DISCLAIMER

This IEE report has been prepared by Third Party, E Guard Environmental Services, for the project of Production of Animal Feed Products Factory of De Heus Myanmar Limited, which is located at Plot (306, 307, and 308), Myaung Dagar Steel Industrial Zone, Mhawbi Township, Yangon Region, and the Republic of the Union of Myanmar. The report preparation was done inside the framework of Myanmar Environmental Impact Assessment Procedure 2015.

The analysis works had been done based on the provided data of the proposed plan of project from the client and observations of environmental parameters guide by Myanmar Government Environmental Authority, Environmental Conservation Department, hereinafter ECD.

The impact assessment and mitigation measure are prepared based on the facts and figures of detail plan/ process of the project obtained from the client.

Moreover, this report has been prepared in line with the prevailing active Laws, Rules, Procedure, Guidelines, and Standards etc. of Myanmar legal system on (November,2019) The drawings, sketches, maps and other illustrative figures in this report are for the demonstrative/ descriptive purposes only and not to be considered as approved boundary nor accepted territory nor recognized properties extend of any kind.

In case of dual or multiple meanings of the wordings, those wordings should be interpreted as relevant meaning to the concerned areas of discussed in this report.

The individual/ personal, organizational and commercial data and information found in this report are included based on the concerned authority's requirement. The privacy and trade secrets concerned are to be addressed to the concerned authority ECD.

Report Review Form

Report Title: Initial Environmental Examination for Animal Feed Products Factory		
Report Version: Version - 02		
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This document presents the Initial	
Environmental Examination for animal feed	
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De Heus Myanmar Limited.

INITIAL ENVIRONMENTAL EXAMINATION (IEE) REPORT

For Production and Distribution of Animal Nutrition Products

Revised Version (02)

Proposed by



De Heus Myanmar Limited

Prepared by



E Guard Environmental Services Company Limited

November, 2019

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LIST OF ABBREVIATIONS

: Percentage
: Degrees Celsius
: Biochemical Oxygen Demand
: Carbon Monoxide
: Carbon Dioxide
: Chemical Oxygen Demand
: Nitrogen Dioxide
: Volatile Organic Compound
: Ozone
: Decibel unit
: Metric Ton
: Kilo Ton
: Kilo Watt Hour
: Kilometer
: Milligram per Liter
: Mega Watt per Hour
: Pond us Hydronium
: Particulate Matter
: Part Per Million
: Micro Gram per Cubic meter
: Corporate Social Responsibilities
: Environmental Conservation Department
: Environmental Management Plan
: Initial Environmental Examination
: Health, Safety and Environment
: International Finance Cooperation
: United State Environmental Protection Agency
: World Health Organization
: Ministry of Natural Resources and Environmental Conservation
: National Ambient Air Quality Standard
: De Heus Myanmar Limited

အစီရင်ခံစာအကျဉ်းချုပ်

ဤကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်းအစီရင်ခံစာသည် ရန်ကုန်တိုင်းဒေသကြီး၊ မှော်ဘီမြို့နယ်၊ မြောင်းတကာစက်မှုဇုန်၊ မြေကွက်အမှတ် (၃၀၆) ၊ (၃၀၇) ၊ (၃၀၈)တွင် တည်ဆောက်လည်ပတ် လျက်ရှိသော ဒဟတ်မြန်မာကုမ္ပဏီလီမိတက်၏ တိရစ္ဆာန်အစာထုတ်လုပ်သည့် စက်ရုံအတွက် အဆိုပြုတင်ပြသော အစီရင်ခံစာဖြစ်ပါသည်။ အဆိုပါစီမံကိန်း၏ မြေကွက်ဧရိယာသည် (၅.၅၁) ဧက ကျယ်ဝန်းပါသည်။

