to prevent accidental releases of pollutants into water bodies. • Community Engagement: Engage with the local community to raise awareness and encourage participation in water quality monitoring.	Low
	c) Hazardous Waste Generation: Pharmaceutical factories generate various types of hazardous waste, including chemical residues, solvents, packaging materials, and expired products.	Low	• Segregation and Labeling: Separate hazardous waste streams and label containers to prevent mixing and ensure safe handling. • Storage and Handling: Store hazardous waste securely in designated areas and provide training and protective equipment for employees.	Low

			• Transportation: Transport hazardous waste safely using authorized carriers and vehicles. • Treatment and Disposal: Treat hazardous waste to reduce harm and dispose of it in compliance with regulations. • Emergency Preparedness: Develop response plans and train employees to handle hazardous waste incidents. • Monitoring and Reporting: Track waste activities and maintain records for regulatory compliance	
Decommissioning	**Air Pollution** Air pollution, demolition activities of the factory building and related infrastructure, movement of vehicle, and temporary use of the diesel generator.	Moderate	During the decommissioning phase of the factory, several mitigation measures are in place to address air pollution concerns. These measures include dust suppression techniques using water sprayers, maintaining moisture in demolition areas, using covered transportation for waste and materials, strategically placing storage piles away from residential areas, and ensuring regular maintenance of vehicles and equipment to minimize emissions from diesel engines. These actions are aimed at reducing fugitive dust emissions and preventing air pollution during the demolition process, thus safeguarding the environment and nearby communities.	Low
	Noise Pollution Impact of noise disturbances to surround areas of the project site.	Low	During the decommissioning phase of the factory, several mitigation measures are in place to manage noise effectively. These include regular equipment maintenance to reduce mechanical noise, the installation of temporary noise barriers or enclosures, scheduling	Low

			demolition activities during the daytime to minimize nighttime disturbances, selecting quieter demolition equipment, maintaining open communication with local residents, and ensuring compliance with local noise regulations.	
	Soil and Water pollution The water quality of the nearby drainage systems can be affected by solid waste and wastewater drainage from the factory, and solid waste can also damage soil quality if not properly handled.	Moderate	• Erosion and Sediment Control: Employ erosion control measures like silt fences, straw bales, and erosion control blankets to prevent soil erosion and sediment runoff into nearby water bodies. • Stormwater Management: Develop a stormwater management plan that captures and treats runoff water from the demolition site, incorporating sediment basins or ponds to remove contaminants before discharge. • Chemical Management: Ensure proper disposal of hazardous chemicals and materials encountered during demolition, promptly containing and cleaning up any chemical spills in accordance with regulations. • Decontamination: Prior to demolition, safely remove or decontaminate equipment, machinery, or structures containing hazardous materials like asbestos or lead-based paint to prevent their release. • Waste Disposal: Dispose of demolition debris in compliance with local environmental regulations, segregating and managing hazardous materials separately to avoid contamination of non-hazardous waste.	Low

			• Soil Testing: Conduct soil testing before and after demolition to identify and address potential soil contamination, remediating polluted soil as needed. • Water Quality Monitoring: Continuously monitor water quality in nearby rivers, streams, or groundwater wells to detect any contamination stemming from demolition activities.	
	Solid Waste Solid waste generated from the demolition of the project buildings and related infrastructure, and food waste, and domestic waste from the temporary site of workers at the project site	Low	**Waste Segregation**: Establish a robust waste segregation program that categorizes different waste materials, including concrete, metal, wood, and non-recyclable debris. Use clearly marked bins or containers for each waste category to facilitate proper separation. **Disposal Planning:** Develop a comprehensive disposal plan, especially for non-recyclable and hazardous waste. Hazardous materials like asbestos or lead-based paint must be handled and removed by certified professionals in strict adherence to regulatory guidelines. **Waste Transportation**: Ensure the safe transport of waste materials to disposal or recycling facilities by using appropriate vehicles and containers. Compliance with local regulations is crucial to guaranteeing safe and lawful waste transportation.	Low
	Occupational Health and Safety Physical hazards such as incidents and accidents leading to serious injury or fatalities. Occupational Noise to employees and workers	Low	During the decommissioning phase, ensuring safety is paramount. Key measures include regular equipment inspections and maintenance to prevent accidents, providing appropriate personal protective equipment (PPE) to workers, offering specific safety	Low

			training, and engaging with the local community to address concerns and communicate safety measures and progress effectively.	
	Community Health and Safety Air pollution from demolition activities Noise pollution from the movements of trucks transporting construction materials	Moderate	• Dust Control: Employ effective dust control methods like regular watering or the use of dust suppressants. • Emission Monitoring: Continuously monitor air quality throughout the decommissioning process. • Community Communication: Maintain transparent and open communication with the local community.	Low
	Water pollution from hazardous substances left after operation and waste and sewage generated from construction and demolishing activities and from a contractor's camp	Moderate	• Waste Disposal: Keep hazardous materials separate from non-hazardous waste to prevent contamination. • Chemical Handling: Properly handle and dispose of any hazardous chemicals or materials. • Stormwater Management: Utilize sediment basins or ponds to remove contaminants before discharging runoff into nearby water sources. • Water Quality Monitoring: Continuously monitor the quality of water during decommissioning. • Community Engagement: Maintain transparent communication with the local community throughout the decommissioning process.	Low

5.4 Environmental Impacts and Its Significance Summary

The RVK Myanmar Co., Ltd. is of the intention to make a business operation of the pharmaceutical products manufacturing in Myanmar, in accordance with the existing laws in Myanmar. It will get a long-term lease of the Myanmar Pharmaceutical Factory (MPF) in Pyin Oo Lwin, from the Myanmar Economic Holdings Ltd. (MEHL). The size of the proposed factory area is 26.4 acres within the compound of Myanmar Economic Holdings Ltd. (MEHL). The leased land consists of 26.4 acres for the factory area, and an additional 10.83 acres for the administrative area. The project site located in Block No. 662-Ka (N 14 to N 47), Block No. 655 (N 1 to N 10), Kan Gyi Kone village tract, Mandalay-Lashio Road, Pyin Oo Lwin Township, Mandalay Region, Myanmar.

Based on the evaluation and prediction of significant impact for the operation phase, the environmental impact assessment conducted by Green Enviro Services Ltd. identifies moderate impacts in several areas:

Air Quality Impact: During production processes such as grinding and granulation, as well as packaging and filling in bags, the release of dust poses a moderate impact on air quality.

Water Consumption Impact: The use of water for production, general office use, domestic purposes, canteen, and toilet facilities results in a moderate impact on ground and surface water consumption.

Wastewater Effluents Impact: Discharged wastewater from the production process and cleaning and sanitizing contains residual active pharmaceutical ingredients (APIs), organic solvents, and chemical byproducts, leading to a moderate impact.

Solid Waste Impact: Waste disposal of product waste, packaging materials, filters, laboratory waste, microbiological waste, and other office waste generates hazardous and production waste, resulting in a moderate impact.

Occupational Health and Safety Impact: Exposure of workers to dust, hazardous materials, chemicals, biological agents, and noise poses a moderate risk to occupational health and safety.

Community Health and Safety Impact: Release of pollutants into the air and discharged wastewater from factory operations, offices, canteens, and toilet facilities poses a moderate risk to community health and safety, along with the generation of hazardous waste.

Most of the identified impacts are moderate and can be effectively mitigated with the implementation of a comprehensive environmental management plan. Such a plan would involve targeted measures aimed at reducing emissions, minimizing impact of waste generation, enhancing resource efficiency, and ensuring compliance with environmental regulations.

Specifically, impacts on terrestrial ecology, including flora, fauna, and ecosystem values, are expected to be minimal. This is because the factory is not situated on virgin land that would have required clearing and significant alteration for the project's implementation. The factory building already exists, and pharmaceutical production was previously undertaken by MEHL. RVK Myanmar has taken over the project from MEHL through a lease agreement to continue producing pharmaceutical products. No new buildings will be constructed; instead,

renovation and equipment upgrades are needed. Therefore, the renovation of the project site is not anticipated to pose a threat to the natural habitats of biodiversity or the biotopes of flora and fauna.

The factory's presence can significantly affect the local community's socioeconomic aspects and quality of life, making community engagement and addressing concerns a high-priority consideration. Regulatory compliance is paramount to avoid legal and reputational risks, necessitating strict adherence to environmental regulations.

All the potential threats identified are generic threats associated with factory facilities and can be mitigated with the strictly implementation of the Environmental Management Plan and by maintaining a high-quality environment within and around the facility. The project will significantly contribute to the socio-economic development of nearby villages and the Pyin Oo Lwin City.

5.5 Cumulative Impact Assessment

Methodology and Approach

Impacts directly associated with the project are discussed in the preceding section. In this section, the impacts associated with the cumulative effects of the project and other developments are described. The evaluation of potential cumulative impacts is an integral element of an impact assessment.

Cumulative impacts in relation to an activity are defined as the impact of an activity that, in itself, may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities undertaken in the area.

In order to understand the manner in which the project will contribute to cumulative impacts, an understanding of the existing pharmaceutical factory operations at Kan Gyi Kone village tract through past and present activities over space and time is essential. This will require the identification of existing and proposed projects within the region.

Currently, the selected location lacks neighboring factories or other commercial establishments, and the surrounding area is predominantly composed of some agricultural fields tended by the local community, along with Anee Sakan Airport. Consequently, there are presently no apparent potential cumulative impacts. However, considering RVK Myanmar Company's intention to establish the pharmaceutical factory, it is prudent to factor in the potential cumulative impacts that this project may introduce.

Figure 19. Map of surrounding environment of factory

Cumulative Impact Assessment

Air and Noise Pollution: The transportation vehicles could result in emissions of air pollutants and noise, affecting the local air quality and acoustic environment.

Water Usage and Quality: The factory's water consumption needs and wastewater discharge could impact local water resources, including groundwater and surface water quality, depending on the effectiveness of water management practices.

Economic and Social Dynamics: The establishment of the factory may lead to changes in the local economy, including job creation, increased demand for services, and potential socio-economic shifts within the community.

Mitigation Measures:

- Environmental management: Establish a robust environmental monitoring system to continuously monitor air and noise pollution levels. This plan should include regular reviews and adjustments to minimize unexpected cumulative effects.
- Integrated Water Management: Implemented improved water management in the plant to improve water use efficiency and reduce wastewater discharge. Use sustainable technologies and recycling programs to ensure water quality meets local standards.
- Sustainable transportation methods: It is important that the workplace with low emission vehicles introduce sustainable transportation practices It is important to incorporate better logistics to provide goods a reduction in the overall environmental impact associated with transportation.
- Stakeholder collaboration: Active engagement with communities, regulatory agencies and relevant stakeholders is key to developing a collaborative approach to addressing

cumulative impacts Feedback mechanisms should be established there incorporate community concerns into the decision-making process.

- Skill development programs: Opportunities for local employees are provided through the implementation of skill development and training programs as per the requirements of the department. This arrangement not only matches the skills of the community with the needs of the facility but also allows for internships.
- Adaptive management approach: Adoption of adaptive management approach is essential to continuously reassess and adjust strategies based on changing circumstances. This includes remaining aware of changes in the local environment and local resource developments, and ensuring proactive response strategies are in place.

CHAPTER 6 – PUBLIC CONSULTATION AND DISCLOSURE

6.1 Introduction

The consultation is one of the key elements of the EIA study. In general, public consultation aims at (1) to share the project related information to the public and stakeholders, (2) to incorporate their opinions and suggestions in the project planning stage to ensure wider acceptability of the project and utilize the local knowledge and traditional wisdom in the planning stage, and (3) to encourage the public and stakeholders to participate in the planning stage.

6.2 Public Consultation Process

For this project, the public consultation meeting was organized in accordance with the EIA Procedure of Myanmar (2015). The meeting was held on 5 April, 2017 at each village nearby project site within 3 km radius of Pyin Oo Lwin Township, Mandalay Region in order to disclosure the project information to the following personnel:

- Institutions (Village Authorities)
- Individuals (Groups with special interests, business community etc.)
- Project Affected Persons at proposed sites
- Interested persons (politicians and religious leaders, etc.)

It is aimed at disclosing the findings of environmental and social studies and the likely impacts upon them as well as mitigation and monitoring schemes to remediate the impacts caused by the project activities. The impacts were studied for all activities to be carried out in three phases: construction phase, operation phase and decommissioning phase. It is also aimed at receiving public recommendations, feedbacks upon the studies.

The Green Enviro Survey Team was done in the nearby villages within 2 km radius of project sites namely Aung Chan Tha (2.08 km away), Nyan Nyin Tha village (1.24 km away) and Kan Gyi Kone Village Tract called Ward No.16 (1.45 km away) nearby project site on two purposes, viz. the observation of the surrounding environment as well as to obtain the gather village data to study and analyze the potential socio- economic impact to it.

The public consultation was done in 5 April, 2017 with a team of six members consisting of three members from RVK Myanmar Co., Ltd. three members from Green Enviro Survey Team, and the local authorities of Kan Gyi Kone village (Ward (16)), Nyn Nyin Tha village and Aung Chan Tha village and local people, a total of 12 nos. of attendees participated.

Date of Meeting	Location	Target Village	Number of Participant
5.4.2017 9:30 am to 11:30 am	Ward Administrative Office, Ward (16)	Kan Gyi Kone village Nyan Nyin Tha village Aung Chan Tha village	6 3 3

Meeting Agenda

Agenda of the public consultation meeting was held according to the following program:

1. Opening of the meeting

2. Introduction of RVK Myanmar Co., Ltd. about process of proposed project and business plan by U Ba Thi, RVK Myanmar Co., Ltd.

3. Presentation of Environmental Impact Assessment, EIA report study for proposed project by Dr. Wah Wah Han, Consultant of Green Enviro Services Ltd.

4. Recommendation and suggestion by Attendees

5. Closing of the meeting.

Minutes of the Public Consultation Meeting

Introduction

a. U Ba Thi, representing RVK Myanmar Co., Ltd., opened the meeting with a warm welcome and introduced the purpose of the gathering. He announced that the environmental footprint of their operations would be assessed by Green Enviro Services Ltd. in the upcoming engagement. This evaluation would involve conducting inquiries with residents living within a 2-kilometer radius of the factory premises, in collaboration with the factory management. Following this phase, the comprehensive findings would be formally communicated to the Environmental Conservation Department for thorough review and deliberation. Additionally, U Ba Thi also provided a brief overview of the factory's processes and background. He outlined key aspects such as the nature of the factory's operations, its production processes, and any relevant background information.

b. Dr. Wah Wah Han, a Consultant from Green Enviro Services Ltd., elucidates the organization's role and the overarching objectives of the convened meeting. The primary aim is to solicit empirical feedback from local stakeholders residing in proximity to the factory, focusing on pertinent issues such as wastewater management, and air pollution. This feedback will serve as a cornerstone for conducting a comprehensive environmental impact assessment, encompassing various facets including air quality, water resources, soil integrity, wastewater treatment, drainage systems, and noise levels, in strict adherence to Myanmar's Environmental Conservation Laws and Regulations.

Suggestions and comments from the local community:

1. U Aung Ba, the Village Administrative Officer of Nyan Nyin Tha, addressed a pressing concern regarding land usage during the meeting. He pointed out that certain areas of land have not been applied for by MEHL (Myanmar Economic Holdings Limited), leaving them unutilized. In light of this, ssome villagers expressed interest in utilizing these vacant plots for crop cultivation and have requested permission from MEHL for this purpose.
2. U Tin Naing Oo, the Administrative Officer of Kan Gyi Kone village (Ward-16), underscored the necessity of ensuring proper management of wastewater discharge to prevent it from contaminating public drains.
3. U Than Win, representing Aung Chan Tha village, emphasized that there have been no noticeable effects from the factory operations. He mentioned the absence of odors, dust, or any other disturbances attributable to the factory.

Answer by responsible person

In response to U Aung Ba's concerns about land usage, U Ba Thi, the representative of RVK Myanmar, clarified that RVK Myanmar leases the land from MEHL to operate its factory.

Therefore, any inquiries regarding the utilization of vacant plots for crop cultivation should be directed to MEHL, as these lands do not fall under the purview of RVK.

Furthermore, he that the factory operates as a closed-type facility, aiming to minimize negative effects on the surrounding environment.

In addition to addressing concerns regarding wastewater discharge, U Tin Naing Oo, the Administrative Officer of Kan Gyi Kone village (Ward-16), emphasized the importance of managing wastewater properly to prevent it from reaching public drains. He noted that wastewater treatment facilities have been implemented to treat the water, and the treated water is specifically utilized for gardening purposes within the compound, ensuring that it does not flow into public drains.

Furthermore, U Ba Thi mentioned that the factory has been meticulously designed and operates with careful consideration to ensure minimal impact on the surrounding community. He assured that the factory management is committed to continuing to prioritize the well-being of the community and will take all necessary measures to mitigate any potential adverse effects.

CHAPTER 7 – ENVIRONMENTAL MANAGEMENT PLAN (EMP)

The chapter describes the modalities provided in the project for the implementation of the proposed mitigation measures to mitigate its negative impacts. It proposes the institutional responsibilities for the implementation of the management plans, the mitigation plans, and the monitoring plan, and follow up activities. The Environmental Management Plan of the Pharmaceutical Factory is organized into the following sections:

1. Institutional Requirements
2. Objectives of the Environmental Management Plan
3. Responsibilities of the EMP
4. Planning Budget for the Environmental Management Plan
5. Environmental Management Plan
6. Environmental Monitoring Plan

7.1 Institutional Requirements

RVK Myanmar Co., Ltd. is committed to incorporating institutional requirements into its Environmental Management Plan (EMP). These requirements include:

1. Roles and Responsibilities: Clearly defining the responsibilities of individuals and departments involved in environmental management, ensuring accountability.
2. Institutional Structures: Establishing an Environmental, Health and Safety Management Committee to facilitate coordination and decision-making on environmental matters.
3. Environmental Policy: Developing and adopting an environmental policy that guides the company's commitment to sustainability.
4. Environmental Training and Capacity Building: Providing training programs to enhance employees' knowledge and skills in environmental management.
5. Monitoring and Reporting Systems: Implementing systems to monitor and report on environmental performance, allowing for regular assessment and progress tracking.
6. Communication and Stakeholder Engagement: Engaging in effective communication with internal and external stakeholders regarding environmental concerns.
7. Compliance and Legal Requirements: Ensuring adherence to relevant environmental laws, regulations, and permits.

The development of the proposed project will be managed by RVK Myanmar Co., Ltd. The project proponent needs to appoint one Environmental, Health, and Safety (EHS Team) Coordinator and Assistants for Environmental Management and Monitoring issues throughout the lifespan of the project. The EHS Coordinator is responsible for the implementation and monitoring of the Environmental Management Plan (EMP) and Monitoring Plan, as well as coordination with contractors, local authorities, and the nearby communities. The EHS Team also makes regular reviews of the EMP to cover all potential impacts, amendments, and modifications.

7.2 Objectives of the Environmental Management Plan

The objectives of the Environmental Management Plan are:

1. As a reference and commitment for the proponent to implement the EMP for three phases of the project life cycle, construction, operation, and decommission phases of the project
2. It will fulfil the needs of the Environmental Conservation Department of the Ministry of Natural Resources and Environmental Conservation (MONREC).
3. Serve as a guiding document for the monitoring of environmental and social activities of the project.
4. Provide a detailed framework to mitigate negative impacts on the environment and management actions to be adopted for proper implementation of the project.

7.3 Responsibilities of the EMP

In order to effectively implement the mitigation and management plan, it will be necessary to define the responsibilities of various stakeholders. RVK Myanmar Co., Ltd. has the responsibility to develop, implement, and adhere to an environmental mitigation and management plan for its factory establishment. This includes designing the plan, ensuring compliance with environmental regulations, implementing the outlined measures, monitoring environmental performance, and continuously improving practices. By fulfilling these responsibilities, the company demonstrates its commitment to responsible environmental management and sustainable operations.

RVK Myanmar Co., Ltd develop EHS Statement and Policy to proactively perform and achieve excellence in the Environment, Health and Safety (EHS) practices. An EHS Committee, formed and inclusive of 8 members representing all departments along with a Chairman and Vice Chairman, will be responsible for ensuring compliance with all environmental, health, and safety (EHS) activities across the plant.

RVK Myanmar Co., Ltd. is committed to effectively implementing the environmental mitigation and management plan by undertaking the following actions:

1. **Top Management**: The company's top management will take responsibility for providing leadership and guidance in the implementation of the plans to reduce impacts through monitoring and field inspections. They will establish the vision, policy, and objectives of the plan, integrating it into the company's strategic planning and decision-making processes.
2. **EHS Management Team**: A dedicated environmental management team will be formed to oversee and coordinate the implementation of the management plan. This team will consist of EHS team coordinator, managers, or designated employees who possess the necessary expertise in environmental management. They will develop action plans, monitor progress, and facilitate communication across departments.

   EHS Team Coordinator

   The EHS Team Coordinator is responsible for overseeing health, safety, and environmental initiatives within an organization. Their key responsibilities include:

- Developing and implementing EHS programs and policies.
- Ensuring compliance with regulations and conducting audits.
- Providing training and education to employees on safety and environmental practices.
- Leading incident investigations and developing corrective action plans.
- Conducting EHS audits and inspections to identify areas for improvement.
- Developing emergency response plans and coordinating drills and exercises.
- Driving continuous improvement through data analysis and proactive measures.
- Collaborating with health authorities for employee health checks and talks
- Take responsibility for assessing and addressing impacts on affected communities and engage in discussions and negotiations regarding compensation or remediation if necessary.

EHS Assistants

The EHS Assistants play a crucial role in supporting the EHS team and ensuring a safe and healthy work environment. Their responsibilities include:

- Assisting in the development and implementation of EHS programs.
- Maintaining accurate records and documentation of EHS activities.
- Conducting inspections and audits to identify hazards and non-compliance.
- Assisting in delivering EHS training and raising awareness among employees.
- Supporting incident response and investigation processes.
- Assisting in preparing and submitting EHS reports.
- Promoting a strong EHS culture within the organization.
- Staying updated with EHS regulations and industry best practices

3. **Departmental Representatives**: The company will assign representatives from each department who will be responsible for implementing the management plan within their respective areas. These representatives will collaborate with the environmental management team to integrate environmental considerations into departmental operations, processes, and practices.
4. **Employee Engagement**: The company will actively engage all employees in the implementation of the management plan. Employees will be made aware of the objectives and targets of the plan through training and communication programs.
5. **Monitoring and Reporting**: The company will assign specific responsibilities for monitoring and reporting environmental performance. Designated personnel will collect data, conduct regular inspections, and prepare reports on key environmental indicators.

6. **Compliance and Audit**: The company will ensure compliance with environmental regulations by designating individuals or teams responsible for monitoring regulatory requirements. Regular internal audits will be conducted to assess the effectiveness of environmental mitigation and management implementation.

7.3.1 Environmental Management Team

The RVK Myanmar Co., Ltd. organize the Environmental Management Team to establish the environmental management plan and monitoring plan.

Duties and Responsibilities

- Potential environmental impact is checked monthly by department and presented and discussed at the monthly meeting.
- Develop and implement procedures and practices necessary to protect personnel from unwanted injuries, cuts, or scratches at workplaces and in surroundings.
- Establish a system to receive and respond to instructions, suggestions, and complaints that may arise during operational work time.
- Communicate and train all employees about RVK's occupational health and safety procedures and practices.
- Regularly review EHS practices and procedures across the plant and ensure timely implementation.
- Prepare for safety audits and organize mock events, such as firefighting drills, testing of hydrant systems, and establishing assembly points in case of emergencies.

7.4 Planning Budget for the Environmental Management Plan

The RVK Myanmar Co., Ltd. has set up a policy of utilizing about 3% of the profit income on implementing the CSR and environment-related management works, including the expenses of the Environment Management Committee and/or the appointed EHS coordinator and assistant, who could also be one of the factory staff with responsibility to take care of the EMP activities in the factory compound. 25% of the allocated funds for CSR and environment-related management works will be used for environmental impact monitoring, mitigation, and management. The proposed company to be established will fulfill its corporate social responsibilities through the following planned programs:

- To hire as more as possible number of local labors to help to increase the local employment rate.
- To donate the necessary funds to the local societies for social welfare.
- To implement the EMP and environment-related management works

7.4.1 CSR Plan

The RVK Myanmar Co., Ltd. plans to commit 3% of its annual profit after tax to Myanmar's Corporate Social Responsibility Program for any usage that the State sees fit and environment-related management works. It inevitably has to continue, support, and maintain some of the CSR works and activities in the nearby community of the factory, as it has a good reputation for CSR activities in other countries and in Myanmar.

The company to be established will fulfill its corporate social responsibilities in the following programs.

- (25%) of subscribed money to rural development such as road maintenance, educational support for village schools and village library development in the area
- (25%) will be budgeted for community welfare, health and sport support to the nearby villages
- (25%) for donations and religious support to the village's monasteries, religious facilities and Myanmar traditional festivals.
- (25%) will be used for environmental impact monitoring, mitigation and management.

Besides the CSR Program, the company. also aims to accomplish

- Good relations with the government units
- Creation of sustainable friendly neighbourhood by supporting for the welfare of the community in the project area as per the village committee and authority.
- Employee Welfare and Benefits for staff and workers is also an important program of the Company. RVK Myanmar provides welfare facilities to the employees to keep their motivation levels high and to increase their productivity and efficiency at work. Employee benefits are arranged well for all the staff to feel safe and secure by their work and livelihood.

7.4.2 Cost Estimation for Environmental Mitigation and Monitoring

In terms of the budget for environmental mitigation and monitoring during operation phases, the main monitoring cost is a cost for field measurements such as air quality, water quality and noise quality. It can change according to the situation, and the below table (102) mentions the allocation of budget for the mitigation and monitoring plan throughout the life cycle of production, extendable for the long term. In addition, another main cost is the one for community support programs as a part of CSR activities, as mentioned above. All of the money is allocated to the implementation of community support programs and other CSR programs, which are planned based on the requests and actual demand from the communities. In the event that the budget allocated for the environmental mitigation and monitoring plan proves inadequate, RVK will establish a reserve fund to ensure that the project's objectives are met.

Table 102. Budget Allocation for the Environmental Mitigation and Monitoring Plan

No.	Item	Frequency/ Time	Unit Cost (MMK)	Annual Cost (MMK)
Management: Operation Phase				
1.	Air Quality			
	Greening area within and outside of the area of the factory compound	Monthly	833,333	10,000,000
	Check and maintain proper ventilation and airflow control	Annual	50,000,000	50,000,000
	Replace filter	Annual	10,000,000	10,000,000

	Cleaning and Housekeeping	Daily	25,000,000	25,000,000
	Maintain generator and boiler	Monthly	1,000,000	12,000,000
2.	Noise Quality	-	-	-
	Machine Inspection and Maintenance	As and when require	2,000,000	2,000,000
3.	Water Consumption	Annual	2,240,000	4,480,000
4.	Wastewater management	Annual	10,000,000	10,000,000
5.	Solid and hazardous waste management	Monthly	1,000,000	12,000,000
6.	Soil Contamination management	Monthly	500,000	6,000,000
7.	Occupational Health and Safety			
	Purchase of PPE	Monthly	1,000,000	12,000,000
	Medical Check-ups and Health Care	Annual	6,000,000	6,000,000
	Emergency Preparedness for fire hazards	Monthly	1,700,000	20,400,000
	Boiler Inspection and Maintenance	Biannual	1,800,000	3,600,000
	Pest Control	Monthly	1,000,000	12,000,000
	Sub-Total			**195,480,000**
Management: Decommissioning Phase				
1.	Air Quality		Lump sum	2,000,000
2.	Noise		Lump sum	1,000,000
3.	Soil and Water Pollution		Lump sum	4,000,000
4.	Waste Management		Lump sum	2,000,000
5.	Occupational Health and Safety		Lump sum	2,000,000
6.	Community Health and Safety		Lump sum	5,000,000
	Sub-Total			**16,000,000**
Monitoring: Operation Phase				
1.	Air Quality Odor Boiler stack	Biannual	500,000 150,000 -	1,000,000 300,000 -
2.	Noise Quality	Biannual	200,000	400,000
3.	Water Quality (Tube Well Water, Wastewater (treatment pond))	Biannual	300,000	600,000
4.	Solid Waste	Monthly	0	0
5.	Occupational Health and Safety	Monthly	0	0
6.	Environmental Auditing	Biannual	2,500,000	5,000,000
	Sub-Total			**2,800,000**
Monitoring: Decommissioning Phase				
1.	Air Quality	Once	-	1,200,000
2.	Noise	Twice	500,000	1,000,000
3.	Water Quality	Once	-	1,000,000
4.	Waste Management	Weekly	-	1,000,000
5.	Occupational Health and Safety	Monthly	-	1,500,000
	Sub-Total			**5,700,000**
1.	EHS Coordinator	Monthly	5,00,000	6,000,000
2.	EHS Assistant	Monthly	300,000	3,600,000
3.	Training			5,000,000

	Sub-Total			**14,600,000**
	Grand-Total			**234,580,000**

7.5 Environmental Management Plan

7.5.1 Operation Phase

During the operation phase, a comprehensive set of internal control procedures will be implemented to ensure the responsible management of environmental aspects and safety. The plan encompasses the following key areas:

- Air Pollution Control
- Noise Pollution Control
- Water Consumption Control
- Water Pollution Control
- Waste Management plan
- Occupational Health and Safety
- Chemical Safety
- Fire Safety
- Community Health and Safety

7.5.1.1 Air Pollution Management

(a) Dust and particulate Management

As pharmaceutical manufacturing processes often involve various activities such as material handling, mixing, grinding, and packaging, they can generate dust and particulate matter. These airborne particles can include various pollutants, such as chemicals, pharmaceutical ingredients, and contaminants from raw materials and production processes.

Installation of Dust Collection Systems: Implement dust collection systems at various points in the production process, such as mixing, compounding, formulation, raw material storage, and packaging. These systems capture airborne particles before they can be emitted into the atmosphere, reducing pollution levels.

Filtration and Ventilation Systems: Prioritize the installation of an HVAC ventilation system in the production area. Install filtration systems to remove dust and particulates from air emissions before they are released into the environment. These systems can include air filters and scrubbers designed to trap and remove pollutants, improving air quality.

Regular Maintenance and Inspection: Conduct regular maintenance and inspection of equipment to ensure optimal performance and minimize emissions. This includes cleaning machinery, repairing leaks or faulty components, and replacing filters as needed to prevent dust buildup.

Implementation of Good Manufacturing Practices (GMP): Adhere to GMP standards to promote cleanliness and hygiene in pharmaceutical manufacturing facilities. This includes maintaining clean workspaces, proper storage of materials, and thorough cleaning procedures to minimize dust generation.

Proper Ventilation and Airflow Management: Optimize ventilation systems to ensure adequate airflow and circulation within the manufacturing facility. Proper ventilation helps to remove airborne contaminants and maintain a safe and healthy working environment for employees.

Personal Protective Equipment (PPE): Providing workers with appropriate PPEs such as respirators, goggles, and shields, can reduce direct contact and inhalation of the pathogen.

Monitoring and Compliance: Regularly monitor air quality and emissions to ensure compliance with regulatory standards and guidelines. Conduct periodic air quality testing to assess pollution levels and identify areas for improvement.

Regulatory Compliance: Conformity to relevant environmental and occupational health regulations ensures that the plant is running within permitted limits and safeguarding both employees and the surrounding environment.

(b) Odor Management

In pharmaceutical manufacturing, the use of 273 raw materials encompasses various chemical categories that have the potential to generate odors. To mitigate odors in pharmaceutical manufacturing, the following measures can be implemented:

Proper Storage and Handling Procedures: Store raw materials in enclosed packages, containers, and bags to prevent odor emissions. Implement protocols for handling aromatic substances and solvents to minimize exposure and odor generation.

Good Housekeeping Practices: Maintain cleanliness and organization in the warehouse and production areas to prevent the accumulation of odorous residues. Regular cleaning and disposal of waste materials can help reduce odors in the facility.

Spillage Management Practices: Implement spillage management protocols to quickly and effectively clean up any spills or leaks of aromatic substances or solvents. Prompt action can prevent the spread of odors and minimize their impact on the surrounding environment.

Effective Ventilation Systems: Design process buildings with effective extract ventilation systems to remove odors from the air. Proper ventilation helps to dilute and disperse odorous emissions, reducing their concentration in the facility.

Implementation of Good Manufacturing Practices (GMP): Adhere to GMP standards to ensure that all aspects of pharmaceutical manufacturing, including odor control, are conducted in a manner that minimizes environmental impact. This includes proper labeling, storage, and handling of raw materials to prevent odor emissions.

(c) Greenhouse Gas Emission Management

The Myanmar Pharmaceutical Factory operates two backup generators, each with a capacity of 500 kW, to supply electricity for its operations. Additionally, the factory utilizes a steam boiler fueled by furnace oil, consuming approximately 24,000 gallons annually (equivalent to 90.8259 metric tonnes). The combustion of fuels in stationary (non-transport) combustion sources leads to the emission of greenhouse gases (GHGs) such as carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O).

To mitigate greenhouse gas emissions from the generators and boiler at Pharmaceutical Factory, the following techniques can be implemented:

- **Improve energy efficiency**: By doing regular upkeep on generators while making sure correct combustion happens with gasoline in optimal conditions during use, improve general performance overall. Fuel consumption can be minimized, leading to lower greenhouse gas emissions.
- **Fuel Switching**: Explore the possibility of adopting alternative fuels for the generator. One promising option is using biodiesel or ultra-low-sulfur diesel. Biofuels, in comparison to traditional diesel or finance oil, exhibit significantly reduced GHG emissions.
- **Emissions Control Technologies**: Install emissions control technologies, which include particulate filters and catalytic converters, within the generators to lessen the release of pollution and greenhouse gases. These technologies can help seize and mitigate pollution before it is released into the atmosphere.
- **Operational Optimization**: Optimize the operational time-table of the generators to reduce idle time and maximize efficiency. This can help reduce fuel consumption and greenhouse gas emissions.
- **Employee Training and Awareness**: Encourage employees to adopt sustainable practices by teaching them the importance of strength performance and greenhouse gas reduction. A subculture of environmental duty can be fostered within the organization thanks to this.
- **Monitoring and Reporting**: Create a system for tracking and reporting greenhouse gas emissions from generators and the boiler. This enables the detection of areas for improvement and the evaluation of mitigation efficiency.

7.5.1.2 Noise Pollution Management

Pharmaceutical manufacturing often involves the use of various machinery and equipment, such as mixers, grinders, compressors, ventilation, and packaging machines. The operation of these machines can generate significant levels of noise, particularly during high-speed or heavy-duty operations. To mitigate noise pollution in the pharmaceutical manufacturing facility, several measures can be implemented:

Equipment Maintenance: Regular maintenance of machinery and equipment to minimize noise emissions and ensure optimal performance.

Adherence to Good Manufacturing Practices (GMP): Following GMP guidelines to optimize production processes and minimize noise generation.

Provision of Proper Personal Protective Equipment (PPE): Providing employees with appropriate hearing protection such as earplugs or earmuffs to mitigate the risk of hearing damage.

Continuous Monitoring: Implementing a system for ongoing monitoring of noise levels to identify any areas where noise exceeds acceptable limits and taking corrective actions promptly.

7.5.1.3 Water Consumption Management

Mitigating the potential impact of the Pharmaceutical Factory's annual water extraction of 24,000,000 gallons in the context of existing water stress and challenges in Pyin Oo Lwin would involve a combination of regulatory, technological, and sustainable management measures. The management plan can be implemented.

- Water Use Efficiency Improvements: Conduct a water audit to identify areas for improving water use efficiency within the pharmaceutical manufacturing process. Implement advanced water recycling and reuse systems to minimize water consumption and reduce the overall demand.
- Technological Upgrades: Invest in water-efficient technologies and equipment to reduce the amount of water required for manufacturing processes. Implement closed-loop systems to minimize water discharge and ensure that water is recycled within the manufacturing facility.
- Alternative Water Sources: Explore and invest in alternative water sources, such as rainwater harvesting, to supplement the factory's water supply. Investigate the feasibility of using non-potable water sources for certain processes, reducing reliance on freshwater.
- Compliance with Regulations: Ensure strict adherence to water usage regulations and permits issued by local water management authorities.
- Investment in Sustainable Practices: Support and invest in community-wide sustainable practices, such as reforestation initiatives and ecosystem restoration, to enhance the overall water availability in the region.
- Continuous Monitoring and Reporting: Implement a robust monitoring system to track water usage, quality, and environmental impact.

7.5.1.4 Water Pollution Management

Wastewater generated in pharmaceutical production originates from cleaning and sanitization processes, production operations, quality control and testing activities, and general facility use. The management plan can be implemented

Wastewater Treatment Systems: Installing and operating wastewater treatment systems tailored to the specific contaminants present in pharmaceutical wastewater. This may include physical, chemical, and biological treatment processes such as sedimentation, filtration, activated sludge treatment, and advanced oxidation.

Advanced Treatment Technologies: Incorporating advanced treatment technologies such as membrane filtration, reverse osmosis, and ultraviolet (UV) disinfection to achieve higher levels of wastewater quality and remove trace contaminants, including pharmaceutical residues (if necessary).

Effluent Monitoring and Testing: Conducting regular monitoring and testing of wastewater effluent to assess its quality and ensure compliance with regulatory standards. This may involve measuring parameters such as pH, biochemical oxygen demand (BOD), chemical oxygen demand (COD), total suspended solids (TSS), and specific contaminants of concern.

Recycling and Reuse: Implementing wastewater recycling and reuse programs to minimize water consumption and reduce the volume of wastewater discharged. Treated wastewater can be reused for non-potable applications such as irrigation, cooling water, or facility cleaning, thereby conserving freshwater resources.

Spill Prevention and Response: Developing and implementing spill prevention measures to minimize the risk of accidental releases of hazardous substances into the wastewater system. Establishing spill response protocols and providing training to employees on proper spill response procedures can help mitigate potential environmental impacts.

Regulatory Compliance: Ensuring compliance with local, national, and international regulations governing wastewater discharge from pharmaceutical facilities. This may include obtaining permits, adhering to discharge limits and reporting requirements, and maintaining documentation of wastewater management practices for regulatory inspections.

The RVK Myanmar Co., Ltd implemented the wastewater treatment system without discharge the wastewater into drain, The treated wastewater reuse for gardening purpose.

Wastewater Management Plan

The factory has implemented a comprehensive wastewater management plan, which includes the operation of a dedicated wastewater treatment plant. This facility is designed to effectively treat effluents discharged from the production process, ensuring that all wastewater undergoes proper treatment to meet acceptable environmental standards. As part of this plan, the treated water is repurposed for watering plants within the factory compound, contributing to sustainable water usage practices. For liquid waste generated during production, a systematic approach is followed. Initially, the waste is diluted with water or a suitable solvent as recommended or specified in standard operating procedures (SOPs). Subsequently, the pH of the liquid waste is carefully checked to determine its acidity or basicity. Depending on the nature of the waste, neutralization is carried out as an initial step to adjust the pH level. Following neutralization, the liquid waste undergoes further treatment in the wastewater treatment plant, where contaminants are removed to ensure compliance with environmental regulations.

Wastewater Treatment System

The RVK uses a holistic, multi-staged wastewater treatment system in order to guarantee the effective clarification of wastewater before its release or reuse. The initial actions are the deployment of filter grills that trap the larger debris, to start the process that will lead to fracture filtration later. Grease traps are thereafter exploited to produce a separation and collection of grease and oils, prohibiting the entry of the later into subsequent treatment processes. Skimmers also play the role of taking out any free oil which permits enforcement of high-quality effluent.

Treatment stage continues with the use of dissolved air flotation or oil water separators which have the objective of filtering oily droplets and suspended particles. After that, the filtration stage uses to eliminate finer suspended sediments, thus, creating the crystalline and cleaner

water flow. Steps like flow and load equalization aim at equalizing variations in flow and pollutant loads so as to optimize the treatment efficacies, and assure consistent processing.

Sedimentation is a critical factor in the removal of suspended solids, wherein they settle following the downward movement of their own weight. Next, a full treatment is pursued in order to minimize the BOD, COD, and TDS. These factors serve as a basis for measurement of organic pollutants, chemically oxidizable substances, and dissolved minerals, respectively.

Aeration Pump has installed in the pond to promote microbials growth. And for the sedimentation purpose, the impeller operation is daily.

Finally, chlorination is implemented if necessary, adding chlorine for disinfection by eradicating or inactivating pathogenic microorganisms that were present in the secondary treated effluent. In order to manage the residual sludge or waste generated as a part of the treatment process, RVK ascertains its safe disposal in sanctioned landfills for hazardous wastes.

Water Recycling

RVK has implemented water recycling initiatives aimed at minimizing wastage and optimizing water utilization across various stages of the water treatment process, including Pre-treatment, Demineralization, and Distillation. Key actions undertaken by RVK include:

Recycling rejected water from Pre-treatment by recirculating it to sedimentation Tank 1.

Recycling rejected water from the Demineralization plant, including RO 1st stage rejects and Filter washings.

Recycling rejected water from the Distillation plant, particularly from Large Volume Parenteral production, by sending it to the Boiler for re-use.

Progressing towards the recycling of Distillation reject water from SVP and Beta Lactam Injection.

Initiating plans to recycle circulation Potable water generated from the Oral Liquid Plant.

7.5.1.5 Eutrophication Management

To address the potential risk of eutrophication resulting from the discharge of nutrients, particularly phosphorus and nitrogen, into water bodies during pharmaceutical manufacturing processes, it is crucial to implement effective wastewater treatment processes. These processes should focus on the elimination or reduction of nutrients before discharging effluent water into the environment.

Wastewater Treatment Systems: Installing and operating wastewater treatment systems tailored to the specific contaminants present in pharmaceutical wastewater. This may include physical, chemical, and biological treatment processes such as sedimentation, filtration, activated sludge treatment, and advanced oxidation.

Spill Prevention and Response: Developing and implementing spill prevention measures to minimize the risk of accidental releases of hazardous substances into the water system. Establishing spill response protocols and providing training to employees on proper spill response procedures can help mitigate potential environmental impacts.

Monitoring and Optimization: Regular monitoring of wastewater quality and treatment performance is essential to ensure that nutrient concentrations remain within acceptable limits. By implementing real-time monitoring systems and optimizing treatment processes based on the observed data, facilities can proactively manage nutrient levels and prevent adverse environmental impacts.

Public Reporting and Transparency: Maintaining transparency regarding wastewater treatment processes and their effectiveness in nutrient removal is crucial for building trust with stakeholders and the community. Public reporting of wastewater quality data, treatment performance, and compliance with regulatory standards can enhance accountability and encourage continuous improvement efforts.

7.5.1.6 Waste Management

(a) Solid Waste

In response to the diverse range of waste types generated during pharmaceutical manufacturing operations, it is imperative to implement specific management strategies for each waste category. From packaging materials to laboratory waste, and from filters to office waste, each type requires careful handling and disposal methods to ensure environmental sustainability and regulatory compliance.

Specialized Disposal Protocols for Contaminated Filters and Filtration Media: Given the critical role of filters and filtration media in maintaining product quality and safety, their disposal, when contaminated with active pharmaceutical ingredients (APIs) or solvents, requires meticulous attention. Pharmaceutical factories must adhere to specialized disposal guidelines, which may involve treatments such as incineration or other specialized processes to mitigate environmental contamination risks.

Adherence to Regulatory Guidelines: Compliance with waste management regulations is paramount to mitigating the environmental impact of solid waste disposal. Pharmaceutical manufacturers must strictly adhere to regulatory requirements governing the disposal of various waste types, including filters and filtration media. By following established guidelines, companies can ensure responsible waste management practices and minimize adverse environmental consequences.

Implementation of Appropriate Disposal Measures: To mitigate the environmental impact of solid waste, pharmaceutical manufacturers should implement appropriate disposal measures tailored to each waste category. This may include segregating waste streams, implementing recycling or reuse programs where feasible, and employing environmentally friendly disposal methods for non-recyclable or hazardous waste.

Continuous Monitoring and Improvement: Regular monitoring of solid waste management practices allows for the identification of areas for improvement and the implementation of corrective measures as necessary. By continuously evaluating waste generation patterns, disposal methods, and environmental impacts, pharmaceutical manufacturers can refine their waste management strategies to enhance environmental sustainability and regulatory compliance.

Employee Training and Awareness Programs: Ensuring that employees are adequately trained in proper waste handling and disposal procedures is essential for maintaining effective solid waste management practices. Implementing awareness programs can further promote a culture of environmental responsibility among staff members, encouraging compliance with waste management protocols and fostering a proactive approach to waste reduction and recycling initiatives.

(b) Hazardous Waste

Addressing the risks associated with hazardous waste generated from pharmaceutical manufacturing facilities requires comprehensive strategies for handling, storage, transportation, treatment, and disposal. By prioritizing compliance with regulatory requirements and adhering to best management practices, pharmaceutical companies can effectively mitigate the impact of hazardous waste on human health and the environment.

Comprehensive Waste Identification and Segregation: Implementing robust waste identification processes to accurately categorize hazardous waste streams is essential. This includes identifying chemical waste, expired pharmaceuticals, laboratory waste, biological waste, and packaging waste. Segregating hazardous waste from non-hazardous waste streams facilitates safe handling and ensures compliance with regulatory guidelines.

Safe Handling and Storage Protocols: Establishing strict protocols for the safe handling and storage of hazardous waste minimizes the risk of accidental spills, leaks, or exposures. Pharmaceutical facilities must provide appropriate training to employees on proper handling procedures, use of personal protective equipment (PPE), and containment measures to prevent environmental contamination and protect human health.

Secure Transportation and Packaging: Hazardous waste transportation requires adherence to stringent safety protocols to prevent accidents and spills during transit. Utilizing specialized containers and packaging materials designed for hazardous materials ensures secure transportation and minimizes the risk of environmental contamination during transit to treatment or disposal facilities.

Effective Treatment and Disposal Methods: Implementing effective treatment technologies tailored to the characteristics of hazardous waste streams is crucial for mitigating environmental risks. Treatment methods such as chemical neutralization, incineration, biological degradation, and physical separation can render hazardous waste less harmful or inert before disposal. Pharmaceutical companies must prioritize the use of licensed treatment facilities that comply with regulatory standards for hazardous waste management.

Continuous Monitoring and Compliance: Regular monitoring of hazardous waste management practices allows for the early detection of potential issues and ensures ongoing compliance with regulatory requirements. Pharmaceutical facilities must conduct routine inspections, audits, and environmental assessments to assess the effectiveness of waste management procedures and identify areas for improvement.