စီမံကိန်းအဆိုပြုသူသည် ၂၀၁၅ ခုနှစ်၊ စွန်လ ၁၉ ရက်နေ့တွင် မြန်မာနိုင်ငံရင်းနှီးမြှုပ်နှံမှု ကော်မရှင် (MIC) သို့ စီမံကိန်း ရင်းနှီးမြှုပ်နှံမှု အဆိုပြုလွှာကို လျှောက်ထားခဲ့ပါသည်။ ထို့နောက် ၂၀၁၅ ခုနှစ်၊ အောက်တိုဘာလ (၂၃) ရက်နေ့တွင် အဆိုပါ တိရစ္ဆာန်အစားစာထုတ်လုပ်ခြင်းနှင့် ပြည်တွင်း ဖြန့်ဖြူးခြင်းစီမံကိန်းအား ဒဟတ်မြန်မာလီမိတတ် အမည်ဖြင့် နယ်သာလန်နိုင်ငံမှ တစ်ရာ ရာခိုင်နှုန်း နိုင်ငံခြားသား ရင်းနှီးမြှပ်နှံခြင်းဆိုင်ရာ စီမံကိန်း၏ အဆိုပြုလွှာအပေါ် ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးဆိုင်ရာ သဘောထားမှတ်ချက်ရယူရန်အတွက် သယံဧာတနှင့် သဘာဝပတ်ဝန်းကျင် ထိန်းသိမ်းရေးဝန်ကြီးဌာနသို့ ဆက်လက်တင်ပြပြီး လမ်းညွှန်ချက် တောင်းခံခဲ့ပါသည်။ မြန်မာနိုင်ငံ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဆိုင်ရာ ဥပဒေ၏ ပတ်ဝန်းကျင်ဆိုင်ရာဆန်းစစ်မှု လိုအပ်ချက်ဥပဒေနှင့် နည်းဥပဒေများ၊ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းဆိုင်ရာလုပ်ထုံးလုပ်နည်းများ စသည်တို့နှင့် ကိုက်ညီစေရန် သယံဧာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာမှ ဤစီမံကိန်းနှင့် ပတ်သက်၍ ကနဦးပတ်ဝန်းကျင်ဆိုန်းစစ်ခြင်း အစီရင်ခံစာ ရေးသားတင်ပြရန် လိုအပ်ကြောင်း လမ်းညွှန်ချက်ပေးခဲ့ပါသည်။ ထို့ကြောင့် ဒဟတ်မြန်မာလီမိတက်သည် ကနဦး ပတ်ဝန်းကျင် ဆန်းစစ်ခြင်း အစီရင်ခံစာလေ့လာမှုအား E Guard Environmental Services Company Limited နှင့် လေ့လာမှုများ လုပ်ဆောင်ခဲ့ပါသည်။