Education and Training Programs: Providing comprehensive education and training programs to employees on the proper handling, storage, and disposal of hazardous waste fosters a culture of safety and environmental stewardship within the organization. Increasing awareness of regulatory obligations, potential hazards, and best practices empowers

employees to actively participate in hazardous waste management efforts and contribute to the prevention of environmental harm.

The RVK Myanmar Waste Disposal Procedure, outlined in detail in Appendix (5), delineates the systematic approach for handling waste materials

7.5.1.7 Soil Contamination Management

During the operational phase, soil quality is well-maintained due to the presence of concrete road facilities across the entire project site. These roadways act as a protective barrier against potential soil contamination from production activities. While accidental spills of raw materials and chemicals during deliveries, as well as the occasional oil spills from vehicles and the emergency generator, may occur, their impact is considered insignificant when proper handling and systematic control are in place.

Site Protection: The project site benefits from concrete road facilities, which serve as a protective barrier, reducing the risk of soil contamination resulting from production activities.

Chemical Handling: Implement best practices for the safe handling, storage, and transportation of chemicals and raw materials to reduce the risk of spills during delivery and handling activities.

Accidental Spillage Prevention: While accidental spillage of raw materials, chemicals, diesel, and petrol is mentioned, it's essential to emphasize proactive measures for spill prevention. Implement strict spill response plans and employee training to minimize the likelihood of spills during delivery and filling activities.

Regular Site Inspections: Conduct regular inspections of the entire project site area to identify potential spill sources, weak points, or areas vulnerable to soil contamination.

Responsible Disposal: Contaminated residues, including any oily waste, receive meticulous handling and are disposed of by the guidance of the City Development Committee.

Used Oil Collection: Used oil, including generator oil, is methodically collected in designated metal tanks. These oils are responsibly managed through proper collection and sale processes, preventing any potential environmental repercussions.

Training and Awareness: Continuously train employees on spill prevention, emergency response procedures, and the importance of environmental stewardship.

Documentation and Reporting: Establish a clear reporting process for employees to immediately report any spills, no matter how minor they may seem. Swift reporting can facilitate prompt responses and damage mitigation.

7.5.1.8 Occupational Health and Safety Management

a) Respiratory hazards

In pharmaceutical factories, respiratory hazards pose a significant risk to workers due to exposure to airborne particles, vapors, and gases. During various manufacturing processes and chemical handling tasks, employees may inhale hazardous substances that can irritate the respiratory tract or cause long-term health issues.

To mitigate the risks associated with respiratory hazards in pharmaceutical factories, the following measures can be implemented:

Adequate Ventilation Systems: Install and maintain effective ventilation systems throughout the facility to ensure proper airflow and dilution of airborne contaminants.

Respiratory Protection Equipment: Provide workers with appropriate respiratory protection equipment such as masks, respirators, or air-purifying respirators when handling hazardous substances. Ensure that respiratory protection devices are properly fitted, maintained, and used according to manufacturer instructions.

Hazardous Substance Control: Implement measures to minimize the release of airborne particles, vapors, and gases during manufacturing processes and chemical handling tasks. This may include using closed systems, containment enclosures, or engineering controls to control emissions at the source.

Training and Education: Conduct regular training and education programs to raise awareness about respiratory hazards and the importance of respiratory protection. Train workers on proper respirator use, maintenance, and storage, as well as the potential health effects of exposure to hazardous substances.

Regular Monitoring of Air Quality: Implement a program for regular monitoring of air quality to assess exposure levels to airborne contaminants. Use air sampling and monitoring equipment to measure concentrations of hazardous substances and ensure compliance with occupational exposure limits.

b) Infections and Allergic Reactions

In pharmaceutical factories, workers are at risk of infections and allergic reactions due to exposure to biological agents used in research or production. Additionally, some employees may develop allergic reactions to certain biological materials, leading to symptoms ranging from mild skin irritation to severe respiratory distress.

To mitigate the risks associated with infections and allergic reactions in pharmaceutical factories, the following measures can be implemented:

Good Manufacturing Practices (GMP): Comply with GMP procedures strictly for the safe handling and storage area, reducing the risk of contamination.

Training and Awareness: Implement training and awareness training for employees on the potential allergen and pathogen risk. Encourage hygiene behaviors, such as handwashing and PPE wearing.

Personal Protective Equipment (PPE): Provide appropriate PPE, such as gloves and masks, to minimize direct contact and inhalation of allergenic or pathogenic materials.

Ventilation and Containment: Maintain appropriate ventilation and containment systems at facilities to minimize the disbursement of allergens or pathogens.

c) Chemical Exposure:

Chemical exposure refers to the contact or interaction of workers with hazardous chemicals or substances used in pharmaceutical manufacturing processes. These chemicals can include

active pharmaceutical ingredients (APIs), solvents, cleaning agents, and other chemical compounds.

To mitigate the risks associated with chemical exposure in pharmaceutical manufacturing, the following measures can be implemented:

Strict Safety Protocols: Develop and enforce comprehensive safety protocols for handling hazardous chemicals. These protocols should include procedures for storage, handling, labeling, and disposal to minimize the risk of exposure.

Personal Protective Equipment (PPE): Provide workers with appropriate PPE such as gloves, goggles, face shields, and respirators. Ensure that PPE is properly fitted, maintained, and worn at all times when working with hazardous chemicals.

Engineering Controls: Implement engineering controls such as ventilation systems, containment enclosures, and barriers to minimize exposure to hazardous chemicals in the workplace.

Hazard Communication: Clearly label containers of hazardous chemicals with appropriate hazard warnings and instructions for safe handling. Ensure that workers understand the risks associated with specific chemicals and how to protect themselves.

Training and Education: Conduct regular training and education programs to raise awareness about the hazards associated with chemical exposure. Train workers on proper handling techniques, emergency procedures, and the importance of following safety protocols.

Medical Surveillance: Establish a medical surveillance program to monitor the health of workers who may be exposed to hazardous chemicals. Provide access to medical evaluations, screenings, and follow-up care as needed.

Emergency Response Planning: Develop and implement emergency response plans and procedures for dealing with spills, leaks, or other incidents involving hazardous chemicals. Ensure that workers know how to respond effectively and safely in an emergency situation.

Regular Monitoring and Auditing: Conduct regular monitoring and auditing of safety protocols to ensure compliance and identify areas for improvement. Address any deficiencies promptly to minimize the risk of chemical exposure.

d) Exposure to Biological Agents:

Exposure to biological agents refers to contact or interaction with living organisms or biological materials used in pharmaceutical research or production processes. Exposure to biological agents can occur through inhalation, ingestion, skin contact, or accidental inoculation.

To mitigate the risks associated with exposure to biological agents, the following measures can be implemented:

Strict Safety Protocols: Develop and enforce comprehensive safety protocols for handling biological agents. These protocols should include procedures for containment, decontamination, and waste disposal to minimize the risk of exposure.

Personal Protective Equipment (PPE): Provide workers with appropriate PPE such as gloves, goggles, face shields, and respirators. Ensure that PPE is properly fitted, maintained, and worn at all times when working with biological agents.

Training and Education: Conduct regular training and education programs to raise awareness about the hazards associated with biological agents. Train workers on proper handling techniques, emergency procedures, and the importance of following safety protocols.

Engineering Controls: Implement engineering controls such as ventilation systems, containment enclosures, and barriers to minimize the spread of biological agents in the workplace.

Hazard Communication: Clearly label containers of biological agents with appropriate hazard warnings and instructions for safe handling. Ensure that workers understand the risks associated with specific biological agents and how to protect themselves.

Medical Surveillance: Establish a medical surveillance program to monitor the health of workers who may be exposed to biological agents. Provide access to medical evaluations, immunizations, and follow-up care as needed.

Emergency Response Planning: Develop and implement emergency response plans and procedures for dealing with spills, leaks, or other incidents involving biological agents. Ensure that workers know how to respond effectively and safely in an emergency situation.

Regular Monitoring and Auditing: Conduct regular monitoring and auditing of safety protocols to ensure compliance and identify areas for improvement. Address any deficiencies promptly to minimize the risk of exposure.

e) Physical Hazards:

Physical hazards are prevalent in pharmaceutical factories and pose risks such as machinery accidents, ergonomic strain, slips, trips, and falls. Employees may be at risk of injuries while operating machinery or handling equipment, especially if proper safety precautions are not followed

To mitigate the risks associated with physical hazards in pharmaceutical factories, the following measures can be implemented:

Safety Training Programs: Provide comprehensive safety training to employees on identifying and avoiding physical hazards, proper equipment handling techniques, and emergency response procedures.

Strict Safety Protocols: Enforce strict safety protocols, including the use of personal protective equipment (PPE), adherence to safe work practices, and regular safety inspections of machinery and equipment.

Hazardous Area Signage: Clearly mark hazardous areas and equipment with appropriate signage to alert employees to potential risks and remind them to exercise caution.

Housekeeping Practices: Maintain a clean and organized work environment to reduce the risk of slips, trips, and falls. Promptly clean up spills, remove clutter from walkways, and ensure proper storage of materials and equipment.

Incident Reporting and Investigation: Establish procedures for reporting and investigating workplace incidents and near misses. Use incident data to identify trends and implement corrective actions to prevent future accidents.

Continuous Improvement: Regularly review and update safety policies and procedures based on feedback from employees, changes in regulations, and advancements in safety technology.

f) Exposure to Noise:

Exposure to noise is a common occupational hazard for employees in pharmaceutical factories, especially those working in areas with loud machinery or equipment. Prolonged exposure to high levels of noise can lead to hearing damage, including temporary or permanent hearing loss. Additionally, excessive noise levels can contribute to other health issues such as stress, fatigue, and reduced concentration, impacting workers' overall well-being and productivity.

To mitigate the risks associated with exposure to noise in pharmaceutical factories, the following plan can be implemented:

Equipment Maintenance: Regularly maintain machinery and equipment to reduce noise emissions and prevent unnecessary noise-related risks.

Work Scheduling: Rotate workers through noisy areas to limit individual exposure to high noise levels. Schedule maintenance and repair work during times when fewer employees are present to minimize disruption and exposure.

Personal Protective Equipment (PPE): Provide hearing protection devices such as earplugs or earmuffs to employees working in noisy environments. Ensure proper fitting and use of hearing protection and provide training on their correct usage.

Monitoring: Conduct regular noise monitoring throughout the facility to identify areas with excessive noise levels. Implement measures to control noise at the source or implement administrative controls where necessary.

Training and Education: Provide training to employees on the risks associated with noise exposure and the importance of using hearing protection.

g) Electric Shock and Equipment Safety:

Electric shock and equipment safety failures in pharmaceutical factories present substantial risks to workers, especially those engaged in electrical machinery maintenance or operation. Mishandling or inadequate maintenance of electrical systems can cause electric shock, burns, or other severe injuries.

To mitigate the risks associated with electric shock and equipment safety failures in pharmaceutical factories, the following measures can be implemented:

Regular Inspection and Maintenance: Conduct regular inspections and maintenance of electrical systems and equipment to identify and address potential hazards or defects. Ensure that maintenance tasks are performed by qualified professionals following established procedures.

Employee Training: Provide comprehensive training to workers on electrical safety practices, including proper handling of equipment, recognition of electrical hazards, and procedures for responding to emergencies such as electric shock or equipment failures.

Use of Personal Protective Equipment (PPE): Ensure that workers use appropriate PPE, such as insulated gloves, safety goggles, and non-conductive footwear, when working with or near electrical systems to minimize the risk of electric shock and other injuries.

Safe Work Practices: Implement safe work practices, such as de-energizing electrical systems before performing maintenance or repairs, using lockout/tagout procedures to control energy sources, and following established procedures for working in confined spaces or at heights.

Equipment Testing and Certification: Regularly test and certify electrical equipment to ensure compliance with safety standards and regulations. Replace outdated or malfunctioning equipment promptly to minimize the risk of accidents.

Emergency Response Planning: Develop and implement emergency response plans and procedures for dealing with electric shock incidents, equipment failures, or other electrical emergencies. Train workers on emergency response protocols and conduct regular drills to ensure readiness.

Supervision and Oversight: Provide adequate supervision and oversight of electrical work activities to ensure compliance with safety procedures and regulations. Designate qualified personnel to oversee electrical installations, repairs, and maintenance tasks.

7.1.5.9 Safety Equipment, Hazard Mitigation, and Employee Health Programs

a) Safety and Emergency Equipment

Safety equipment, including spill control kits, safety shields, fire safety equipment, respirators, safety showers and eyewash units, and emergency equipment, will be available in well-marked, highly visible locations. Fire-alarm pull stations and telephones with emergency contact numbers will be readily accessible. The factory manager is responsible for ensuring proper training and providing supplementary equipment as needed.

Storage and Inspection of Emergency Equipment

Establish a central location for the storage of emergency equipment. Include the following:

- blankets for covering the injured,
- stretchers (it is generally best to wait for qualified medical help to move a seriously injured person),
- first-aid equipment, and
- chemical spill cleanup kits and spill control equipment (e.g., spill pillows, gloves, shoe covers, and a drum in which to collect material).

Inspect safety equipment regularly (e.g., every 3 to 6 months) to ensure that it will function properly when needed. The factory supervisor or safety coordinator is responsible for establishing a routine inspection system and verifying that inspection records are appropriately maintained and archived.

b) Hazard Warning Signs

Whenever possible, warning signs will be displayed where a potential hazard may cause injury. Warning signs must be strictly adhered to. Warning signs must be posted where hazards exist and must not be removed unless the hazard has been controlled.

All safety signs are intended to convey important information that may not be obvious at first glance in order to keep workers and other people safe from potential injuries or health risks. Industrial safety signs can help reduce liability by providing proper notification for operators and other workers in the vicinity of the risks presented by machines, chemical hazards, requirements for protective safety gear such as eye protection or ear protection, and the like.

RVK Myanmar Co., Ltd. posted safety and warning signs in designated areas in the factory compound.

c) Employee Health Care Facility

Health risks at the workplace, such as heat, noise, dust, hazardous chemicals, unsafe machines, and psychological stress, cause occupational diseases and can aggravate other health problems. Chronic respiratory diseases, musculoskeletal disorders, noise-induced hearing loss, and skin problems are the most common occupational diseases. In addition to general health care, all workers, and particularly those in high-risk occupations, need health services to assess and reduce exposure to occupational risks.

There are effective interventions to prevent occupational diseases, such as encapsulation of pollution sources, ventilation, noise control, substitution of dangerous chemicals, improvement of furniture, and the organization of work.

The task of specialized occupational health services is to assess these risks and develop recommendations for the prevention of occupational and work-related diseases. Workers at risk need regular medical check-ups to detect any health problems at an early stage, when treatment and modification of the workplace can help avoid permanent damage. The health care services for employees are followed.

- Perform pre-medical checkup for employees at the time of employment.
- Provide an annual medical checkup for all workers and consider work rotation strategies to reduce occupational exposure to allergens.
- Provide appropriate first aid facilities at the factory.
- Organize first aid training for all employees.
- Immunizations and other preventive measures
- Inspection and advice on canteens and sanitary facilities
- Advice and education in general hygiene for personnel and the work community
- Maintenance of general health records if workers are treated as patients or health service clients
- Collection of data on surveyed, detected, and measured occupational exposures and risk assessments

- Collection of statistics on occupational diseases and injuries
- Collection of data on health examinations
- Keep an occupational medical record consisting of information about the physical or mental health or condition of an identifiable individual made by or on behalf of a health professional in connection with the care of that individual. It may be in a computerized form, or in a paper form, or a combination of both.

d) Personal Protective Equipment (PPE)

PPE, Personal Protective Equipment, are the tools that ensure the basic health protection and safety of users. PPE includes all clothing and other work accessories designed to create a barrier against workplace hazards, and using PPE requires hazard awareness and training on the part of the user. Employees must be aware that the equipment does not eliminate the hazard; if the equipment fails, exposure will occur. To reduce the possibility of failure, equipment must be properly fitted and maintained in a clean and serviceable condition.

Employers are required to assess the workplace to determine if hazards that require the use of head, eye, face, hand, or foot protection are present or are likely to be present. If hazards or the likelihood of hazards are found, employers must select and have affected employees use properly fitted PPE suitable for protection from these hazards. Before doing work requiring the use of PPE, employees must be trained to know when PPE is necessary, what type is necessary, how it is to be worn, and what its limitations are, as well as its proper care, maintenance, useful life, and disposal. The most common categories and types of PPE are as follows.

- Eye and face protection: Industrial safety glasses, goggles, face shields, welding helmets
- Head protection: Protective helmets, such as hardhats
- Hearing protection: Single-use earplugs, molded ear plugs, or earmuffs
- Respiratory protection: Air-purifying respirators, atmosphere-supplying respirators, combination respirators, and dust masks
- Foot and leg protection: Metatarsal guards, toe guards, foot and shin guards, steel-toed boots, industrial safety shoes and boots, and leggings
- Hand and arm: Durable work gloves, fabric/coated fabric protection gloves, chemical/liquid resistant gloves, and insulating rubber gloves
- Torso protection: Chemical protective clothing (CPC), flame/heat resistant clothing, cooling vests, surgical gowns, aprons, and full body suits
- Fall protection: Full-body harnesses and body belts (only when used as part of a positioning system that limits falls to two feet)
- Musculoskeletal: Back belts, joint braces, and other devices designed to prevent overexertion-type injuries

e) Training Employees in the Proper Use of PPE

All employees requiring PPE must receive training from their employer to ensure they can properly use and don/doff PPE before undertaking duties where it is necessary. The owner must document PPE training by certifying each trainee employee, including their name, date of training, and the certified subject.

f) OHS Training

Provisions will provide OHS orientation training to all new employees to ensure they are apprised of the basic site rules of work at or on the site, personal protection, and preventing injury to fellow employees.

Training may consist of basic hazard awareness, site-specific hazards, safe work practices, and emergency procedures for fire, evacuation, and natural disasters, as appropriate. Any site-specific hazard or color coding in use should be thoroughly reviewed as part of orientation training.

7.5.1.10Generator Safety

The generator in a manufacturing facility can pose various potential hazards, and it's crucial to implement mitigation measures to ensure safety.

Generator Hazards: Implement regular maintenance schedules to identify and address potential issues promptly. Conduct thorough inspections before and after critical operations to ensure the generator's integrity. Train personnel to follow proper operating procedures to minimize the risk of mishandling.

Potential Impact Hazards: Provide adequate training to personnel to handle hazards safely. Establish emergency response protocols to address potential consequences promptly. Implement safety signage and clear communication to inform personnel about potential hazards.

Fuel or Oil Spills: Designate spill containment areas and equip them with appropriate spill kits. Regularly inspect and maintain fuel and oil storage systems to prevent leaks. Train personnel on spill response procedures and containment strategies.

Noise and Vibration Hazards: Isolate the generator from occupied areas using sound barriers or enclosures. Implement hearing protection measures for personnel working near the generator. Schedule maintenance activities during off-peak hours to minimize noise disruptions.

Improper Installation, Repair, and Upkeep: Ensure that installation, repair, and upkeep work are carried out by qualified professionals. adhere to the manufacturer's tips and industry standards during installation and repair. Implement thorough quality control checks after any installation, repair, or upkeep.

Inadequate Air Flow and Emission Control: Regularly inspect and clean exhaust systems to ensure unobstructed airflow. Install ventilation systems that effectively disperse exhaust gases. Use emissions control technologies to reduce the release of harmful gases.

Clutter and Combustible Materials: Establish clearly designated areas for generator installation and maintenance. Regularly conduct inspections to identify and remove clutter around the generator. Store combustible materials in a separate area, away from the generator.

7.5.1.11 Boiler Safety

Boilers play a vital role in various industrial processes, providing steam or hot water for heating, power generation, and other essential functions. However, the operation of boilers involves inherent hazards that can pose risks to personnel, the environment, and the facility itself. To ensure the safe and efficient operation of boilers, it is crucial to identify these hazards and implement effective mitigation measures.

Fire Hazard Due to Fuel: Ensure that the fuel is stored in a secure tank away from potential ignition sources. Follow proper safety procedures during fuel delivery and transfer.

Boiler Operation Malfunction or Failure: Regularly maintain and inspect the boiler. Ensure that operators are trained to recognize and respond to potential issues promptly.

Water Contamination from Boiler Effluent: Adhere to regional guidelines while treating and disposing of wastewater to safeguard clean drinking water sources.

Environmental Contamination from Waste Water Discharge: With due care towards pollution prevention, monitored and treated recycled water needs thorough screening for possible impurities before being released into ecosystems.

Storage Risks: Frequent monitoring and upkeep of storage tanks help avoid any potential risks or hazards.

7.5.1.12 Fire Hazard Management

Fire safety is an important part of the environmental and operational management of any industrial facility. Some industrial processes, as well as machinery and materials, the potential to cause fires if not controlled, which could lead to disastrous circumstances. To safeguard personnel, property, and the environment, robust fire safety measures will be implemented as follows:

Good Manufacturing Practices (GMP): Follow GMP protocol, keeping cleanliness, tidiness, and security at the premises to reduce the chances of any fire.

Proper Housekeeping: Keep the workspace clean and tidiness, and flammables aways from heat and electrical equipment.

Electrical Maintenance: Inspect, test, and maintain electrical systems and equipment regularly and upgrade them in order to avoid electrical faults and minimize the risk of electrical fires.

Gas System Safety: Implement rigorous safety protocols for gas-powered systems, including regular inspections, leak detection, and emergency response plans.

Fire Suppression Systems: Install and maintain fire suppression equipment, such as fire extinguishers, fire hydrants and hoses, throughout the facility.

Emergency Response Plans: Develop and communicate clear emergency response plans for fire incidents, including evacuation procedures and assembly points.

Training and Education: Train all employee in fire safety and familiarize them with appropriate fire extinguisher usage and emergency exit procedures.

Storage Practices: Store flammable materials and chemicals in designated areas equipped with proper ventilation and safety measures.

Electrical Safety: Educate employees on electrical safety practices, including reporting any electrical issues promptly.

Regular Inspections: Conduct routine safety inspections to identify and address fire hazards and potential risks.

The RVK Myanmar Co. Ltd. prepares a Fire Prevention Plan and organizes an Emergency Response Team (see Appendix (5)) to be in line with the Myanmar Fire Services Law enacted and abides by the instructions from Township Fire Services Stations and Minimum Standards.

The company will contact the Township-level Fire Services for inspection and to get certification on approval of Fire safety preparations.

Employee Training Program

The employees will be provided extensive training to order to improve their awareness and response time towards fire safety. This program encompasses the following key elements:

Fire Prevention Training: Education for employees on recognizing material and process fire risks in the workplace. Through this training, they will acquire the knowledge and processes that will enable them to avoid fires in the course of their duties.

Evacuation Training: Through regular training, employees will be trained in fire alarm signals, evacuation procedures, designated gathering points, and safe areas (refuge areas). This training will also outline roles and responsibilities during an evacuation.

Fire Safety Training: Employees assigned fire-fighting duties will undergo specialized training, including learning the locations and proper use of portable fire extinguishers and manual fire-fighting equipment. Additionally, they will be educated on the correct utilization of protective clothing and equipment required for safe fire response.

7.5.1.13 Raw Material and Chemical Safety

The assessment, handling, and storing of pharmaceutical raw materials constitute a critical phase in the intricate process of pharmaceutical manufacturing. Each raw material plays a pivotal role in the formulation of pharmaceutical products, be it as an active ingredient, excipient, or additive. The efficacy, safety, and quality of the final medicinal product are intricately tied to the meticulous scrutiny and adherence to stringent standards throughout the lifecycle of these raw materials. From the initial inspection to the final storage, pharmaceutical manufacturers must exercise precision and adherence to regulatory guidelines.

Hazard Identification and Assessment: Rigorous evaluation of raw materials and chemicals to identify potential hazards such as toxicity, flammability, or reactivity. This includes reviewing safety data sheets (SDS) and conducting risk assessments.

Proper Handling Procedures: Implementing protocols for safe handling practices, including appropriate techniques for transferring, mixing, and dispensing raw materials and chemicals. This may involve the use of specialized equipment and tools to minimize exposure.

Storage and Segregation: Establishing designated storage areas equipped with suitable containment measures to prevent spills or leaks. Raw materials and chemicals should be stored according to compatibility, with incompatible substances segregated to avoid reactive interactions.

Ventilation and Engineering Controls: Ensuring adequate ventilation systems and engineering controls are in place to control airborne contaminants and maintain safe working environments. This includes the installation of fume hoods, exhaust systems, and ventilation monitoring devices.

Personal Protective Equipment (PPE): Providing employees with appropriate PPE such as gloves, goggles, lab coats, and respirators to protect against potential chemical exposure. Training on the correct use and maintenance of PPE is essential.

Emergency Response Planning: Developing comprehensive emergency response plans and procedures to effectively manage incidents involving spills, leaks, or exposures. This includes training employees on emergency protocols and conducting regular drills to ensure preparedness.

Training and Education: Providing comprehensive training programs to educate employees on the safe handling and use of raw materials and chemicals. This includes raising awareness of potential hazards, emphasizing proper procedures, and promoting a culture of safety.

Regulatory Compliance: Ensuring compliance with relevant regulations, standards, and guidelines governing the handling and storage of raw materials and chemicals in pharmaceutical manufacturing. This includes maintaining accurate records, conducting inspections, and responding promptly to regulatory requirements.

Raw Material Handling and Storage

No	Type of Raw Material	Assessment	Handling	Storage
1	Acacia BP	Commonly used as binder in pharmaceuticals	Wear appropriate personal protective equipment (PPE), Handle in well-ventilated area.	Store in a cool, dry place away from incompatible substances. Keep containers tightly closed.
2	Allopurinol BP	Used to treat gout. Handle as a pharmaceutical active ingredient.	Use PPE, including gloves and safety goggles. Avoid inhalation and skin contact.	Store in a cool, dry place, away from heat and incompatible materials. Keep containers tightly closed.
3	Amaranth BPC	A food dye; follow guidelines for safe handling of food additives.	Use PPE. Avoid inhalation and contact with eyes and skin.	Store in a cool, dry place away from incompatible substances. Protect from light.
4	Amlodipine BESILATE Bp/EP	Calcium channel blocker used in hypertension. Handle as a pharmaceutical ingredient.	Handle in a well-ventilated area. Use appropriate PPE.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
5	Amoxicillin Trihydrate BP	Broad-spectrum antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Keep containers tightly closed.
6	Thiamine (Aneurine)HCL BP Powder	Thiamine (Vitamin B1) supplement; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Keep containers tightly closed.
7	Apple Green Dye (Food Grade)	Food coloring; handle in accordance with food safety regulations.	Use PPE. Avoid contact with eyes and skin.	Store in a cool, dry place. Protect from moisture.
8	Ascorbic Acid BP	Vitamin C supplement; handles as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Keep containers tightly closed.
9	Aspirin powder (Granular)	Analgesic and anti-inflammatory; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture.
10	Atenolol powder (Granular)	Beta-blocker used for hypertension; handles as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Keep containers tightly closed.
11	Avicel NF(PH 301) BP	Cellulose-base binder and disintegrant; handle as a pharmaceutical excipient.	Use PPE, including gloves and safety goggles. Avoid dust inhalation.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.

12	Calciferol BP	Vitamin D supplement; handle as a pharmaceutical ingredient.	Use PPE to avoid skin contact. Protect from light.	Store in a cool, dry place. Keep containers tightly closed.
13	Calcium Chloride BP (Inj., Grade)	Used in injections; handle with care following pharmaceutical manufacturing standards.	Use PPE. Avoid contact with eyes and skin.	Store in a cool, dry place. Keep away from incompatible materials. Protect from moisture.
14	Calcium Glycerophosphate B.P	Calcium supplement; handle as a pharmaceutical ingredient.	Use appropriate PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Keep containers tightly closed.
15	Carbimazole BP	Antithyroid medication; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light.
16	Carbocisteine BP	Mucolytic agent; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Keep containers tightly closed.
17	Ceftriaxone Sodium USP	Third-generation cephalosporin antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
18	Cetirizine Hcl BP	Antihistamine; handle as a pharmaceutical ingredient.	Use PPE. Avoid contact with eyes and skin.	Store in a cool, dry place. Protect from moisture.
19	Chlorpheniramine Maleae BP	Antihistamine; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Keep containers tightly closed.
20	Chlopheniramine Maleae BP (Inj: grade)	Antihistamine used in injections; handle with care.	Use PPE. Avoid contact with eyes and skin.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
21	Ciprofloxacin	Fluoroquinolone antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
22	Citric Acid	Acidulant; handle as a pharmaceutical ingredient.	Use PPE. Avoid contact with eyes and skin.	Store in a cool, dry place. Protect from moisture.
23	Crystalline Penicillin G BP (as Sodium Salt)	Penicillin antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
24	Dextrose Anhydrous BP	Simple sugar; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.

25	Dextrose Anhydrous BP (Pyrogen free) Crystalline Powder	Pyrogen-free dextrose; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
26	Dextrose Monohydrate BP	Monohydrate form of dextrose; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
27	Dispersed Orange	Coloring agent; handle according to safety guidelines.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light.
28	Dispersed Pink	Coloring agent; handle according to safety guidelines.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light.
29	Dispersed Yellow	Coloring agent; handle according to safety guidelines.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light.
30	Empty Capsule Gelatin Capsule (Size-0) (Flumoxy)	Gelatin capsule for pharmaceutical encapsulation; handle as a pharmaceutical excipient.	Handle with clean and dry hands. Avoid excessive force to prevent damage.	Store in a cool, dry place. Protect from humidity. Keep containers tightly closed.
31	Empty Capsule Gelatin Capsule (Size-1) (Carbocisteine)	Gelatin capsule for pharmaceutical encapsulation; handle as a pharmaceutical excipient.	Handle with clean and dry hands. Avoid exposing to moisture.	Store in a cool, dry place. Protect from humidity. Keep containers tightly closed.
32	Empty Capsule Gelatin Capsule (Size 1) (Flucloxacillin)	Gelatin capsule for pharmaceutical encapsulation; handle as a pharmaceutical excipient.	Handle with clean and dry hands. Avoid excessive force to prevent damage.	Store in a cool, dry place. Protect from humidity. Keep containers tightly closed.
33	Enalapril Maleate USP	ACE inhibitor used in hypertension; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
34	Essence of Orange	Flavoring agent; handle according to safety guidelines.	Use PPE. Avoid contact with eyes and skin.	Store in a cool, dry place. Protect from light.
35	Ethyl Alcohol BP (Alcohol 95%)	Solvent; handle with care due to flammability.	Use in a well-ventilated area. Avoid open flames.	Store in a cool, dry place. Keep away from heat sources. Keep containers tightly closed.
36	Flucloxacillin Sodium BP	Antibiotic; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.

37	Folic Acid BP	B-vitamin; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
38	Gelatin	Used as a pharmaceutical excipient in capsule shells.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
39	Glycerine BP	Humectant; handle as a pharmaceutical ingredient.	Use PPE. Avoid contact with eyes and skin.	Store in a cool, dry place. Keep containers tightly closed.
40	Lactose BP	Commonly used as a filler in pharmaceuticals.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
41	Liquid Paraffin BP	Used as a laxative and emollient; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Keep containers tightly closed.
42	Maize Starch BP	Commonly used as a filler and binder in pharmaceuticals.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
43	Magnesium Trisilicate BP	Antacid; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Keep containers tightly closed.
44	Magnesium Hydroxide N.F	Antacid and laxative; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Keep containers tightly closed.
45	Mannitol NF	Osmotic diuretic; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
46	Metformin HCL BP	Antidiabetic medication; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
47	Magnesium Stearate BP	Lubricant and glidant in pharmaceuticals; handle as an excipient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Keep containers tightly closed.
48	Methyl Hydroxy Benzoate BP	Preservative; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
49	Metroidazole BP	Antibiotic and antiprotozoal; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.

50	Metaphosporic Acid	Stabilizing agent; handle according to safety guidelines.	Use PPE, including gloves and safety goggles. Avoid contact with skin and eyes.	Store in a cool, dry place. Keep containers tightly closed. Protect from moisture.
51	Nicotinic Acid BP	Vitamin B3; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
52	Nicotinamide	Vitamin B3; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
53	Pantothenyl Alcohol	Vitamin B5; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
54	Purified Talc BP	Used as a lubricant and glidant in pharmaceuticals.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Keep containers tightly closed.
55	Paracetamol BP	Analgesic and antipyretic; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
56	Potassium Chloride BP(Inj., Grade)	Used in injections; handle with care.	Use PPE. Avoid contact with eyes and skin.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
57	Propylene Glycol BP	Humectant and solvent; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Keep containers tightly closed.
58	Propyl Hydroxy Benzoate BP	Preservative; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
59	Phenoxymethyl Penicillin Potassium BP	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
60	Pyridoxine HCL BP	Vitamin B6; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
61	Pantothenyl Alcohol	Derivative of pantothenic acid (Vitamin B5); used in cosmetics and pharmaceuticals; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
62	Repaglinide USP	Antidiabetic medication; handle with care, and follow regulations for pharmaceutical substances.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.

63	Raspberry Flavour BE 7394	Flavoring agent; handle according to safety guidelines.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
64	Riboflavin BP	Vitamin B2; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
65	Sodium Chloride B.P	Commonly used in saline solutions; handle with care.	Use PPE. Avoid contact with eyes and skin.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
66	Sodium Cirate B.P	Anticoagulant; handle as a pharmaceutical ingredient.	Use PPE. Avoid contact with eyes and skin.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
67	Sodium Chloride B.P (Inj., Grade)	Used in injections; handle with care.	Use PPE. Avoid contact with eyes and skin.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
68	Soluble Saccharin BP	Artificial sweetener; handle according to safety guidelines.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
69	Sulphamethoxazole BP	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
70	Sodium Lactate Solution BP	Electrolyte solution; handle as a pharmaceutical ingredient.	Use PPE. Avoid contact with eyes and skin.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
71	Tetracycline Hcl (Micronised)	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
72	Aluminium Hydroxide-Magnesium Carbonate-Co-Dried Gel BP	Antacid; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Keep containers tightly closed.
73	Potassium Chloride B.P	Electrolyte supplement; handle as a pharmaceutical ingredient.	Use PPE. Avoid contact with eyes and skin.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.

74	PVP(K-30)BP	Binder and disintegrant in pharmaceuticals; handle as an excipient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
75	Yellow Soft Paraffin	Emollient; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Keep containers tightly closed.
76	Wool Fat BP	Emollient; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
77	Trimethoprim	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
78	Cinnarizine BP/EP	Antihistamine; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
78	Diclofenac Sodium BP	Nonsteroidal anti-inflammatory drug (NSAID); handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
80	Dichlorometaxylenol	Antiseptic; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Keep containers tightly closed.
81	Chlorocresol BP	Preservative and antiseptic; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Keep containers tightly closed.
82	Chloroquine Phosphate BP	Antimalarial drug; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
83	Ciprofloxacin BP	Fluoroquinolone antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
84	Doxycycline Hyclate BP	Tetracycline antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
85	Haloperidol BP	Antipsychotic medication; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
86	Acetone BP	Solvent; handle with care due to flammability.	Use in a well-ventilated area. Avoid contact with eyes and skin.	Store in a cool, dry place. Keep containers tightly closed.
87	Albendazole USP	Anthelmintic drug; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.

88	Thiamine HCL (Inj; Grade)	Injectable form of Vitamin B1; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
89	Ascorbic Acid BP(Inj; Grade)	Injectable form of Vitamin C; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
90	Calcium Pantothenate	Calcium salt of Vitamin B5; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
91	Castor Oil	Laxative; handle as a pharmaceutical ingredient.	Use PPE. Avoid contact with eyes and skin.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
92	Chloropheniramine Maleate (Inj;Grade)	Injectable form of antihistamine; handle with care.	Use PPE. Avoid contact with eyes and skin.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
93	Fluconazole UDP	Antifungal medication; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
94	Folic Acid BP Inj;	Injectable form of Vitamin B9; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
95	Glacial Acetic Acid BP	Acidulant and solvent; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Keep containers tightly closed.
96	Grape Skin Extract	Antioxidant; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
97	Oleic Acid	Fatty acid; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Keep containers tightly closed.
98	Pantothenyl Alcohol (Inj;)	Injectable form of Vitamin B5; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
99	Peach Flavor	Flavoring agent; handle according to safety guidelines.	Use PPE. Avoid contact with eyes and skin.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
100	Pine Oil	Used in pharmaceutical formulations; handle according to safety guidelines.	Use in a well-ventilated area. Avoid contact with eyes and skin.	Store in a cool, dry place. Keep containers tightly closed.
101	Sucrose	Commonly used as a sweetener in pharmaceuticals.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.

102	Sunset yellow	Coloring agent; handle according to safety guidelines.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
103	HPMC(Phthalate)BP	Used as a film-coating agent in pharmaceuticals.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
104	Inositol	Vitamin B8; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
105	Magnesium Trisilicate BP	Antacid; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Keep containers tightly closed.
106	Parachlorometaxylenol	Antimicrobial agent; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Keep containers tightly closed.
107	Pantothenyl Alcohol (Inj)	Injectable form of Vitamin B5; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
108	Phytomenadione(Vitamin LK1) BP	Vitamin K supplement; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
109	Ponceau 4R colour	Coloring agent; handle according to safety guidelines.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
110	Potassium Hydroxide	Alkaline substance; handle with care.	Use PPE. Avoid contact with eyes and skin.	Store in a cool, dry place. Keep containers tightly closed.
111	Pyridoxine HCL Inj; Grade	Injectable form of Vitamin B6; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
112	Riboflavine '5' Phoshe Sodium Roche	Injectable form of Vitamin B2; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
113	Sodium Acetate BP	Buffering agent; handle as a pharmaceutical ingredient.	Use PPE. Avoid contact with eyes and skin.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
114	Sodium Bicarbonate BP (Inj;Grade)	Injectable form of sodium bicarbonate; handle with care.	Use PPE. Avoid contact with eyes and skin.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.

115	Sodium Hydroxide BP(Pellet)	Alkaline substance; handle with care.	Use PPE. Avoid contact with eyes and skin.	Store in a cool, dry place. Keep containers tightly closed.
116	Sodium Lauryl Sulphate	Surfactant; handle as a pharmaceutical ingredient.	Use PPE. Avoid contact with eyes and skin.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
117	Sodium Metabisulphate BP	Antioxidant and preservative; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
118	Tartrazine	Coloring agent; handle according to safety guidelines.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
119	Terpinolene	Used in pharmaceutical formulations; handle according to safety guidelines.	Use in a well-ventilated area. Avoid contact with eyes and skin.	Store in a cool, dry place. Keep containers tightly closed.
120	Tetracycline HCL BP	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
121	Tetracycline Hcl (Micronised)	Micronized form of tetracycline; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
122	Titanium Dioxide BP	Coloring and opacifying agent; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
123	Tween 80	Surfactant and emulsifying agent; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
124	Tween 80 (Suitable for Inj;)	Injectable form of Tween 80; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
125	Cefipime	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
126	Spray Ninhydrin	chemical used in analytical chemistry; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Keep containers tightly closed.
127	Sodium-1 pentane sulfonate	Surfactant; handle with care.	Use PPE. Avoid contact with eyes and skin.	Store in a cool, dry place. Keep containers tightly closed.
128	Acetonitrile	Solvent; handle with care due to flammability.	Use in a well-ventilated area. Avoid contact with eyes and skin.	Store in a cool, dry place. Keep containers tightly closed.

129	Acetic acid	Acidulant; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Keep containers tightly closed.
130	Tenofovir Disoproxil Fumarate	Antiretroviral drug; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
131	Emtricitabine	Antiretroviral drug; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
132	Microcrystalline Cellulose	Binder and disintegrant in pharmaceuticals; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
133	Dibasic Calcium Phosphate	Filler and binder in pharmaceuticals; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
134	Isopropyl Alcohol	Solvent; handle with care due to flammability.	Use in a well-ventilated area. Avoid contact with eyes and skin.	Store in a cool, dry place. Keep containers tightly closed.
135	Povidone K-30	Binder and disintegrant in pharmaceuticals; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
136	Polysorbate 80	Surfactant and emulsifying agent; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
137	Colloidal Anhydrous Silica	Flow and anti-caking agent; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
138	Sodium Starch Glycollate	Disintegrant in pharmaceuticals; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
139	Croscarmellose Sodium	Superdisintegrant in pharmaceuticals; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
140	Indigo carmine	Coloring agent; handle according to safety guidelines.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.

141	Isopropyl alcohol	Solvent; handle with care due to flammability.	Use in a well-ventilated area. Avoid contact with eyes and skin.	Store in a cool, dry place. Keep containers tightly closed.
142	Dichloromethane	Solvent; handle with care due to toxicity.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Keep containers tightly closed.
143	Tenofovir Disoproxil Fumarate	Antiretroviral drug; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
144	Microcrystalline Cellulose (Avicel pH 102) FM	Modified form of microcrystalline cellulose; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
145	Dibasic calcium Phosphate Dihydrate (ENARCHEM)	Calcium salt; handle as a pharmaceutical ingredient.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
146	Lactose (Dinamix)	Filler and binder in pharmaceuticals; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
147	Polysorate 80BP	Grade of polysorbate 80; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
148	Talcum Powder extra white	Lubricant and anti-adherent; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Keep containers tightly closed.
149	Magnesium Stearate (Sunshine)	Lubricant in pharmaceuticals; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
150	Aerosil	Flow aid and anti-caking agent; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
151	Sodium Starch Glycolate (Promogel)	Disintegrant in pharmaceuticals; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
152	Avicel-102	Microcrystalline cellulose; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.

153	Sodium lauryl sulphate	Surfactant; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
154	Crosscarmellose Sodium (AC-DISOL)	Superdisintegrant in pharmaceuticals; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
155	S-Amlodipine Besylate	Calcium channel blocker; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
156	Microcrystalline Cellulose pH 102	Binder and disintegrant in pharmaceuticals; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
157	Sodium Starch Glyccolate	Disintegrant in pharmaceuticals; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
158	Colloidal Sillicon Dioxide	Flow and anti-caking agent; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
159	Rabeprazole Sod EC 20mg	Proton pump inhibitor; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
160	Domperidone 10 mg Pellets	Antiemetic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
161	Orlistat Pellets 120mg	Lipase inhibitor; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
162	Cefprozil	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.

163	Cefdinir	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
164	Cefixime	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
165	Cefpodoxime	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
166	Cefditoren	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
167	Faropenem Sodium	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
168	Ceftibuten	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
169	Amoxicillin clavulanic Acid	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
170	Amoxycillin+sulbactum	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
171	Deferiprone	Iron-chelating agent; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
172	Deferasirox	Iron-chelating agent; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.

173	Esomeprazole	Proton pump inhibitor; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
174	Pregabalin	Anticonvulsant and analgesic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
175	Gabapentin	Anticonvulsant; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
176	Methylcobalamin	Vitamin B12 supplement; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
177	Sevelamer carbonate	Phosphate binder; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Keep containers tightly closed.
178	Glimepride	Antidiabetic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
179	Glibenclamide	Antidiabetic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
180	Rosuvastatin	Statin; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
181	Moxifloxacin	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
182	Fenofibrate	Antilipemic agent; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
183	Valsartans	Angiotensin II receptor blocker; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
184	Irbesartans	Angiotensin II receptor blocker; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
185	Telmisartan	Angiotensin II receptor blocker; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
186	Candesartan	Angiotensin II receptor blocker; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.

187	Vildagliptin	Antidiabetic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
188	Citicholine	Cognitive enhancer; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
189	Perindopril	ACE inhibitor; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
190	Atorvastatin	Statin; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
191	Pyrazinamide	Antituberculosis agent; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
192	Anastrazole	Aromatase inhibitor; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
193	Ebastine	Antihistamine; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
194	Sofosbuvir	Antiviral for Hepatitis C; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
195	Diacerin	Anti-inflammatory for osteoarthritis; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
196	Linezolid	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
197	Sitagliptin	Antidiabetic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
198	Choline alfoscerate	Cognitive enhancer; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
199	Ibuprofen	Nonsteroidal anti-inflammatory drug (NSAID); handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
200	Etoricoxib	NSAID; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
201	Hydroxyurea	Antineoplastic agent; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.

202	Clarithromycin	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
203	Azithromycin	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
204	Febuxostat	Xanthine oxidase inhibitor; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
205	Ursadeoxycholic acid	Bile acid; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
206	Ambroxol	Mucolytic agent; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
207	Tadalafil	Phosphodiesterase inhibitor; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
208	Dapoxetin Hydrochloride	Serotonin reuptake inhibitor; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
209	Dimethicone	Silicone-based compound; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
210	Azithromycin Dihydrate	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
211	Clarithromycin	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
212	Cyproheptadine	Antihistamine; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
213	Amboroxol hydrochloride BP	Mucolytic agent; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
214	Guifenasin	Expectorant; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
215	Salbutamol sulphate BP	Beta-2 agonist bronchodilator; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
216	Amino Acid	Building blocks of proteins; handle with care.	Use PPE. Avoid inhalation and skin contact. Follow good hygiene practices.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.

217	Clarithromycin	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
218	Macragol	Polyethylene glycol; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Keep containers tightly closed.
219	Lactobacillus	Probiotic; handle with care.	Follow aseptic techniques. Avoid contamination.	Store in a cool, dry place. Protect from moisture. Follow recommended temperature conditions.
220	Isabgol	Psyllium husk; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
221	Diomsectite	Natural clay used in pharmaceuticals; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
222	Glucosamine hydrochloride BP	Used in joint health supplements; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
223	Ondansetron hydrochloride	Antiemetic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
224	Amikacin sulphate	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
225	Azithromycin Dihydrate	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
226	Montelukast Sodium	Leukotriene receptor antagonist; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
227	Levetiracetam	Antiepileptic drug; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
228	Tranexamic acid	Antifibrinolytic agent; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
229	Tramadol	Analgesic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
230	Diclofenac sodium BP(Inj;grade)	Nonsteroidal anti-inflammatory drug; handle with care.	Use PPE. Follow sterile procedures for injections.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.

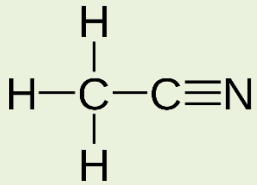
231	Sodium Chloride (Inj;grade)	Intravenous electrolyte solution; handle with care.	Use PPE. Follow sterile procedures for injections.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
232	Levofloxacin	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
233	Moxifloxacin	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
234	Ofloxacin	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
235	TRETINOIN	Topical retinoid; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
236	Mometasone FUROATE USP	Topical corticosteroid; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
237	Eflonithine HCL	Antiprotozoal agent; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
238	MOXIFLOXACIN HCL USP	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
239	Amikacin sulphate (Inj;grade)	Antibiotic; handle with care.	Use PPE. Follow sterile procedures for injections.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
240	Ofloxacin	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
241	TimoLOL MALEATE USP	Non-selective beta-adrenergic antagonist; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
242	Omeprazole pellet	Proton pump inhibitor; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
243	Methylcobalamin	Vitamin B12 supplement; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
244	Hypromellose	Pharmaceutical excipient; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.