အဆိုပါ တိရစ္ဆာန်အစာထုတ်လုပ်ခြင်း စက်ရုံအား ၂၀၁၅ ခုနှစ်၊ အောက်တိုဘာလတွင် စတင် တည်ဆောက်ခဲ့ပြီး ၂၀၁၆ ခုနှစ်၊ စက်တင်ဘာလတွင် စက်ရုံအား စတင်လည်ပတ်ခဲ့ပါသည်။ အဆိုပြုစီမံကိန်း၏ ရင်းနှီးမြှုပ်နှံမှုကာလသည် နှစ်ပေါင်း (၅၀) ဖြစ်ပါသည်။ ထို့အပြင် အဆိုပါစက်ရုံပုံစံငယ်တွင် ဥရောပတိရစ္ဆာန်အစားအစာ ထုတ်လုပ်သည့် စက်ရုံတို့၏ စံသတ်မှတ်ချက် ဒီဇိုင်းများအတိုင်း ကုန်ထုတ်လုပ်ရာ အဆောက်အဦးထပ်မြင့်တာဝါ (၇) ထပ်၊ ကုန်ချောသိုလှောင်ရုံ၊ ကုန်ကြမ်းများ သိုလှောင်ရုံ၊ ဖြည့်စွက်စာနှင့်ဆေးဝါးများ သိုလှောင်ရုံ၊ ကုန်ပစ္စည်းအဝင် စစ်ဆေးသည့် အဆောက်အအုံ၊ အသုံးအဆောင် ပစ္စည်းများထားသည့်အခန်း၊ ထရန်စဖော်မာအခန်း ဘွိုင်လာခန်း၊ လုံခြုံရေးဂိတ်၊ အထွေထွေအသုံးပြုသော ပစ္စည်းများထားသည့်အခန်း၊ ကောက်ပဲ သီးနှံသိုလှောင်ရုံ (၃) ရုံ၊ အရည်သိုလှောင်ကန် (၃) ကန်၊ မီးသတ်ရေစုပ်ပိုက်ထားသည့်ခန်း၊ မီးသတ်ရေသိုလှောင်ကန်၊ ယာဉ်ရပ်နားရန်နေရာ၊ ရုံးခန်းများ၊ ဓာတ်ခွဲခန်းနှင့် စားသောက်ဆိုင်ခန်းတို့ ပါဝင်ပါသည်။ တိရစ္ဆာန်အစာထုတ်လုပ်ရာတွင် စက်ရုံလည်ပတ်ခြင်း၏ အဓိကလုပ်ဆောင်မည့် လုပ်ငန်းစဉ်များတွင် ကုန်ကြမ်းများတင်သွင်းခြင်း၊ အသုံပြုထုတ်လုပ်မည့် ကုန်ကြမ်းများကို ပါဝင်နှုန်းအလိုက် အော်တိုစနစ်စက်ကြီများဖြင့် ချိန်တွယ်ခြင်း၊ ကြိတ်ခွဲခြင်းတို့ ပါဝင်ပါသည်။ ထို့မှတဆင့် ပြင်ဆင်ချိန်တွယ်ထားသော ကုန်ကြမ်းများ၊ ဖြည့်စွက်စာများ၊ ဆေးဝါးများကို ရောနှောခြင်း၊ အအေးခံခြင်း၊ ထုတ်လုပ်သည့်ရက်စွဲနှင့် အစာတောင့်ပြုလုပ်ခြင်း၊ ရေနွေးငွေ့ဖြင့် ရိုက်နှိပ်ခြင်း၊ ထုတ်ပိုးခြင်းတို့ ဆောင်ရွက်ပါသည်။ သက်တမ်းကုန်ဆုံးရက် လက်ရှိ အသုံးပြုလျက်ရှိသော စက်ပစ္စည်းကိရိယာများကို ဇယား (c.c) တွင် အသေးစိတ် ဖော်ပြထားပါသည်။ ထို့မှတဆင့် ရရှိလာသော ကုန်ချောများကို ကုမ္ပဏီ၏ အရည်အသွေး စံချိန်စံညွှန်းများအတိုင်း ကုဒ်နံပါတ်များ ရိုက်နိုပ်ပြီး ကုန်လှောင်ရုံတွင် သတ်မှတ်ချက် သိုလှောင်ထားရှိမည် ဖြစ်ပါသည်။