245	Triacetin	Pharmaceutical plasticizer; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
246	Copovidone	Binder in pharmaceutical formulations; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
247	Carnauba Wax	Natural wax used in pharmaceuticals; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
248	Methylene Dichloride	Solvent; handle with care due to its toxicity.	Use PPE. Avoid inhalation and skin contact. Work in a well-ventilated area.	Store in a cool, dry place. Keep containers tightly closed.
249	Colloidal Anhydrous Silica	Pharmaceutical excipient; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
250	Sitagliptin Phosphate	Antidiabetic drug; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
251	Diabasic Calcium Phosphate	Pharmaceutical excipient; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
252	Sodium Stearyl Fumarate	Lubricant in pharmaceutical formulations; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
253	Sodium Lauryl Sulfate	Surfactant in pharmaceuticals; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
254	Cefepime	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
255	Faropenem Sodium	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
256	Cefaclor	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact	Store in a cool, dry place. Protect from light. Keep containers tightly closed.

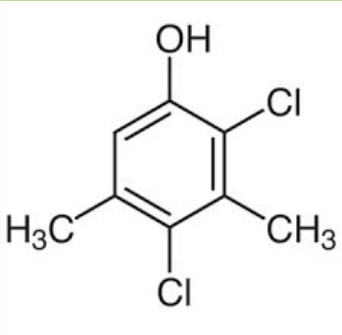
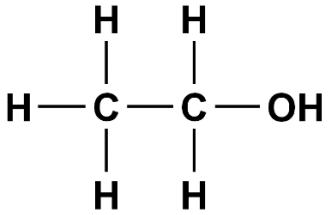
257	Cefuroxime	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
258	Cefpirome sulphate	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
259	Cefoperazone	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
260	Cefoxitin	Antibiotic; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
261	Capecitabine	Antimetabolite chemotherapy drug; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
262	Hydrochloric Acid (AR)	Strong acid; handle with extreme care due to corrosive properties.	Use PPE. Work in a well-ventilated area.	Store in a cool, dry place. Keep containers tightly closed.
263	Liquefied Phenol BP	Used as a disinfectant and in chemical synthesis; handle with care.	Use PPE. Work in a well-ventilated area.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
264	Sodium Acetate BP(Inj;Grade)	Buffering agent; handle with care.	Use PPE. Follow sterile procedures for injections.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
265	Lactose Anhydrous	Pharmaceutical excipient; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
266	Rabeprazole Sodium	Proton pump inhibitor; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from light. Keep containers tightly closed.
267	Sodium Stearyl Fumarate	Lubricant in pharmaceutical formulations; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
268	Cross Caramellose Sodium	Superdisintegrant in pharmaceuticals; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.
269	Caramel/Pink Size 1 hard gelatin Capsules	Capsule shell for pharmaceuticals; handle with care.	Use PPE. Avoid exposure to eyes and skin.	Store in a cool, dry place. Protect from moisture.

270	Yellow/Yellow Size 2 hard gelatin Capsules	Capsule shell for pharmaceuticals; handle with care.	Use PPE. Avoid exposure to eyes and skin.	Store in a cool, dry place. Protect from moisture.
271	White/White Size 2 hard gelatin capsules	Capsule shell for pharmaceuticals; handle with care.	Use PPE. Avoid exposure to eyes and skin.	Store in a cool, dry place. Protect from moisture.
272	Yellow/Yellow Size3 hard gelatin capsules	Capsule shell for pharmaceuticals; handle with care.	Use PPE. Avoid exposure to eyes and skin.	Store in a cool, dry place. Protect from moisture.
273	Sodium Starch Glycolate	Superdisintegrant in pharmaceuticals; handle with care.	Use PPE. Avoid inhalation and skin contact.	Store in a cool, dry place. Protect from moisture. Keep containers tightly closed.

Chemical Handling and Storage

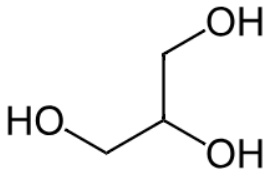
Type of Product		Chemical compound	Safety Handling and Storage
1.	Acetonitrile 	**Purpose of use:** Acetonitrile (360 Lit/annual) is to be used in QC analysis process. **Physical and chemical properties** Condensed formula: C_2H_3N Molar Weight: 41.05 g/mol Appearance: Form: Clear, liquid, Colour: colourless. Odor: ether-like Melting: -48°C Initial boiling point and boiling range: 81-82°C	**Storage:** Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. **Handling:** Avoid contact with skin and eyes. Avoid inhalation of vapour or mist. Use explosion-proof equipment. Keep away from sources of ignition-No smoking. Take measures to prevent the build-up of electrostatic charge. **Accidental Release Measures:** Personal precautions, protective equipment and emergency procedures: Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas. Environmental precautions: Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

			Methods and materials for containment and cleaning up: Contain spillage, and the collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations. **Firefighting Measures:** Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Wear self-contained breathing apparatus for firefighting if necessary. Use water spray to cool unopened containers.
2.	Castor Oil	**Purpose of use:** Castor Oil (Commercial Grad) BP (2,435 kg/annual) is to be used in the Aseptol. **Physical properties:** Physical State: Viscous liquid Liquid Appearance: Yellow Odor: Strong Melting Point: -10°C Boiling Point: 229 °C	**Storage:** Keep in a dry, cool and well-ventilated place. Keep container tightly closed. Incompatible Materials. Strong oxidizing agents. **Handling:** Wear personal protective equipment/face protection. Ensure adequate ventilation. Avoid contact with skin, eyes or clothing. Avoid ingestion and inhalation. **Exposure Controls:** This product does not contain any hazardous materials with occupational exposure limits established by region-specific regulatory bodies. **Personal Protective Equipment:** Eye/face protection: Wear appropriate protective eyeglasses or chemical safety google. Skin and body protection: Wear appropriate protective gloves and clothing to prevent skin exposure. Respiratory protection: No protective equipment is needed under normal use conditions. Hygiene Measures: Handle in accordance with good industrial hygiene and safety practice.
3.	Dichloro Meta Xylenol	**Purpose of use:** Dichloro meta xylenol BP (429 kg/annual) is to be used in the Aseptol. **Physical and chemical Properties** Chemical Formula: $C_8H_8Cl_2O$	**Storage:** To maintain product quality. Do NOT store in heat or direct sunlight. Keep in a dry, cool and well-ventilated place. Keep out of reach of children **Handling:** Avoid contact with eyes.

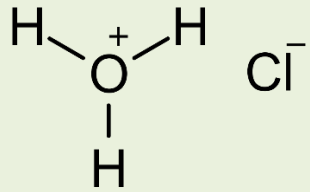
		Molecular weight: 191.95 g/mol Physical state: Clear Form: Liquid Color: Colored Odor: Pleasant (Perfume)	Wash hands after use. **Exposure Controls and Personal Protection:** **Contains no substances with occupational exposure limit values.** **Respiratory: Not normally required.** **Hand protection: Protective gloves.** **Eye protection: Googles-avoid contact of materials with eyes** **Engineering Controls: General ventilation normally required.**
4.	Ethanol 	**Purpose of use:** Ethanol BP (33,702 Lit/annual) chemical raw material is to be used in the Methylated Spirits 500ml, Spray Clean 100 mL, Spray Clean 500 mL, Spray Clean 30 mL, Spray Clean 1 L, Spray Clean 5L, Aseptol, Burplex Elixir, Paracetamol Elixir, Penicillin V 100's Bot, and Penicillin V 500's Bot pharmaceutical products. **Physical and chemical Properties** Chemical Formula: C_2H_6O Molecular weight: 46.07 g/mol Appearance: liquid, clear, colourless Melting point: -114°C Initial boiling point: 78°C	**Storage:** Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. **Handling:** Avoid contact with skin and eyes. Avoid inhalation of vapour or mist. Use explosion-proof equipment. Keep away from sources of ignition-No smoking. Take measures to prevent the buildup of electrostatic charge. **Exposure Controls and Personal Protection:** Eye/face protection: Face shield and safety glasses use equipment for eye protection tested and approved under appropriate government standard. Skin protection: Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands. Body protection: Impervious clothing. Flame retardant antistatic protective clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace. **First Aid Measures:**

			If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician. In case of skin contact: Wash off with soap and plenty of water. Consult a physician. In case of eye contact: Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. If swallowed: Do NOT indue vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician. **Firefighting Measures:** Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Wear self-contained breathing apparatus for firefighting if necessary. Use water spray to cool unopened containers. **Accidental Release Measures:** Personal precautions, protective equipment and emergency procedures: Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas. Environmental Precautions: Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Methods and materials for containment and cleaning up: Contain spillage, and the collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations. **Waste Treatment Methods:** Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dispose of as unused product.
5.	Eucalyptus Oil	**Purpose of use:**	**Storage:**

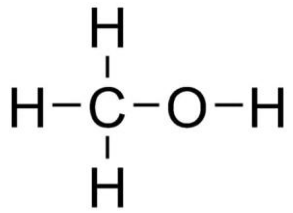
		Eucalyptus Oil BP (8 kg/annual) is to be used in Aseptol. **Physical Properties:** Appearance: Liquid Melting Point: <-20°C. Initial boiling point: 175°C Chemical stability: Stable under recommended storage conditions.	Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. **Handling:** Avoid contact with skin and eyes. Avoid inhalation of vapour or mist. Keep away from sources of ignition-No smoking. Take measures to prevent the build-up of electrostatic charge. **Personal protective equipment:** Eye/face protection: Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards. Skin protection: Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands. Body protection: Complete suit protecting against chemicals, flame retardant antistatic protective clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace Control of environmental exposure: Prevent further leakage or spillage if safe to do so. Do not let product enter drain Discharge into the environment must be avoided. **First Aid Measure:** If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician. In case of skin contact: Wash off with soap and plenty of water. Consult a physician In case of eye contact: Flush eyes with water as precaution. If swallowed: Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician. **Firefighting Measure:**

			Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Wear self-contained breathing apparatus for firefighting if necessary. **Accidental Release Measures:** Personal precautions, protective equipment and emergency procedures: Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas. Environmental precautions: Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided. Methods and materials for containment and cleaning up: Contain spillage, and then collect with a electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations.
6.	Glycerline  	**Purpose of use:** Glycerine BP (16,374 kg/annual) is to be used in Burplex Elixir, Paracetamol Elixir. **Physical and chemical properties:** Chemical Formula: $C_3H_8O_3$ Appearance: Clear viscous liquid Odor: Faint odor Melting/Freezing point: 20°C Boiling poing: 182°C Explosion limit lower: 2.7% Explosion limit upper: 19.9 % Solubilities: miscible in water	**Storage:** Store in a cool location. Keep away from food and beverages. Protect from freezing and physical damage. Protect from freezing and physical damage. Provide ventilation for containers. Keep container tightly sealed. Store away from incompatible materials. **Handling:** Avoid contact with skin, eyes, and clothing. Follow good hygiene procedures when handling chemical materials. Do not eat, drink, smoke, or use personal products when handling chemical substances. **Exposure controls/personal protection:** Appropriate Engineering controls: Emergency eye wash fountains and safety showers should be available in the immediate vicinity of use or handling. Provide exhaust ventilation or other engineering controls to keep airborne concentrations of vapor and mists below the applicable workplace exposure limits. Respiratory protection: Not required under normal conditions of use. Where risk assessment shows air-purifying respirators are appropriate,

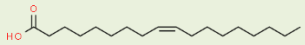
			use full-face particle respirator cartridges as a backup to engineering controls. When necessary, use NIOSH approved breathing equipment. Protection of skin: Select glove material impermeable and resistant to the substance. Select glove material based on rates of diffusion and degradation. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Use proper glove removal technique without touching outer surface. Avoid skin contact with used gloves. Wear protective clothing. Eye protection: Wear equipment for eye protection tested and approved under appropriate government standards such as NIOSH. Safety glasses or googles are appropriate eye protection. General hygienic measures: Perform routine housekeeping. Wash hands before breaks and at the end of work. Avoid contact with skin, eyes, and clothing. Before wearing wash contaminated clothing. **First aid measures:** After inhalation: Loosen clothing as necessary and position individual in a comfortable position. Move exposed to fresh air. Give artificial respiration if necessary. If breathing is difficult give oxygen. Get medical assistance if cough or other symptoms appear. After skin contact: Wash hands and exposed skin with soap and plenty of water. Seek medical attention if irritation persists or if concerned. After eye contact: Protect unexposed eye. Rinse or flush exposed eye gently using water for 15-20 minutes. Remove contact lenses while rinsing. Seek medical attention if irritation persists or if concerned. After swallowing: Rinse mouth thoroughly. Do not induce vomiting. Seek medical attention if irritation, discomfort, or vomiting persists. Never give anything by mouth to an unconscious person. **Firefighting measures:** Use water, dry chemical, chemical foam, carbon dioxide, or alcohol-resistant foam. Thermal decomposition can lead to release of irritating gases and vapors.

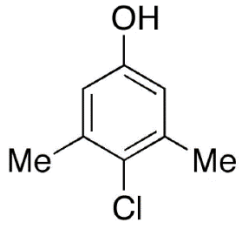
			Accidental release measures: Personal precautions, protective equipment and emergency procedures: Ensure adequate ventilation. Ensure that air-handling systems are operational. Environmental precautions: Should not be released into environment. Prevent from reaching drains, sewer, or waterway. Methods and material for containment and cleaning up: Wear protective eyeware, gloves, and clothing. Always obey local regulations. Containerize for disposal. Absorb with suitable material. If necessary, use trained response staff or a contractor. Evacuate personnel to safe areas. Keep in suitable, closed containers for disposal.
7	Hydrochloric acid 	**Purpose of use:** Hydrochloric acid (50 Gal/annual) is to be used in Water treatment process. **Physical and chemical properties:** Chemical formular: HCl Molecular weight: 36.46 g/mol Physical state: liquid Color: light yellow Odor: pungent Melting point/freezing point: -30°C Initial boiling point: >100°C Water solubility: Soluble	**Storage:** No metal containers. Store in a well-ventilated place. Keep container tightly closed. (Non-combustible, corrosive hazardous materials) **Handling:** Avoid breathing mist or vapors. Wash skin thoroughly after handling. Wear protective gloves/protective clothing/ eye protection/face protection. **Exposure controls:** Appropriate engineering controls: Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance. Eye/face protection: Use equipment for eye protection tested and approved under appropriate government standards as NIOSH(US). Tightly fitting safety goggles. **Skin protection:** Full contact: Nitrile rubber, minimum layer thickness 0.11 mm, break through time 480 min. Splash contact: Latex gloves, minimum layer thickness 0.6 mm, break through time 120 min. Body protection: Acid-resistant protective clothing.

			Control of environmental exposure: Do not let product enter drains. **First-aid measures:** If inhaled: After inhalation: fresh air. Call in physician. In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/shower. Call a physician immediately. In case of eye contact: After eye contact, rinse out with plenty of water. Immediately call in ophthalmologist. Remove contact lenses. If swallowed: After swallowing, make victim drink water (two glasses at most), avoid vomiting (risk of perforation). Call a physician immediately. Do not attempt to neutralise. **Firefighting measures:** Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing. **Accidental release measures:** Personal precautions, protective equipment and emergency procedures: Do not breath vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert. Environmental precautions: Do not let product enter drains. Methods and materials for containment and cleaning up: Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions. Take up with liquid-absorbent and neutralising material. Dispose of properly. Clean up affected area. **Waste treatment methods** Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.
8.	Methanol	**Purpose of use:**	**Storage:**

		Methanol BP (1,200 Lit/annual) is to be used in Methylated Spirits 100mL, Methylated Spirits 500mL. **Physical and chemical properties:** Chemical formular: CH_3OH Molecular weight: 32.04 g/mol Appearance: liquid, colourless Odour: pungent Melting point/freezing point: -98°C Initial boiling point: 64.7°C Upper explosion limit: 36 % (V) Lower explosion limit: 6%(V) Chemical stability: Stable under recommended storage conditions. Possibility of hazardous reactions: Vapours may form explosive mixture with air. Conditions to avoid: Heat, flames and sparks. Incompatible materials: Acid chlorides, Acid anhydrides, Oxidizing agents, Alkali metals, Reducing agents.	Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. (Flammable liquids) **Handling:** Avoid contact with skin and eyes. Avoid inhalation of vapour or mist. Use explosion-proof equipment. Keep away from sources of ignition-No smoking. Take measures to prevent the build-up of electrostatic charge. **Exposure controls:** Appropriate engineering controls: Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product. Eye/face protection: Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US). Skin protection: Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands. Full contact: butyl-rubber, minimum layer thickness 0.3 mm, break through time 480 min. Splash contact: Nitrile rubber, minimum layer thickness 0.4 mm, break through time 31 min Body protection: Complete suit protecting against chemicals. Flame retardant antistatic protective clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace. Control of environmental exposure: Prevent further leakage or spillage if safe to do so. Do not let product enter drain. **First aid measures:**

			If inhaled: If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician. In case of skin contact: Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician. In case of eye contact: Fush eyes with water as a precaution. If swallowed: Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician. **Firefighting Measure:** Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Special hazards arising from the substance or mixture: Carbon oxides Wear self-contained breathing apparatus for firefighting if necessary. Use water spray to cool unopened containers. **Accidental release measures:** Personal precautions, protective equipment and emergency procedures: Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas. Environmental precautions: Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Methods and materials for containment and cleaning up: Contain spillage, and then collect with and electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations. **Waste treatment methods:** Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.
9	Oleic acid	**Purpose of use:**	**Storage:** Tightly closed. Recommended storage temperature 2-8°C.

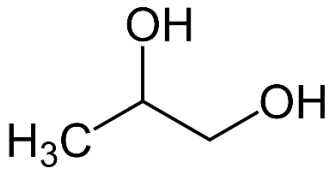
		Oleic Acid BP (24 kg/annual) is to be used in Aseptol. **Physical and chemical properties:** Chemical formula: $C_{18}H_{34}O_2$ Molecular weight: 282,46 g/mol Appearance: liquid, clear, colorless Melting point/freezing point: 13-14°C Initial boiling point: 194-195°C Reactivity: Forms explosive mixtures with air on intense heating. Chemical stability: The product is chemically stable under standard ambient conditions (room temperature). Violent reactions possible with: Oxidizing agents, perchloric acid Risk of explosion with: Aluminium Conditions to avoid: Strong heating	**Handling:** Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharge. Hygiene measures: Change contaminated clothing. Wash hands after working with substance. **Exposure controls:** Ingredients with workplace control parameters. Eye/face protection: Use equipment for eye protection tested and approved under appropriate governments standards such as NIOSH (US). Skin protection: not required Body protection: Flame retardant antistatic protective clothing. Respiratory protection: Not required; except in case of aerosol formation. Control of environmental exposure: Do not let product enter drains. **First aid measures:** If inhaled: After inhalation, fresh air In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/shower. In case of eye contact: After eye contact, rinse out with plenty of water. Remove contact lenses. If swallowed: After swallowing, make victim drink water (two glasses at most). Consult doctor if feeling unwell. **Firefighting measure:** Carbon dioxide (CO_2) foam dry powder. Special hazards arising from the substance or mixture: Carbon oxides, Combustible. Vapours are heavier than air and may spread along floors. Forms explosive mixtures with air on intense heating. Development of hazardous combustion gases or vapours possible in the event of fire. In the event of fire, wear self-contained breathing apparatus. Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system.

			Accidental release measures: Personal precautions, protective equipment and emergency procedures: Do not breathe vapours, aerosol. Keep away from heat and sources of ignition. Evacuate the danger area, observe emergency procedures, consult an expert. Environmental precautions: Do not let product enter drains. Methods and materials for containment and cleaning up: Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions. Take up with liquid-absorbent material. Dispose of properly. Clean up affected area.
10	Chloroxylenol  	**Purpose of use:** Chloroxylenol is commonly used in pharmaceutical production for antimicrobial properties. **Physical and chemical properties:** Molecular Formula: C8H9ClO Molecular Weight: 156.61 g/mol Appearance: white to off-white solid Melting point/Freezing point: 113-115°C Solubility: Chloroform(slightly), Ethyl Acetate (slightly), Methanol (Slightly) Chemical stability: Stable under recommended storage conditions. Incompatible Materials: Strong oxidizing agents, Strong bases	**Storage:** Keep container tightly closed in a dry and well-ventilated place. Keep in a dry place. **Handling:** Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Potential health effects and routes of exposure Inhalation: May be harmful if inhaled. May cause respiratory tract irritation. Ingestion: Harmful if swallowed. Skin: may be harmful if absorbed through skin. Causes skin irritation. Eyes: Cause eye irritation. **Exposure Controls/Personal Protection:** Appropriate engineering controls: A laboratory fumehood or other appropriate form of local exhaust ventilation should be used to avoid exposure. Eye/face protection: All equipment should have been tested and approved under appropriate standards, such as NIOSH (US). Skin protection: Gloves should be used when handling this material. Gloves are to be inspected prior to use. Contaminated gloves are to be removed using proper glove removal technique so that the outer surface

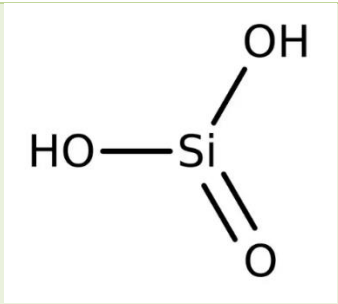
			of the glove does not contact bare skin. Dispose of contaminated gloves after use in compliance with good laboratory practices and local requirements. Gloves used for incidental exposures (splash protection) should be designated as chemical resistant by EU standard EN 374 with the resistance codes corresponding to the anticipated use of the material. Unrated gloves are not recommended. **First aid measures:** If inhaled: move person to fresh air. If not breathing, give artificial respiration and consult a physician. In case of skin contact: Wash affected area with soap and water. Consult a physician if any exposure symptoms are observed. In case of eye contact: Immediately rinse eyes with plenty of water for at least 15 minutes. Consult a physician. If swallowed: Never give anything by mouth to an unconscious person. Rinse mouth with water. Do NOT induce vomiting unless advised to do so by a physician or Pison Control Centre. Seek medical attention. **Accidental release measures:** Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. Environmental precautions: Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Method and materials for containment and cleaning up: Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.
11	Pine needle oil	**Purpose of use:** Pine Oil BP (532 kg/annual) is to be used in Aseptol. **Physical and chemical properties:** Appearance: Liquid	**Storage:** Keep away from heat/sparks/open flames/hot surfaces. No smoking. Keep container tightly closed in a dry and well-ventilated place. Keep cool. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Ground/bond container and receiving equipment.

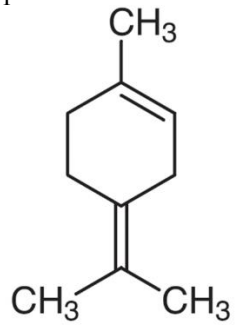
		Flash point: 40.56°C – closed cup Relative density: 0.9 g/cm^3 at 25° C Chemical stability: Stable under recommended storage conditions. Conditions to avoid: Heat, flames and sparks Incompatible materials: Strong oxidizing agents	**Handling:** Avoid contact with skin and eye. Avoid inhalation of vapour or mist. Keep away from sources of ignition-No smoking. Take measures to prevent the build-up of electrostatic charge. Wash skin thoroughly after handling. Wear protective gloves/eye protection/face protection. Flammable liquid and vapor. Causes skin irritation. Causes serious eye irritation. **Exposure controls/personal protection** Appropriate engineering controls: Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday. Eye/face protection: Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US). Skin protection: Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product, Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands. Full contact: Nitrile rubber, minimum layer thickness 0.4 mm, break through time 480 min. Splash contact: Nitrile rubber, minimum layer thickness 0.4 mm, break through time480 min. Body protection: Impervious clothing, flame retardant antistatic protective clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace. Control of environmental exposure: Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Response: If on skin or hair: Take off immediately all contaminated clothing. Rinse skin with water/shower.

			If eye irritation persists: Get medical advice/attention. In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish. **First aid measures:** If inhaled: if breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician. In case of skin contact: wash off with soap and plenty of water. Consult a physician. In case of eye contact: Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. If swallowed: Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician. Firefighting measures: Dry powder, Dry Sand. Do NOT use water jet. Wear self-contained breathing apparatus for firefighting if necessary. Use water spray to cool unopened containers. **Accidental release measures:** Personal precautions, protective equipment and emergency procedures: Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas. Environmental precautions: Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Methods and materials for containment and cleaning up: Contain spillage, and the collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local/national regulations. **Waste treatment methods:**

			Offer surplus and non-recyclable solution to a licensed disposal company. Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Dispose of as unused product.
12	Propylene glycol 	**Purpose of use:** Propylene Glycol BP (1,771 kg/annual) is to be used in Paracetamol Elixir. **Physical and chemical properties:** Chemical Formula: $C_3H_8O_3$ Molecular weight: 76.09 g/mol Appearance: liquid, clear, viscous Melting/Freezing point: -59.99°C Initial boiling point: 185-189°C Explosion limit lower: 2.6% Explosion limit upper: 12.5 % Chemical stability: Stable under recommended storage conditions. Incompatible materials: Acid chlorides, Acid anhydrides, Oxidizing agents, Chloroformates, Reducing agents	**Storage:** Keep container tightly closed in a dry and well-ventilated place away from heat and direct sunlight. Store at room temperature. Hygroscopic light sensitive. Combustible liquids. **Handling:** Wear gloves, safety glasses, and appropriate clothing to avoid skin and eye contact. Ensure proper ventilation in the workspace to avoid inhaling vapours. Clean up spills immediately with absorbent materials like sand or vermiculite, and dispose of them according to local regulations. **Exposure controls:** Appropriate engineering controls: Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday. Eye/face protection: Safety glasses with side-shields conforming EN 166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US). Skin protection: Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands. Full and splash contact: Nitrile rubber, minimum layer thickness 0.11 mm, break through time 480 mm. Body protection: Impervious clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace. **First aid measures:**

			If inhaled: If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician. In case of skin contact: Wash off with soap and plenty of water. Consult a physician. In case of eye contact: Flush eyes with water as precaution. If swallowed: Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician. **Firefighting measures:** Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Special hazards arising from the substance mixture: Carbon oxides Wear self-contained breathing apparatus for firefighting if necessary. **Accidental release measures:** Personal precautions, protective equipment and emergency procedures: Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Environmental precautions: Do not let product enter drains. Methods and materials for containment and cleaning up: Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal. Waste treatment methods: Offer surplus and non-recyclable solutions to a licensed disposal company. Dispose of as unused product.
13	Silica gel	**Purpose of use:** Silica gel (7,920,000 Nos/annual) is to be used in All Bottle medicine. **Physical and chemical properties:** Molecular Formula: H_2O_3Si Molecular weight: 78.098 g/mol Appearance: powder, white	**Storage:** Keep container tightly closed in a dry and well-ventilated place. Keep in a dry place. **Handling:** Provide appropriate exhaust ventilation at places where dust is formed. Exposure controls/personal protection: Eye/face protection: Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US).

		Chemical stability: Stable under recommended storage conditions. Incompatible materials: Strong oxidizing agents Hazardous decomposition products: Hazardous decomposition products formed under fire conditions. Silicon oxides	Skin protection: Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands. Full and splash contact: Nitrile rubber, minimum layer thickness 0.11 mm, break through time 480 min Body protection: Choose body protection in relation to its type, the concentration and amount of dangerous substances, and specific work place. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace. Respiratory protection: Respiratory protection is not required. Control of environmental exposure: No special environmental precautions required. **First aid measures:** If inhale: If breathed in, move person into fresh air. If not breathing, give artificial respiration. In case of skin contact: Wash off with soap and plenty of water. In case of eye contact: Flush eyes with water as a precaution. If swallowed: Never give anything by mouth to an unconscious person. Rinse mouth with water. **Firefighting measures:** Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Wear self-contained breathing apparatus for firefighting if necessary. The product itself does not burn. Accidental release measures: Personal precautions, protective equipment and emergency procedures: Avoid dust formation. Avoid breathing vapours, mist or gas

			Environmental precautions: No special environmental precautions required. Methods and materials for containment and cleaning up: Sweep up and shovel. Keep in suitable, closed containers for disposal. Waste treatment methods: Offer surplus and non-recyclable solutions to a licensed disposal company. Dispose of as unused product.
14	Terpinolene 	**Purpose of use:** Terpinolence Oil BP (1,162 kg/annual) is to be used in Aseptol. **Physical and chemical properties:** Molecular Formula: $C_{10}H_{16}$ Molecular weight: 136.23 g/mol Appearance: liquid Melting point/freezing point: <-20°C Initial boiling point: 184-185°C Reactivity: Forms explosive mixtures with air on intense heating Chemical stability: The product is chemically stable under standard ambient conditions (room temperature). Conditions to avoid: Strong heating	**Storage:** Flammable liquids. Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition. **Handling:** Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharge. Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance. **Exposure controls/personal protection** Appropriate engineering controls: Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance. Eye/face protection: Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US). Skin protection: Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands. The selected protective gloves have to satisfy the specifications of Regulation (EU) 2016/425 and the standard EN 374 derived from it. Full contact: Nitrile rubber, minimum layer thickness 0.4 mm, break through time 480 min.

			Splash contact: Nitrile rubber, minimum layer thickness 0.2 mm, break through time 38 min. Body protection: Protective clothing. Respiratory protection: Required when vapours/aerosols are generated. Control of environmental exposure: Do not let product enter drains. First aid measures: If inhaled: After inhalation, fresh air. In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/shower. Consult a physician. In case of eye contact: After eye contact: rinse out with plenty of water. Remove contact lenses. If swallowed: After swallowing, caution if victim vomits. Risk of aspiration! Keep airways free. Pulmonary failure possible after aspiration of vomit. Call a physician immediately. Firefighting measures: Use foam carbon dioxide (CO_2) Dry powder. Special hazards arising from the substance or mixture: Carbon oxides, Combustible. Vapours are heavier than air and may spread along floors. Forms explosive mixtures with air on intense heating. Development of hazardous combustion gases or vapours possible in the event of fire. Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing. Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system. **Accidental release measures:** Personal precautions, protective equipment and emergency procedures: Do not breath vapours, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition.

			Evacuate the danger area, observe emergency procedures, consult and expert. Environmental precautions: Do not let product enter drains. Methods and materials for containment and cleaning up: Cover drains. Collect bind, and pump off spills. Take up carefully with liquid-absorbent material. Dispose of properly. Clean up affected area. **Waste treatment methods:** Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

7.5.1.14 Emergency Preparedness Plan and Training Programs

Emergency preparedness is vital, as a quick and correct response is necessary in case of emergency to reduce injuries, harm, and other damage. Care must be taken during processing activities in order to prevent man-made errors and accidental cases. The emergency response plans should be established for handling all foreseeable emergency situations in the workplace and must provide the following:

1) Assignment of responsibilities
2) Emergency procedures

Assignment of responsibilities: All senior staff, such as a production manager, or safety officer, or EHS coordinator will be assigned to lead the emergency response team and charged with the duties of (1) assessing the emergency situation and taking necessary actions (2) overseeing the implementation of the emergency response plan (3) organizing regular drill, and (4) ensuring all emergency equipment is well maintained.

Emergency procedures: Emergency procedures are operating instructions for employees to follow in emergency case. In regard to work safety in the concerned processing, the management team will

a. Identify and list out all possible emergency situations in the workplace.
b. Assess the effects and impacts of emergency situations.
c. Establish emergency response plans.
d. Provide and maintain emergency equipment and other necessary resources.
e. Ensure that staff are familiarized with the arrangements in case of emergencies by providing procedural instructions, and employee training, and organizing drills.

Worker notification and communication: Alarm bells, visual alarms, or other forms of communication will be used to reliably alert workers to an emergency. Related measures include:

- Testing warning systems at least annually (fire alarms monthly) and more frequently if required by local regulations, equipment, or other considerations
- Installing a backup system for communications on-site with off-site resources, such as fire departments, in the event that normal communication methods may be inoperable during an emergency

Community Notification: If a local community may be at risk from a potential emergency arising at the facility, the company should implement communication measures to alert the community, such as:

- Audible alarms, such as fire bells or sirens
- Fan out telephone call lists
- Vehicle-mounted speakers
- Communicating details of the nature of the emergency
- Communicating protection options (evacuation, quarantine)

- Providing advice on selecting an appropriate protection option

Training for Emergencies

The type, amount, and frequency of training vary, depending on the tasks employees are expected to perform. Training programs and practice exercises provide for testing systems to ensure an adequate level of emergency preparedness. Programs will:

- Identify training needs based on the roles and responsibilities, capabilities, and requirements of personnel in an emergency.
- Develop a training plan to address needs, particularly for firefighting, spill response, and evacuation.
- Conduct annual training, at least, and perhaps more frequent training when the response includes specialized equipment, procedures, or hazards, or when otherwise mandated.
- Provide training exercises to allow personnel the opportunity to test emergency preparedness, including:
    - Desktop exercises with only a few personnel, where the contact lists are tested and the facilities and communication assessed.
    - Response exercises typically involve drills that allow for the testing of equipment and logistics
    - Debrief upon completion of a training exercise to assess what worked well and what aspects require improvement.
    - Update the plan, as required, after each exercise. Elements of the plan subject to significant change (such as contact lists) should be replaced.
    - Record training activities and the outcomes of the training.
- Regardless of the specific type of facility, training should include, though not be limited to, the following:
    - Hazard recognition and prevention
    - Proper use of fire extinguishers
    - Emergency reporting procedures
    - Preventive maintenance
    - Hazardous materials spill response
    - First Aid

Emergency Procedures

The following general emergency procedures are recommended in the event of a fire, explosion, spill, or medical or other accident. These procedures are intended to limit injuries and minimize damage if an accident occurs. Post numbers to call in emergencies clearly at all telephones in hazardous areas. Because emergency response personnel contact information, and procedures vary greatly from institution to institution, all employees should be properly trained and informed of the protocols for their particular institution.

- Have someone call for emergency help, for instance, 199 or another number as designated by the institution. State clearly where the accident occurred and its nature.
- Ascertain the safety of the situation. Do not enter or reenter an unsafe area.
- Without endangering yourself, render assistance to the personnel involved and remove them from exposure to further injury.
- Warn personnel in adjacent areas of any potential risks to their safety.
- Render immediate first aid; appropriate measures include washing under a safety shower, administration of CPR by trained personnel if heartbeat, or breathing, or both have stopped, and special first-aid measures.
- Put out small fires by using a portable extinguisher. Turn off nearby equipment and remove combustible materials from the area. For larger fires, contact the appropriate fire department promptly. Be aware that many organizations limit fire extinguisher use to designated, trained personnel only.
- Provide emergency personnel with as much information as possible about the nature of the hazard, including a copy of the material safety data sheet (MSDS).
- In a medical emergency, laboratory personnel should remain calm and do only what is necessary to protect life.
- Summon medical help immediately.
- Do not move an injured person unless he or she is in danger of further harm.
- Keep the injured person warm. If feasible, designate one person to remain with the injured person. The injured person should be within sight, sound, or physical contact of that person at all times.
- If clothing is on fire and a safety shower is immediately available, douse the person with water; otherwise, roll the person on the floor to smother the flames.
- If harmful chemicals have been spilled on the body, remove the chemicals, usually by flooding the exposed area with the safety shower, and immediately remove any contaminated clothing.
- If a chemical has splashed into the eye, immediately wash the eyeball and the inner surface of the eyelid with water for 15 minutes. An eyewash unit should be used if available. Forcibly hold the eye open to wash thoroughly behind the eyelid.
- If possible, determine the identity of the chemical and inform the emergency medical personnel attending to the injured person. Provide an MSDS for each chemical that is involved in the incident to the attending physician or emergency responders.

7.5.1.15 Disaster Emergency Response Plan

1) Response Plan for an Earthquake

The preparedness measures must be taken in the following:

(a) Before earthquake

(1) The plain area close to the buildings is designated as an emergency gathering spot for a secure area.

(2) To have collapsible materials secured in advance.

(3) To inform and train staff with measures to be taken during the hazard.

(b) During earthquake

(1) Try to be calm and steady, without fear.

(2) Try to reach the outside gathering spot within 5 seconds through the allocated path, and if impossible, try to stay under the duck, cover, and hold position in a secure place.

Drop To duck at a secure spot

Cover To stay under a sturdy desk or table and

Hold To hold firmly on to it.

(3) To get to a plain spot in an open area, stay away from the high buildings, electrical lines, posts, and trees.

(4) When fire is in use, try to extinguish the flame and switch off the power line.

(5) While driving a car or motorcycle, try to lessen the speed and halt at a secure place.

(6) Try not to fall or jump out of high places.

(c) After an earthquake

(1) To check the losses and the affected number of staff and materials

(2) To engage with the respective task forces organized to deal with the affected

(3) To be well informed and alert with the news issued by the respective authority, and share the staff with them, and not rely on rumors.

(4) To be aware of the upcoming additional quakes after the stronger one.

Administration

The units are formed in the following ways:

(a) Unit for information and materials

(3) supervisors team will take responsibility for the job. As the hazards of earthquakes are unpredictable, care must be taken at all times. The materials needed must be acquired in advance and in readiness.

(b) Health and evacuation unit

(8) members of the supervisory team will take responsibility for caring for the injured and affected under first aid and providing them to hospitals or clinics where necessary.

(c) Transport and allocating Units

(7) members of Repair/Maintenance will take responsibility for selecting a secure and firm place, allocating a path to an open place for emergency exit, securing collapsible materials, and piling the affected and lost materials.

(d) General Unit

Assistant manager and admin Staff will support the 3 Units above.

Communication

The following will be undertaken:

(a) During the hazard, those people accessible to a secure spot are announced and instructed to gather at the designated spot, and those inaccessible are told to stay in a duck, cover, or hold position in a possible secure place and to warn people not to go to endangered areas after the earthquake because of possible additional quakes.

(b) To notify the responsible personnel of the company and the Government Authority of the damaged after inspecting.

2) Response Plan for the Wind Disaster

Procedure

The preparedness measures must be taken in the following:

(a) Before disaster

(1) To be ever attentive to meteorological information.

(2) To procure potable water and fast food in advance.

(3) To select a secure place against the wind disaster. (All the existing buildings are strong enough to withstand the hazard.)

(4) To procure materials such as flash lights, batteries, candles, matches/lighters and medicines for emergencies.

(5) To have both raw and finished products covered and sealed securely under a tarpaulin sheet.

(6) To grow trees around the factory as windbreaks to lessen the rate of wind

(7) To make the staff aware of the wind hazards.

(b) During the disaster

(1) To stay informed and ever attentive to meteorological news and to follow the advice and instructions. Not to leave the shelter area without necessity.

(2) To inform the staff by providing information and materials to the acquiring unit when the storm situation is ensured safe and to let them stay remained until further information.

(c) After the storms

(1) To check the losses and damaged number of staff and materials

(2) To care for the injured people under First Aid and provide them to hospitals or clinics where necessary.

(3) To check the damage to raw and finished products and categorize the things to be recycled and disposed of for further notification to the respective department.

(4) To avoid carefully the likely hazardous electrical power lines, posts, and tree branches and notify the respective departments.

(5) To undertake cleaning and rehabilitation when the situation becomes safe and sound.

Administration

The units are formed in the following ways:

(a) Unit for information and materials

3 supervisors will take responsibility for listening continuously to news from the radio since the meteorological warning is first received and reporting to their respective departments. At the same time, the emergency materials, water, fast food, and medicines to be required must be procured.

(b) Health and evacuation unit

During and after the storm period, the 10 members of the supervisory team will take responsibility for caring for the injured and affected under first aid and providing them to hospitals or clinics where necessary.

(c) Transport and allocating Units

Before, during, and after the storm period, the 10 members of Repair/Maintenance will take responsibility for having the raw, finished products and machineries of high value covered to prevent losses, shifting them to non-flooded areas, transferring people to secure and safe places, and salvaging and piling up the usable products out of damaged materials.

(d) General Unit

The assistant manager and admin staff will support 3 Units above with necessary assistance by collaborating with all units to undertake cleaning and rehabilitation collectively.

Communication

The following will be undertaken:

(a) Before, during, and after the hazard, communication will be undertaken through the H/P system with the departments of the factory.

(b) To notify the responsible personnel of the company and the Government Authority of the damage and losses of men, materials, and the actual situation of the aftermath.

3) Response Plan for Floods

Procedure

The preparedness measures must be taken in the following:

(a) Before disaster

(1) To be ever attentive to meteorological information.

(2) To procure potable water and fast food in advance.

(3) To make all staff evacuate to a secure place.

(4) To procure materials such as flash lights, batteries, candles, matches/lighters and medicines for emergencies.

(5) To have both raw and finished products covered and sealed securely under a tarpaulin sheet.

(6) To make the staff aware of the flood hazards

(7) To ensure adequate fuel is available for emergency equipment. Store fuel safely according to fire safety requirements and ensure it will not be impacted by flood water.

(8) To back up critical computer data and ensure important paper documents are stored in a safe place.

(9) To define septic tanks, sewage lines, etc. through which flood water can backflow into the buildings or site and provide backflow prevention valves, where necessary.

(b) During the disaster

(1) To stay informed and ever attentive to meteorological news and to follow the advice and instructions. Keep stakeholders informed of the situation.

(2) To inform the staff by providing information and materials to acquiring units when the situation is ensured safe and to let them stay remained until further information.

(3) To prepare for the safe shut-down of operations.

(4) To remove all hazardous substances to a safe location.

(5) Remove portable machinery and equipment to higher levels (groundwater/river flood) or away from the building envelope (wind/rain).

(6) Close sewer backflow prevention valves and plug drains and/or sewer lines to prevent sewage backup.

(c) After the disaster

(1) To check the losses and damaged number of staff and materials

(2) To care for the injured people under first aid and provide them to hospitals or clinics where necessary.

(3) To check the damage to raw and finished products and categorize the things to be recycled and disposed of further notification to the respective department.

(4) To avoid carefully the likely hazardous electrical power lines, posts, and tree branches and notify the respective departments.

(5) To undertake cleaning and rehabilitation when the situation becomes safe and sound.

Administration

The units are formed in the following:

(a) Unit for information and materials

3 supervisors will take responsibility for listening continuously to news from the radio since the meteorological warning is first received and reporting to their respective departments. At the same time, the emergency materials, water, fast food, and medicines to be required must be procured.

(b) Health and evacuation unit

During and after the storm period, the 8 members of the supervisory team will take responsibility for caring for the injured and affected under first aid and providing them to hospitals or clinics where necessary.

(c) Transport and allocating Units

Before, during, and after the storm period, the 7 members of Repair/Maintenance will take responsibility for having the raw, finished products and machineries of high value covered to prevent losses, shifting them to non-flooded areas, transferring people to secure and safe places, and salvaging and piling up the usable products out of damaged materials.

(d) General Unit

The assistant manager and admin staff will support 3 units above with necessary assistance by collaborating with all units to undertake cleaning and rehabilitation collectively.

Communication

The following will be undertaken:

(a) Before, during, and after the hazard, communication will be undertaken through the H/P system to the departments of the factory.

(b) To notify the responsible personnel of the company and the Government Authority of the damage and losses of men, materials, and the actual situation of the aftermath.

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7.5.1.16 Community Health and Safety

Air Pollution:

Pharmaceutical manufacturing processes may release pollutants into the air, potentially impacting the surrounding community. Emissions of volatile organic compounds (VOCs), particulate matter, and other hazardous chemicals can contribute to air pollution. Exposure to these pollutants can pose risks to respiratory health and the overall well-being of the community.

To mitigate the impact of air pollution on community health and safety resulting from pharmaceutical manufacturing processes, the following measures can be implemented:

Installation of Dust Collection Systems: Implement advanced dust collection systems to capture and remove particulate matter and other pollutants generated during manufacturing processes.

Filtration System Improvement: Upgrade filtration systems to effectively remove volatile organic compounds (VOCs) and other hazardous chemicals from air emissions.

Regular Maintenance and Inspection: Conduct regular maintenance and inspection of equipment to ensure proper functioning and minimize emissions of pollutants.

Implementation of Good Manufacturing Practices (GMP): Adhere to strict GMP guidelines to minimize the generation of pollutants and ensure the highest standards of air quality within the manufacturing facility.

Ventilation and Airflow Management: Improve ventilation systems and airflow management within the facility to efficiently remove pollutants from the air and prevent their dispersion into the surrounding community.

Water Pollution:

Pharmaceutical factories may discharge wastewater containing pharmaceutical residues, heavy metals, or other contaminants, which can pollute water bodies. This discharge can adversely affect water quality and aquatic ecosystems, posing risks to both environmental and community health.

To mitigate the impact of water pollution from pharmaceutical factory wastewater discharge, the following measures can be implemented:

Implementation of Advanced Wastewater Treatment Systems: Install advanced wastewater treatment systems capable of effectively removing pharmaceutical residues, and other contaminants from wastewater before discharge.

Monitoring and Testing: Regularly monitor and test the treated wastewater to ensure that it meets regulatory standards for water quality and is safe for discharge into water bodies.

Recycling and Reuse: Implement systems for recycling and reusing treated wastewater for non-potable purposes such as irrigation and gardening. This reduces the reliance on fresh water sources and minimizes environmental impact.

Spill Prevention and Response: Develop and implement spill prevention measures to minimize the risk of accidental releases of pollutants into water bodies. Establish protocols for prompt response and cleanup in the event of a spill.

Community Engagement: Engage with the local community to raise awareness about water pollution issues and the measures being taken to mitigate them. Encourage community participation in monitoring and reporting water quality concerns.

Hazardous Waste Generation:

Pharmaceutical factories generate various types of hazardous waste, including chemical residues, solvents, packaging materials, and expired products. Improper handling, storage, or disposal of these wastes can pose risks to human health and the environment.

To mitigate the impact of hazardous waste generated from pharmaceutical manufacturing, the following measures can be implemented:

Segregation and Labeling: Properly segregate hazardous waste streams and ensure that containers are labeled with appropriate hazard information to prevent cross-contamination and ensure safe handling.

Storage and Handling: Store hazardous waste in designated areas that are secure, well-ventilated, and equipped with containment measures to prevent spills and leaks. Ensure that employees handling hazardous waste receive adequate training and use appropriate personal protective equipment.

Transportation: Safely transport hazardous waste to treatment, recycling, or disposal facilities using authorized carriers and vehicles that comply with regulatory requirements for hazardous materials transportation.

Treatment and Disposal: Implement treatment technologies to render hazardous waste less harmful or inert before disposal. Dispose of hazardous waste in accordance with applicable regulations, using permitted treatment, recycling, or disposal facilities.

Emergency Preparedness and Response: Develop and implement emergency response plans and procedures to address spills, leaks, or other hazardous waste incidents promptly and effectively. Train employees on emergency response protocols and conduct regular drills to ensure readiness.

Monitoring and Reporting: Establish a monitoring program to track hazardous waste generation, handling, and disposal activities. Maintain records of waste manifests, disposal receipts, and compliance documentation for regulatory reporting purposes.

7.5.1.17 Community Feedback and Complaint Procedure

Complaints are an important way for the management of an organization to be accountable to the public, as well as providing valuable prompts to review organizational performance and the conduct of people that work within and for it.

Respectful engagement with local communities is critical to the success of projects and long-term operations. Employers need to understand priorities and address any concerns or grievances people may have. It is important that people in communities are able to contact the factory in charge, give feedback, and receive a response or action from the factory side.

Effective complaint handling systems are:

STEP 1 - ENABLING COMPLAINTS

Arrangements for enabling people to make complaints are community-focused, visible, accessible, valued, and supported by management. Complaints will be accepted verbally, in writing, or by telephone. Place a mailbox in front of the factory site or on a fence to easily send a complaint letter and clearly show the contact number or name of the designated person for handling community complaints.

STEP 2 - RESPONDING TO COMPLAINTS

Complaints are responded to promptly and handled objectively, fairly, and confidentially. Remedies are provided where complaints are upheld, and there is a system for review.

STEP 3 - ACCOUNTABILITY AND LEARNING

There are clear accountabilities for complaint handling, and complaints are used to stimulate organizational improvements.

RVK Myanmar Company will prepare an information board at the security gate and place a mailbox for feedback and complaint letters in the front of factory site. And also prepare documents and files to keep and handle the complaints and send an information letter to related authorities.

Table 103. Environmental Management Action Plan for the Operation Phase

Issue	Management Action	Significance With Mitigation	Time Frame	Estimated Cost Monitoring (MMK)	Supervised/ Approved by
Air Quality	**Control of Dust** • Implement dust collection systems at key production points to capture airborne particles, reducing pollution levels. • Prioritize installation of HVAC ventilation and filtration systems to remove dust and particulates from air emissions, improving air quality. • Conduct regular equipment maintenance to minimize emissions and ensure optimal performance. • Adhere to Good Manufacturing Practices (GMP) to promote cleanliness and minimize dust generation. • Optimize ventilation systems for proper airflow and contaminant removal, maintaining a safe working environment. • Provide workers with appropriate Personal Protective Equipment (PPE) to reduce exposure to contaminants. • Monitor air quality and emissions regularly to ensure compliance with regulatory standards. • Ensure regulatory compliance to safeguard employees and the environment. **Control of dour** • Enclosed storage will prevent odor spread. • Immediate cleaning will be done to prevent odor development. • Effective ventilation systems will be implemented in areas where these chemicals are handled to ensure proper airflow and reduce the concentration of odors.	Low	Annual	107,000,000	EHS Coordinator/ Factory Manager

	• Chemicals with strong odors will be stored separately from those with milder or no odors to prevent cross-contamination. • Chemicals will be kept in sealed containers when not in use to minimize vapor release. • Workers will be trained on proper handling procedures, the use of personal protective equipment (PPE), and emergency response measures. **Control of GHG Emissions** • Improving energy efficiency through regular maintenance will be done to reduce fuel consumption and greenhouse gas emissions. • Equipment operation schedules will be optimized to minimize idle time and enhance efficiency as part of efforts. • Implementing monitoring and reporting systems to track and reduce greenhouse gas emissions from equipment is part of the plan.				
Noise	• Regular equipment maintenance to minimize noise emissions and ensure optimal performance. • Adherence to Good Manufacturing Practices (GMP) to optimize production processes and minimize noise generation. • Provision of proper Personal Protective Equipment (PPE), such as earplugs or earmuffs, to mitigate the risk of hearing damage. • Continuous monitoring of noise levels to identify and address any areas where noise exceeds acceptable limits promptly	Low	Annual	2,000,000	EHS Coordinator/ Factory Manager
Water Consumption	• Conduct Water Audit: Perform a comprehensive water audit to pinpoint areas for enhancing water efficiency.	Low	Annual	4,400,000	EHS Coordinator/

	• Adopt Advanced Technologies: Invest in water-efficient technologies and equipment to minimize water consumption and implement closed-loop systems for water recycling within the facility. • Explore Alternative Sources: Explore options like rainwater harvesting and non-potable water sources to supplement freshwater usage and reduce dependency on traditional water sources. • Ensure Regulatory Compliance: Strictly adhere to water usage regulations and permits issued by local authorities to maintain legal compliance. • Promote Sustainability: Support community-wide sustainable initiatives like reforestation to improve water availability in the region. • Implement Monitoring Systems: Establish a robust monitoring system to continuously track water usage, quality, and environmental impact for effective management.				Factory Manager
Wastewater management	• Install tailored treatment systems encompassing physical, chemical, and biological processes. • Employ advanced treatment technologies like membrane filtration and UV disinfection to remove contaminants (if necessary). • Conduct regular monitoring and testing of effluent quality to ensure regulatory compliance. • Implement recycling and reuse programs to minimize water consumption. • Develop spill prevention measures and response protocols to mitigate environmental risks. • Ensure adherence to regulatory standards for wastewater discharge.	Low	Annual	10,000,000	EHS Coordinator/ Factory Manager

	• Reuse treated wastewater for gardening to promote sustainability. • The RVK Myanmar Co., Ltd implemented the wastewater treatment system without discharge the wastewater into drain, The treated wastewater reuse for gardening purpose.				
Hazardous Waste and Solid Waste Management	**Hazardous Waste** • Identify and segregate hazardous waste streams accurately, including chemical, pharmaceutical, laboratory, biological, and packaging waste. • Establish strict handling and storage protocols to minimize the risk of spills, leaks, and exposures, ensuring employee safety and environmental protection. • Ensure secure transportation and packaging of hazardous waste using specialized • containers and materials to prevent accidents and environmental contamination during transit. • Utilize effective treatment methods tailored to hazardous waste characteristics, such as chemical neutralization, incineration, and biological degradation, to mitigate environmental risks before disposal. • Monitor waste management practices regularly to ensure compliance with regulatory requirements and identify areas for improvement. • Provide comprehensive education and training programs to employees on proper waste handling, storage, and disposal procedures to foster a culture of safety and environmental stewardship. • RVK Myanmar follows a systematic waste disposal procedure, outlined in detail in the provided appendix.	Low	Monthly	12,000,000	EHS Coordinator/ Factory Manager

	Solid Waste Pharmaceutical manufacturers must adhere to specialized disposal protocols for contaminated filters and filtration media to mitigate environmental contamination risks associated with active pharmaceutical ingredients (APIs) or solvents. Compliance with waste management regulations is crucial, necessitating strict adherence to regulatory guidelines governing solid waste disposal. Implementing appropriate disposal measures tailored to each waste category, such as segregation, recycling, or environmentally friendly disposal methods, is essential for responsible waste management. Continuous monitoring allows for the identification of areas for improvement, enabling refinements to waste management strategies to enhance environmental sustainability and regulatory compliance. Employee training and awareness programs promote a culture of environmental responsibility, encouraging compliance with waste management protocols and proactive waste reduction initiatives.				
Soil Contamination	• Site Protection: Concrete roads act as a protective barrier, reducing soil contamination risk from production activities. • Chemical Handling: Implement safe practices for chemical handling, storage, and transportation to minimize spill risks. • Spillage Prevention: Emphasize proactive measures, including strict spill response plans and employee training, to prevent spills during delivery and filling activities. • Regular Site Inspections: Conduct frequent site inspections to identify potential spill sources and vulnerabilities to soil contamination.	Low	Annual	6,000,000	EHS Coordinator/ Factory Manager

	• Responsible Disposal: Contaminated residues, including oily waste, are carefully handled and disposed of by the City Development Committee. • Used Oil Collection: Collect and manage used oil, including generator oil, in designated metal tanks, ensuring responsible disposal to avoid environmental impact. • Training and Awareness: Continuously educate employees on spill prevention, emergency response, and environmental stewardship. • Documentation and Reporting: Establish a clear spill reporting process for swift response and damage mitigation, regardless of spill size.				
Occupational Health and Safety	• Ventilation Systems and Air Quality Monitoring: Ensure effective airflow, containment, and contaminant dilution through proper ventilation systems, coupled with regular air quality monitoring to ensure compliance. • Respiratory Protection and Training: Provide appropriate respiratory equipment and comprehensive training on respiratory hazards and protection methods. • Hazardous Substance Control and GMP Compliance: Implement measures to minimize airborne emissions, adhere strictly to Good Manufacturing Practices (GMP), and enforce safety protocols for handling hazardous chemicals. • Biological Safety Protocols and Training: Develop strict safety protocols for handling biological agents, provide appropriate PPE, and conduct regular training on biological hazards. • Emergency Response Planning and Medical Surveillance: Establish emergency response plans, conduct regular drills, and provide medical surveillance for workers exposed to hazardous substances or biological agents.	Low	Annual	54,000,000	EHS Coordinator/ Factory Manager

	• Monitoring, Auditing, and Continuous Improvement: Regularly monitor and audit safety protocols, identify areas for improvement, and update safety policies based on feedback and advancements. • Housekeeping and Incident Reporting: Maintain cleanliness, promptly address spills, and establish procedures for incident reporting and investigation. • Noise Control and Electrical Safety: Implement measures to reduce noise emissions, ensure proper equipment maintenance, and provide adequate training on electrical safety practices.				
Community Health and Safety	• Air Quality Management: Install dust collection systems and upgrade filtration systems to remove pollutants from air emissions, ensuring compliance with regulations and maintaining high air quality standards. • Water Pollution Control: Implement advanced wastewater treatment systems to remove contaminants and pharmaceutical residues before discharge, coupled with regular monitoring to ensure compliance and promote recycling for non-potable purposes. • Pollution Prevention: Develop spill prevention measures to minimize accidental releases of pollutants into water bodies and engage with the local community to raise awareness and encourage participation in water quality monitoring. • Hazardous Waste Management: Ensure safe handling, storage, transportation, and disposal of hazardous waste through segregation, labeling, proper storage, transportation, treatment, and disposal methods, along with emergency preparedness and monitoring for regulatory compliance.	Low	Biannual	Allocated under the budget of related field	EHS Coordinator/ Factory Manager

7.5.2 Decommission Phase

There is less prospect of encountering the decommissioning phase in the pharmaceutical factory as it is planned to work for a long term with no intention to stop and will change to the production of appropriate commodities even if the recent products are out of place as time changes. Additionally, even if the factory were to close, there would be no need to demolish the building, as both the building and land are rented from MEHL.

Decommissioning phase impacts include loss of direct and indirect employment, demolition waste, noise pollution, dust and exhaust emissions, and occupational health and safety hazards. The potential impacts of the decommissioning phase are

(i) Air Pollution

(ii) Noise Pollution

(iii) Soil and Water Pollution

(iv) Waste Pollution

(v) Impact on Human

7.5.2.1 Air Pollution

Demolition of the factory building and related infrastructure of the proposed factory may generate emissions of fugitive dust caused by a combination of on-site excavation, movement of earth materials, and transportation of demolition waste. A secondary source of gas emissions may include exhaust from diesel engines in earth-moving equipment and vehicles.

Dust Suppression: Implement dust suppression techniques, such as using water sprayers or dust control agents, during the demolition of factory buildings and infrastructure to reduce fugitive dust emissions.

Moisture Maintenance: Regularly dampen the demolition areas by applying water to minimize dust generation during excavation and the movement of earth materials.

Covered Transportation: Transport demolition waste and materials in trucks equipped with tarpaulin covers to prevent the release of dust during transit from the site.

Strategic Pile Placement: Position storage piles for demolition debris and materials at least 30 meters downwind from nearby residential areas to minimize the dispersion of dust towards communities.

Vehicle Maintenance: Ensure that all vehicles and equipment used during the demolition phase, including earth-moving machinery and trucks, undergo regular maintenance to reduce emissions from diesel engines.

7.5.2.2 Noise Pollution

During the decommissioning phase, noise and vibration may be caused by the operation of pile drivers, earth moving and excavation equipment, cranes, and the transportation of equipment, materials, and decommissioning work.

Equipment Maintenance: Ensure that all demolition equipment and machinery are well-maintained to minimize noise generated by mechanical wear and tear.

Noise Barriers: Install temporary noise barriers or enclosures around the demolition site to contain and reduce noise emissions.

Work Hours: Schedule demolition activities during daytime hours to minimize noise disturbances during the night.

Equipment Selection: Choose demolition equipment that is designed for quieter operation when possible.

Local Communication: Maintain open communication with local residents to inform them of the demolition schedule and expected noise levels.

7.5.2.3 Soil and Water Pollution

The water quality of the nearby drainage systems can be affected by solid waste and wastewater drainage from the factory, and also solid waste can also damage soil quality if not properly handled.

Erosion and Sediment Control: Implement erosion and sediment control measures, such as silt fences, straw bales, or erosion control blankets, to prevent soil erosion and the runoff of sediments into nearby water bodies.

Stormwater Management: Create and execute a stormwater management plan in order to capture and treat surface runoff water from the demolition site. This plan includes the use of sediment basins or sediment ponds to remove contaminants from runoff before discharge.

Chemical Management: Dispose of any hazardous chemicals, materials, or waste found during the demolition process correctly. Ensure that all chemical spills are promptly contained, cleaned up, and reported according to regulatory requirements.

Decontamination: Prior to demolition, remove or safely remediate any equipment, machinery, or structures that may contain hazardous materials, such as asbestos or lead-based paint, to avoid release during the demolition.

Waste Disposal: Dispose of demolition debris in accordance with local environmental regulations. Segregate and manage hazardous materials separately to prevent contamination of non-hazardous waste.

Soil Testing: Conduct soil testing before and after demolition to assess any potential soil contamination. Remediate contaminated soil as necessary to prevent further pollution.

Water Quality Monitoring: Continuously monitor the quality of water in nearby rivers, streams, or groundwater wells to detect any contamination resulting from the demolition activities.

Waste Pollution

There will be significant amounts of solid waste generated from the demolition of the Project Buildings and associated infrastructure. These waste stream includes demolition waste such as concrete, metal, wood, glass, paints, adhesives, sealants, and fasteners.

Waste Segregation: Create a complete waste separation program to differentiate among the different kinds of waste, i.e., concrete, metal, wood, and non-recyclable waste. Each type of waste should have its appropriate labelled bin or container.

Disposal Planning: Arrangement should be made for safe disposal of non-recyclable and hazardous waste. Materials like asbestos or lead-based paints need to be extracted cautiously, taken care of, and discarded by certified specialists according to the instruction.

Waste Transportation: Use appropriate vehicles and containers for the safe transportation of waste materials to disposal or recycling facilities. Ensure that all waste transport complies with local regulations.

7.5.2.4 Unemployment

Every project with long-term investment can bring about changes in the socio-economic conditions of the local environment. Most of the impact on the socio-economic environment may be positively associated with some adverse effects. Being closed out of the proposed project may create temporary unemployment during the decommissioning phase.

Mitigation measures may include providing affected workers with transition support, retraining opportunities, or assisting them in finding alternative employment to minimize the impact on their livelihoods and the local economy.

7.5.2.5 Occupational Health and Safety

During the decommissioning phase, significant physical hazards may be caused by engineering and demolishing activities, including the demolishing of buildings and the transportation of demolishing materials such as heavy equipment, machines, and other materials. Demolished workers will be exposed to the risks of accidents and injuries. Moreover, accidents and injuries to workers and local communities can be caused by heavy vehicle movement for the transport of construction materials and equipment.

Equipment Safety: Regularly inspect and maintain equipment to prevent accidents and injuries.

Personal Protective Equipment (PPE): Ensure that workers have access to and use appropriate PPE for their assigned tasks, including respiratory protection, safety goggles, and protective clothing.

Training: Provide comprehensive training to employees covering the risks associated with the decommissioning tasks they will perform.

Community Engagement: Engage with the local community to address concerns and provide information about safety measures and progress during the decommissioning phase.

7.5.2.6 Community Health and Safety

Air Pollution

Air pollution is another significant concern related to construction activities that can impact both community health and safety.

Dust Control: Implement dust control measures, such as regular watering or dust suppressants, to prevent the generation and dispersal of dust particles during demolition and disposal activities.

Emission Monitoring: Continuously monitor air quality during the decommissioning process to detect and address any spikes in pollutant levels promptly.

Community Communication: Maintain open communication with the local community, informing them of decommissioning activities, potential air quality impacts, and mitigation measures in place.

Noise Pollution

The movements of trucks transporting construction materials can produce noise to some extent for the communities living close to the project site.

Limit Construction Hours: Restrict construction and transportation activities to daytime hours when noise may have a lesser impact on residents. Avoid nighttime or early morning shifts if possible.

Alternative Routes: Explore and utilize alternate transportation routes that bypass residential areas. This can help divert truck traffic away from densely populated zones.

Regular Maintenance: Ensure that all vehicles, including trucks, are well-maintained to reduce noise emissions. Regular maintenance can help prevent noisy breakdowns or malfunctions.

Community Engagement: Maintain open lines of communication with the local community. Establish a designated point of contact for noise-related concerns and inquiries. Actively engage with community members to address their concerns and gather feedback on potential noise reduction strategies.

Water Pollution

Water quality impacts may occur from runoff and waste and sewage generated from construction activities and from a contractor's camp erected on site for the duration of the construction phase and can significantly alter surface and ground water regimes that are used by local communities for portable water supplies and irrigation for farming in downstream areas.

Waste Disposal: Dispose of decommissioning debris in compliance with local environmental regulations. Segregate and manage hazardous materials separately to prevent cross-contamination with non-hazardous waste.

Chemical Handling: Properly handle and dispose of any hazardous chemicals or materials encountered during decommissioning. Ensure that any chemical spills are promptly contained, cleaned up, and reported in accordance with regulatory requirements.

Stormwater Management: Develop a stormwater management plan to capture and treat runoff water from the decommissioning site. Use sediment basins or ponds to remove contaminants from runoff before it is discharged into nearby water sources.

Water Quality Monitoring: Continuously monitor the quality of water in nearby rivers, streams, or groundwater wells to detect any contamination resulting from the decommissioning activities. Implement corrective actions if contamination is detected.

Community Engagement: Foster open lines of communication with the local community and actively engage with residents.

Table 104. Environmental Management Action Plan for the Decommissioning Phase

Issue	Management Action	Significance With Mitigation	Time Frame	Estimated Cost Monitoring (MMK)	Supervised/ Approved by
Air Quality	During the decommissioning (demolition) phase of the factory, several mitigation measures are in place to address air pollution concerns. These measures include dust suppression techniques using water sprayers, maintaining moisture in demolition areas, using covered transportation for waste and materials, strategically placing storage piles away from residential areas, and ensuring regular maintenance of vehicles and equipment to minimize emissions from diesel engines. These actions are aimed at reducing fugitive dust emissions and preventing air pollution during the demolition process, thus safeguarding the environment and nearby communities.	Low	Decommission period	2,000,000	EHS Coordinator/ Construction Supervisor
Noise	During the decommissioning (demolition) phase of the factory, several mitigation measures are in place to manage noise effectively. These include regular equipment maintenance to reduce mechanical noise, the installation of temporary noise barriers or enclosures, scheduling demolition activities during the daytime to minimize nighttime disturbances, selecting quieter demolition equipment, maintaining open communication with local residents, and ensuring compliance with local noise regulations.	Low	Decommission period	1,000,000	EHS Coordinator/ Construction Supervisor
Soil and Water pollution	• Erosion and Sediment Control: Employ erosion control measures like silt fences, straw bales, and erosion control blankets to prevent soil erosion and sediment runoff into nearby water bodies. • Stormwater Management: Develop a stormwater management plan that captures and treats runoff water from the demolition	Low	Decommission period	4,000,000	EHS Coordinator/ Construction Supervisor

	site, incorporating sediment basins or ponds to remove contaminants before discharge. • Chemical Management: Ensure proper disposal of hazardous chemicals and materials encountered during demolition, promptly containing and cleaning up any chemical spills in accordance with regulations. • Decontamination: Prior to demolition, safely remove or decontaminate equipment, machinery, or structures containing hazardous materials like asbestos or lead-based paint to prevent their release. • Waste Disposal: Dispose of demolition debris in compliance with local environmental regulations, segregating and managing hazardous materials separately to avoid contamination of non-hazardous waste. • Soil Testing: Conduct soil testing before and after demolition to identify and address potential soil contamination, remediating polluted soil as needed. • Water Quality Monitoring: Continuously monitor water quality in nearby rivers, streams, or groundwater wells to detect any contamination stemming from demolition activities.				
Waste	**Waste Segregation**: Establish a robust waste segregation program that categorizes different waste materials, including concrete, metal, wood, and non-recyclable debris. Use clearly marked bins or containers for each waste category to facilitate proper separation. **Disposal Planning:** Develop a comprehensive disposal plan, especially for non-recyclable and hazardous waste. Hazardous materials like asbestos or lead-based paint must be handled and removed by certified professionals in strict adherence to regulatory guidelines. **Waste Transportation**: Ensure the safe transport of waste materials to disposal or recycling facilities by using appropriate vehicles and	Low	Decommission period	2,000,000	EHS Coordinator/ Construction Supervisor

	containers. Compliance with local regulations is crucial to guaranteeing safe and lawful waste transportation.				
Occupational Health and Safety	During the decommissioning phase, ensuring safety is paramount. Key measures include regular equipment inspections and maintenance to prevent accidents, providing appropriate personal protective equipment (PPE) to workers, offering specific safety training, and engaging with the local community to address concerns and communicate safety measures and progress effectively.	Low	Decommission period	2,000,000	EHS Coordinator/ Construction Supervisor
Community Health and Safety	a) Air • Dust Control: Employ effective dust control methods like regular watering or the use of dust suppressants. • Emission Monitoring: Continuously monitor air quality throughout the decommissioning process. • Community Communication: Maintain transparent and open communication with the local community. b) Noise • Limited Construction Hours: Restrict construction and transportation activities to daytime hours to minimize noise disruptions during quieter periods. • Alternate Routes: Explore and employ alternative transportation routes. • Regular Vehicle Maintenance: Ensure that all vehicles undergo regular maintenance. • Community Engagement: Maintain open communication channels with the local community. c) Water • Waste Disposal: Keep hazardous materials separate from non-hazardous waste to prevent contamination. • Chemical Handling: Properly handle and dispose of any hazardous chemicals or materials.	Low	Decommission period	5,000,000	EHS Coordinator/ Construction Supervisor

	• Stormwater Management: Utilize sediment basins or ponds to remove contaminants before discharging runoff into nearby water sources. • Water Quality Monitoring: Continuously monitor the quality of water during decommissioning. • Community Engagement: Maintain transparent communication with the local community throughout the decommissioning process.				

7.6 Environmental Monitoring Plan

Monitoring of the environmental and social impacts in the receiving environment is important in evaluating the effectiveness of the mitigation plan so as to comply with the existing regulatory measures. During the construction stage mitigation measures will be monitored for negative impacts and enhancements measures for positive impacts are proposed.

7.6.1 Environmental Quality Monitoring Guidelines during the Operation Phase

General Air Quality Monitoring Guidelines

Parameters	Guidelines Value	Unit	Averaging Period
Particulate Matter (PM 10)	50	µg/m3	24hrs
Particulate Matter (PM 2.5)	25	µg/m3	24hrs
Nitrogen dioxide (NO2)	200	µg/m3	1hr
Sulfur Dioxide (SO2)	20	µg/m3	24hrs
Ozone (O3)	100	µg/m3	8-hour daily maximum
Volatile Organic Compounds (VOC)	100	mg/Nm3	8hrs

Source: National Environmental Quality (Emission) Guideline

[a] Particulate matter 10 micrometers or less in diameter

Air Emission Level (Pharmaceuticals and Biotechnology Manufacturing)

Parameter	Unit	Guideline Value
Active ingredient (each)	Mg/Nm^{3a}	0.15
Ammonia	Mg/Sm^{3b}	30
Arsenic	Mg/Sm^3	0.05
Benzene, Vinyl Chloride	Mg/Nm^3	1
Dichloroethane (each)		
Bromides (as Hyrdrogen Bromide)	Mg/Sm^3	3
Chlorides (as Hydrogen Chloride)	Mg/Sm^3	30
Ethylene oxide	Mg/Sm^3	0.5
Hazardous air pollutants	kg/year	900-1,800[c]
Mutagenic substance	Mg/Sm^3	0.05
Particulate matter PM10[d]	Mg/Nm^3	20
Total class A[c]	Mg/Nm^3	20[f]
Total Class B[g]	Mg/Nm^3	80[h]
Total organic Carbon	Mg/Nm^3	50
Volatile organic compounds	Mg/Nm^3	20-150[i] 50[j]

Source: National Environmental Quality (Emission) Guideline

[a] Milligrams per normal cubic meter at specified at specified temperature and pressure

[b] Milligrams per standard cubic meter at specified temperature and pressure Process-based annual mass limit

[d] Particulate matter 10 micrometers or less in diameter

[e] Class A compounds are those that may cause significant harm to human-to-human health and the environment

[f] Applicable when total Class A compounds exceed 100g/year

[g] Class B compounds are organic compounds of less environmental impact then Class A compounds

[h] Applicable when total Class B compounds, expressed as Toluene, exceed the lower of 5 tons/ year of 2 kg/hour
[i] Facilities with solvent consumption > 50 tons/year
[j] Waste gases from oxidation plants

Effluent Levels Monitoring Guidelines

Parameter	Unit	Guideline Value
1,2-Diclroroethane	mg/l	0.1
5-day Biochemical Oxygen demand	mg/l	30
Acetates (each)[a]	Mg/l	0.5
Acetonitrile	mg/l	10.2
Active ingredient (each)	mg/l	0.05
Adsorbable organic halogen	mg/l	1
Amines (each)[b]	mg/l	102
Amonia	mg/l	30
Aresnic	mg/l	0.01
Benzene	mg/l	0.02
Cadmium	mg/l	0.1
Chemical Oxygen demend	mg/l	150
Chlorobenzene	mg/l	0.06
Chloroform	mg/l	0.013
Chromium (hexavalent)	mg/l	0.1
Dimethyl sulfoxide	mg/l	37.5
Isobutyraldehyde	mg/l	0.5
Isopropanol	mg/l	1.6
Isopropyl ether	mg/l	2.6
Keones (each)c	mg/l	0.2
Mercury	mg/l	0.01
Methanol / Ethanol (each)	mg/l	4.1
Methyl cellosolve	mg/l	40.6
Methylene Chloride	mg/l	0.3
n- Hepane	mg/l	0.02
n-Hexane	mg/l	0.02
o-Dichlorobenze	mg/l	0.06
Oil and grease	mg/l	10
pH	S.U.[d]	6-9
Phenol	mg/l	0.5
Tetrahydrofuran	mg/l	2.6
Toluene	mg/l	0.02
Total Nitrogen	mg/l	10
Total Phosphorus	mg/l	2
Total suspended solid	mg/l	10
Xylenes	mg/l	0.01

Source: National Environmental Quality (Emission) Guideline
[a] n-Amyl acetate, n-butyl acetate, Ethyl acetate, Isopropyl acetate, Methyl formate
[b] Including Diethylamine and Triethylamine
[c] Including Acetone, Methyl Isobutyl Ketone
[d] Standard unit

Noise Level Monitoring Guidelines

Receptor	One Hour L_{Aeq}(dBA)	
	Daytime (07:00-22:00) (10:00-22:00 for Public Holidays)	**Nighttime (22:00-07:00) (22:00-10:00 for Public Holidays)**
Residential, institutional, educational	55	45
Industrial, Commercial	70	70

Source: National Environmental Quality (Emission) Guidelines

[a] Equivalent continuous sound level in decibels

Drinking Water Guidelines

Requirements for physical quality

Parameters	Units of Measurement	Value
Taste	Acceptable/ No objectionable taste	-
Odor	Acceptable/ No objectionable odor	-
Color	TCU (True Color Unit)	15
Turbidity	NTU Nephelometric Turbidity Units	5

Source: National Drinking Water Quality Standards Myanmar

Requirements of Chemical Quality (Inorganic Chemical Constituents of Health Significance)

Parameters	Units of Measurement	Value
Antimony	mg/L	0.02
Arsenic	mg/L	0.05
Barium	mg/L	0.7
Boron	mg/L	2.4
Cadmium	mg/L	0.003
Chromium	mg/L	0.05
Cyanide	mg/L	0.07
Fluoride	mg/L	1.5
Lead	mg/L	0.01
Mercury (Total)	mg/L	0.001
Nickel	mg/L	0.07
Nitrate	mg/L	50
Nitrite	mg/L	3
Selenium	mg/L	0.04
Uranium	mg/L	0.03
Copper	mg/L	2
Manganese	mg/L	0.4

Source: National Drinking Water Quality Standards Myanmar

Requirements of Chemical Quality (Inorganic Chemical Constituents not of Health Significance)

Parameters	Units of Measurement	Value
Aluminum	mg/L	0.2
Ammonia Nitrogen	mg/L	1.5
Chloride	mg/L	250
Hardness	mg/L as CaCO3	500
Sulphide	mg/L	0.05
Iron	mg/L	1
pH		6.5 to 8.5
Sodium	mg/L	200
Sulphate	mg/L	250
Total Dissolved Solid (TDS)	mg/L	1000
Zinc	mg/L	3
Calcium	mg/L	200
Magnesium	mg/L	150

Source: National Drinking Water Quality Standards Myanmar

Effluent Level Guideline

Parameter	Unit	Guideline Value
5-day Biochemical oxygen demand	mg/l	50
Active ingredients / Antibiotics	To be determined on a case-specific basis.	
Chemical oxygen demand	mg/l	250
Oil and grease	mg/l	10
pH	S.U.[a]	6-9
Temperature increase	°CCCC	<3[b]
Total coliform bacteria	100 ml	400
Total nitrogen	mg/l	10
Total phosphorus	mg/l	2
Total suspended solids	mg/l	50

Source: National Environmental Quality (Emission) Guidelines

[a] Standard unit

[b] at the edge of a scientifically established mixing zone that 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.

Boiler Wastewater Discharged Guidelines

Parameter	Unit	Guideline Value
Arsenic	mg/l	0.5
Cadmium	mg/l	0.1
Chromium (total)	mg/l	0.5
Copper	mg/l	0.5
Iron	mg/l	1

Lead	mg/l	0.5
Mercury	mg/l	0.005
Oil and grease	mg/l	10
pH	S.U.[a]	6-9
Temperature increase	°C	<3b
Total residual chlorine	mg/l	0.2
Total Suspended Solids	mg/l	50
Zinc	mg/l	1

Source: National Environmental Quality (Emission) Guidelines

Odor Guidelines

Projects should control odors to ensure that offensive or unacceptable odors do not occur for neighboring residents. Generally, odor levels should not exceed five to ten odorant units at the edge of populated areas near a project. Projects with multiple odorous points, diffuse releases, or complex odor emissions should conduct an odor impact assessment to determine ground-level maximum concentrations, taking into account site-specific factors, including proximity to populated areas.

Odor Guidelines for the Project Odor Control		
Odor Source Type	**Odor Level Limit (Odorant Units)**	**Receptor**
Single Point Source	5 - 10	Populated areas in the vicinity of a project

Source: National Environmental Quality (Emission) Guidelines

The company is fully committed to upholding all relevant environmental laws and regulations. This steadfast commitment includes strict adherence to the National Environmental Quality (Emission) Guidelines in order to effectively maintain the quality of the environment. By following both the established legal framework and the guidelines, the company aims to ensure that its operations have a minimal impact on the environment and contribute to the overall preservation of environmental quality.

Table 105. Environmental Monitoring Plan during the Operation Phase

Phase	Component	Parameter	Target Level	Measurement Method	Monitoring Location/Point	Monitoring Freq.	Responsible Person
Operation Phase	Air Quality (Outdoor) Air Quality (Production Area)	PM_{10}, $PM_{2.5}$, CO_2, CO, NO_2, SO_2, O_3, CH_4, VOC PM_{10}, $PM_{2.5}$, CO_2, CO, NO_2, SO_2, VOC	Within NEQ Guidelines and International standards limit levels	Relevant Air Quality Monitoring Equipment	Inside compound nearby boiler house Inside production area	Biannually	EHS Coordinator
	Odor - Production Area - Warehouse	Odor Level	Within NEQ Guidelines and International standards limit levels	Relevant Monitoring Equipment	Inside Production Area Inside Warehouse	Biannually	EHS Coordinator
	Boiler gas emissions	O2, CO2, CO, NO2, Temp	Within NEQ Guidelines and International standards limit levels	Relevant Monitoring Equipment	Boiler Stack	Biannually	EHS Coordinator
	Noise Level - Outdoor - Operation Area	Noise level (dB(A) scale)	Within NEQ Guidelines and International standards limit levels	Relevant Noise Meter Equipment	Inside compound nearby factory Inside Operation Area	Biannually	EHS Coordinator
	Water Quality 1.Tube wells water 2. Waste Water	**For groundwater:** pH, Color, Turbidity, Conductivity, Total Hardness, Calcium Hardness, Magnesium Hardness, Total Alkalinity,	Within NEQ Guidelines and Within WHO standards limit levels	Relevant Laboratory	Tube wells inside factory compound Waste Water from treatment plant	Biannually	EHS Coordinator

		Phenolphthalein Alkalinity, Carbonate ($CaCO_3$), Bicarbonate (HCO_3), Iron, Chloride (as CL), Sodium Chloride (as NaCL), Sulphate (as SO_4), Total Solids, Suspended Solid, Dissolved Solids, Manganese, Phosphate, Phenolphthalein, Acidity, Methyl Orange Acidity, Salinity **For Wastewater:** As per guideline					
	Solid Waste	Production waste, Rejected products, Packaging waste and containers general office waste and domestic waste	Volume of solid waste (ton or Kg)	According to the related Authority	Temporary Storage Sites of the Factory	Daily	EHS Coordinator
	Occupational, Health, and Safety	Short-term affect (accidents and injuries) Long-term affect (inhalation of dust, noise)	Zero accident cases Safety training for workers and accident reports	According to the Occupational Health and Safety Plan of the Government of the Union of Myanmar	Project Site Production Sector	Monthly	EHS Coordinator

7.6.5 Environmental Quality Monitoring Guidelines during the Decommissioning Phase

Site Runoff and Wastewater Discharges

Parameter	Unit	Maximum Concentration
Biological Oxygen Demand (BOD)	mg/l	30
Chemical Oxygen Demand (COD)	mg/l	125
Oil and grease	mg/l	10
pH	S.U.[a]	6-9
Total Coliform Bacteria	100 ml	400
Total Nitrogen	mg/l	10
Total Phosphorus	mg/l	2
Total Suspended Solids	mg/l	50

Source: National Environmental Quality (Emission) Guidelines

[a] Standard unit

Air Quality Monitoring Guidelines

Parameters	Guidelines Value	Unit	Averaging Period
Particulate Matter (PM_{10})	50	µg/m3	24hrs
Particulate Matter ($PM_{2.5}$)	25	µg/m3	24hrs
Nitrogen dioxide (NO_2)	200	µg/m3	1hr
Sulfur Dioxide (SO_2)	20	µg/m3	24hrs
Ozone (O_3)	100	µg/m3	8-hour daily maximum
Volatile Organic Compounds (VOC)	100	mg/Nm3	8hrs

Source: National Environmental Quality (Emission) Guidelines

[a] Particulate matter 10 micrometers or less in diameter

[b] Particulate matter 2.5 micrometers or less in diameter

Noise Level Monitoring Guidelines

Receptor	One Hour L_{Aeq}(dBA)	
	Daytime (07:00-22:00) (10:00-22:00 for Public Holidays)	**Nighttime (22:00-07:00) (22:00-10:00 for Public Holidays)**
Residential, institutional, educational	55	45
Industrial, Commercial	70	70

Source: National Environmental Quality (Emission) Guidelines

[a] Equivalent continuous sound level in decibels

7.6.6 Environmental Monitoring Plan during the Decommissioning Phase

Table 106. Environmental Monitoring Plan during the Decommissioning Phase

Phase	Component	Parameter	Target Level	Measurement Method	Monitoring Location	Monitoring Freq.	Responsible Person
Decommissioning Phase	Ambient Air Quality	PM_{10}, $PM_{2.5}$, CO_2, NO_2, SO_2	Within NEQ Guidelines and International standards limit levels	Relevant Air Quality Monitoring Equipment	Receptor's Areas near the project site	Once after the Decommissioning Activities	Contractor/ company
	Noise Level	Noise level (dB(A) scale)	Within NEQ Guidelines and International standards limit levels	Relevant Noise Meter Equipment	Sensitive spots	Twice, During the Decommissioning Phase	Contractor/ company
	Wastewater Quality	BOD, COD, pH, Total Coliform Bacteria, Oil, and Grease Total Nitrogen, Total Phosphate, Suspended Solid	Within NEQ Guidelines	Relevant Laboratory	At demolishing the project site	Once after the Decommissioning Activities	Contractor/ company
	Solid Waste	Demolition debris such as concrete, metal, drywall, wood, glass, adhesives, sealants, fasteners, and other hazardous materials	Volume of solid waste (ton or Kg)	According to the related Authority	Disposal sites of the decommissioning phase of project site	Weekly	Contractor/ company
	Occupational, Health and Safety	Short-term affect (accidents and injuries)	Zero accident cases Safety training for workers and accident reports	According to the Occupational Health and Safety Plan	At the Project Site	Monthly	Contractor/ company
	Socio-economic Aspect	Employment 's compensation, Outplacement, or referral system		According to the Labour Laws	Factory	Decommissioning phase	Contractor/ company

7.6.7 Preparation of an Environmental Monitoring Report

Contents of the Environmental Monitoring Reports

The project proponent will prepare the monitoring report and submit it to authorities on bi-annually during the Operation Phase. The monitoring reports will include the latest results of the analysis and surrounding monitoring conditions, including but not limited to the following:

- Objective of the Monitoring
- Summary of Monitoring Activities
- Project activities (summary of the operation work or decommission work)
- Difficulties encountered in implementing the EMP, recommendations for remedying those difficulties, and steps proposed to prevent or avoid similar future difficulties
- Number and type of non-compliance with the EMP and proposed remedial measures and timelines for completion of remediation
- Accidents or incidents relating to occupational and community health and safety and the environment
- Monitoring data on environmental parameters, including sampling date, sampling and analysis method, sampling point, and laboratory result
- Photos

RVK Myanmar Company will conduct monitoring reports every six months. The monitoring will encompass air quality, stack emission, odor, noise levels, and water quality as stipulated in the monitoring plan. These monitoring activities will utilize appropriate measurement techniques and equipment to ensure the accuracy and reliability of data collection. Subsequently, RVK Myanmar Company will compile the gathered data and generate comprehensive monitoring reports. These reports will adhere to the designated schedule and comply with the requirements outlined by the Ministry of Natural Resources and Environmental Conservation (MONREC).

CHAPTER 8 - CONCLUSION AND RECOMMENDATION

8.1 Study Results

Fieldwork activities carry on during the operation periods to verify and complement information gathered from desktop studies. The fieldwork covered all relevant components of the ecological, socio-economic, and health components of the environments.

Air Quality

Air quality assessments were conducted during the operational phases near the generator house and factory on May 25 and 26, 2017. Elevated levels of nitrogen dioxide (NO2) at 228.92 µg/m3 and particulate matter PM2.5 at 33.02 µg/m3 were observed, surpassing recommended limits, while particulate matter PM10 remained within normal levels at 42.64 µg/m3. Sulphur dioxide (SO2) was within acceptable limits at 385.83 µg/m3. Other pollutants such as ammonia (NH3), carbon dioxide (CO2), carbon monoxide (CO), hydrocarbons, methane, atomic radiation, and volatile organic carbon (VOC) were all within normal ranges.

The elevated levels of nitrogen and PM2.5 near the boiler house can be attributed to factors like incomplete combustion of furnace oil and sulfur content in the fuel, leading to increased emissions. Poor boiler maintenance can also contribute to higher pollutant levels.

During a subsequent air quality test near the boiler house and production area on December 17 and 18, 2023, all parameters including NO2, PM10, PM2.5, SO2, and ozone were within their respective guideline limits. The measurement for volatile organic carbon (VOC) also fell within the acceptable range, indicating satisfactory air quality conditions.

In the grinding room operation area, air quality measurements showed generally low pollutant levels, with all parameters including NO2, PM10, PM2.5, SO2, NH3, CO2, CO, hydrocarbons, methane, atomic radiation, and VOC within normal ranges.

Gas Emission from the Boiler

To evaluate the existing environmental conditions of the factory, gas emissions from the boiler were measured by Green Myanmar Environmental Services Co., Ltd. at the selected site using the Kane 988 Combustion Analyzer to monitor stack emissions from furnace for a short-time interval sample (1 hour). According to the result, the NO_2 and SO_2 do not exceed the Nation Environmental Quality (Emission) Guidelines for Small Combustion Facilities.

Noise Level

Noise monitoring was conducted at the project site using the GM1356 Digital Sound Level Meter. Sampling was done over 24 hours during the operational phase and repeated twice. Additionally, 1-hour noise readings were taken in specific areas such as the grinding and granulation room inside the factory.

Initial testing, conducted near ventilation units in the production area, revealed daytime noise levels of 56.6 dBA and nighttime levels of 58.1 dBA. Subsequent testing near the boiler house showed daytime levels of 53.3 dBA and nighttime levels of 49.1 dBA.

These readings are below the NEQG guideline for industrial and commercial areas, which recommends a maximum of 70 dBA for both day and night periods. Furthermore, the noise

levels in the operation area align with NIOSH guidelines, falling within the 85-decibel range aimed at protecting workers from occupational noise exposure.

Water Quality

Baseline data on the quality of portable water from the water treatment plant and wastewater from the wastewater treatment plant at the project site were collected. The analysis indicates that the portable water generally meets acceptable standards, with all parameters such as pH, Total Suspended Solids (TSS), Ammonia, BOD, COD, Total Phosphorous, Oil & Grease, Total Nitrogen, Phenol, and Mercury falling within normal ranges according to specified standards.

8.2 Conclusion

In conclusion, the endeavor undertaken by RVK Myanmar Co., Ltd. to establish a pharmaceutical manufacturing facility in Myanmar presents a significant opportunity for regional socio-economic progress. By securing a long-term lease for the Myanmar Pharmaceutical Factory (MPF) in Pyin Oo Lwin from Myanmar Economic Holdings Ltd. (MEHL), the company aims to gradually increase production capacity over a span of ten years, with plans for further expansions extending up to the thirtieth year.

While the comprehensive environmental impact assessment conducted by Green Enviro Services Ltd. identified several areas of concern, including air quality, water consumption, wastewater effluents, solid waste management, and occupational and community health and safety, it is crucial to note that these impacts are not insurmountable. Through the diligent implementation of a robust environmental management plan, these challenges can be effectively addressed.

Air Quality Impact: During production activities such as grinding, granulation, and packaging, as well as filling processes, the release of dust particles into the air presents a moderate impact on air quality within the facility.

Water Consumption Impact: The utilization of water for diverse purposes including production processes, general office use, domestic activities, canteen operations, and toilet facilities contributes to a moderate impact on both ground and surface water consumption.

Wastewater Effluents Impact: Discharged wastewater originating from the production process and associated cleaning and sanitation activities contains residual active pharmaceutical ingredients (APIs), organic solvents, and chemical byproducts, thereby leading to a moderate impact on water quality.

Solid Waste Impact: The disposal of various types of solid waste generated during pharmaceutical manufacturing operations, such as product waste, packaging materials, filters, laboratory waste, microbiological waste, and other office waste, results in the generation of hazardous and production waste, thereby causing a moderate impact.

Occupational Health and Safety Impact: Workers within the facility are exposed to various occupational hazards including dust, hazardous materials, chemicals, biological agents, and noise, posing a moderate risk to their health and safety.

Community Health and Safety Impact: The release of pollutants into the air and the discharge of wastewater from factory operations, office facilities, canteens, and toilets present a

moderate risk to community health and safety. Additionally, the generation of hazardous waste further contributes to this risk.

Furthermore, it is worth highlighting that the anticipated impact on terrestrial ecology is expected to be minimal, owing to the nature of the project which primarily involves renovation and equipment upgrades within existing infrastructure. This approach mitigates the potential threat to natural habitats and biodiversity, underscoring the project's commitment to environmental sustainability.

In light of these findings, it is imperative for RVK Myanmar Co., Ltd. to prioritize community engagement and strict adherence to environmental regulations throughout all phases of the project. By proactively addressing concerns and diligently implementing proposed mitigations outlined in the Environmental Management Plans, the company can significantly minimize adverse environmental impacts while simultaneously fostering socio-economic development within the Mandalay Region.

Overall, the establishment of the pharmaceutical manufacturing facility by RVK Myanmar Co., Ltd. represents not only an opportunity for economic growth and employment creation but also a commitment to responsible environmental stewardship and sustainable development in Myanmar.

8.3 Recommendation

Aside from the environmental impacts associated with the establishment of the pharmaceutical manufacturing factory, RVK Myanmar Co., Ltd. is poised to effectively manage the Environmental Management Plan, drawing from its extensive experience abroad. The company is committed to mitigating environmental impacts to a significant extent, aiming for medium and/or low impact levels. This commitment is reinforced by the company's adoption of various quality and management systems, including the GMP certificate, Occupational Health and Safety Management System ISO 45001:2018, Quality Management System ISO 9001:2015, and Environmental Management System ISO 14001:2015. The factory has developed its own Environmental policy, documented with organizational structure, planning activities, responsibilities, practices, and procedures. Additionally, an Environmental Health and Safety team has been formed to implement the policy and manage environmental concerns.

The study team recommends further improvements to the high standards set by RVK Myanmar Co., Ltd., such as:

- Ensuring effective implementation of the Environmental Management Plan (EMP) once approved by concerned authorities. Strict adherence to and implementation of the EMP guidelines is essential.
- Appointing a well-experienced and knowledgeable Environmental Health and Safety (EHS) Coordinator and EHS Assistants to serve as Monitoring Officers. They will be responsible for regular monitoring and reporting to the Management Committee on EMP guidelines and arrangements on a weekly basis or as required to ensure strict compliance.

- Maintaining comprehensive records of environmental management activities and presenting them for annual independent third-party environmental audits. The company should then follow the audit reports and recommendations.
- Arranging for the proper disposal of hazardous waste and solid waste through licensed waste management companies or facilities.
- Regularly monitoring wastewater quality according to the NEQG guidelines.

Following the assessment, none of these impacts are regarded as having a significant enough impact to halt the intended activity, provided that the follow-up studies, mitigations, and recommendations proposed are implemented and monitored. Finally, the proponent must adhere to the environmental policy, laws, rules, and instructions of the Republic of the Union of Myanmar.

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