အဆိုပါ တိရစ္ဆာန်အစာထုတ်လုပ်ခြင်း စက်ရုံတွင်ထုတ်ကုန်လိုင်း (၂၂) လိုင်းဖြင့် ချိတ်ဆက်၍ ကြက်စာ၊ ဘဲစာ၊ ငှက်စာ၊ ဝက်နှင့် နို့စားနွားအစာများ စသည်တို့ကို ဖြည့်စွက်စာနှင့် အသင့်စားစာ စသည်ဖြင့် အဓိကထုတ်လုပ်မည်ဖြစ်ပါသည်။ ဖော်ပြပါ ဇယား (၁.၃) နှင့် (၁.၄) တို့တွင် ကုန်ချောပစ္စည်းစာရင်းနှင့် ကုန်ပစ္စည်းတစ်ခုစီ၏ သက်တမ်းကုန်ဆုံးရက် သတ်မှတ်ချက်တို့ကို အသေးစိတ်ဖော်ပြပါသည်။ အဆိုပါ တိရစ္ဆာန်အစာထုတ်လုပ်ခြင်း စက်ရုံလည်ပတ်သည့်ကာလတွင် အဓိကအသုံးပြုမည့် အခြေခံလိုအပ်ချက်များမှာ ရေနွေးငွေ့ဘွိုင်လာလည်ပတ်ရန် အသုံးပြုမည့်ရေ၊ ရုံးတွင်းအသုံးပြုရည့် အခြေခံလိုအပ်ချက်များမှာ ရေနွေးငွေ့ဘွိုင်လာလည်ပတ်ရန် အသုံးပြုမည့်ရေ၊ ရုံးတွင်းအသုံးပြုရန်ရေ၊ စက်ယန္တရားကြီးများလည်ပတ်ရန် လျှပ်စစ်စာတ်အား၊ ယာဉ်ယန္တရားများနှင့် အရေးပေါ်အသုံးပြုမည့် မီးစက်များ လည်ပတ်ရန်အသုံးပြုမည့် လောင်စာဆီ (ဓာတ်ဆီ၊ ဒီဇယ်)၊ ကုန်ထုတ်လုပ်ခြင်းနှင့် ရုံးပိုင်းဆိုင်ရာ ဝန်ထမ်းများနှင့် လုပ်သားများအင်အားတို့ ဖြစ်ပါသည်။ ထို့အပြင် စက်ရုံ၏ အဆောက်အအုံများ နေရာချထားပုံနှင့် စက်ရုံ၏ တည်နေရာအား ဝေဟင်မှ ခြုံငုံမြင်ရသည့် မြေပုံတို့ကို အသေးစိတ် ဖော်ပြထားပါသည်။ (အခန်း ၁ တွင် အသေးစိတ် ကြည့်ရှုရန်)

အခန်း(၂)တွင် စီမံကိန်းအကြောင်းအရာများနှင့် စီမံကိန်းအဆိုပြုသူ၏ အသေးစိတ် သတင်းအချက် အလက်များ၊ ဒဟတ်မြန်မာလီမိတက်၏ ဖွဲ့စည်းပုံ၊ ဒါရိုက်တာအဖွဲ့ဝင်များနှင့် စီမံခန့်ခွဲသည့် အကြီး တန်း ဝန်ထမ်းအဖွဲ့ဝင်များ၊ ရင်းနှီးမြှုပ်နှံမှု ပုံစံတို့ကို အသေးစိတ် ရေးသား ဖော်ပြထားပါသည်။ (အခန်း၂ တွင်အသေးစိတ်ကြည့်ရှုရန်)

အခန်း(၃)တွင် အဆိုပြုစီမံကိန်းအား နယ်ပယ်တိုင်းတာ သတ်မှတ်လေ့လာခြင်း၊ ကနဦး ပတ်ဝန်းကျင်ဆန်းစစ် လေ့လာခြင်း ရည်ရွယ်ချက်နှင့် E Guard Environmental Services Co., Ltd. မှ ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်းတွင် ပါဝင်သောအဖွဲ့ဝင်များ၏ တာဝန်နှင့် လုပ်ငန်း အတွေ့ကြုံတို့ကို ရေးသား ဖော်ပြထားပါသည်။ (အခန်း ၃ တွင် အသေးစိတ်ကြည့်ရှုရန်)

အခန်း(၄)တွင် အဆိုပြုစီမံကိန်းနှင့် ပတ်သတ်ဆက်စပ်ပြီး လိုက်နာရမည့် ဥပဒေနှင့် နည်းဥပဒေများ၊ သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင် ထိန်းသိမ်းရေးဝန်ကြီးဌာန (MONREC) မှ ထုတ်ပြန်ထားသော ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်းများ၊ အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များ၊ စီမံကိန်းနှင့် သက်ဆိုင်သည့်ဒေသတွင်း (သို့) အပြည်ပြည်ဆိုင်ရာ သဘာဝပတ်ဝန်းကျင်နှင့် လူမှုပတ်ဝန်းကျင်ဆိုင်ရာမူဝါဒ၊ ဆက်စပ်နေသော သဘောတူညီချက်များကို အကျဉ်းချုပ် ရေးသားဖော်ပြထားပါသည်။ (အခန်း ၄ တွင်အသေးစိတ် ကြည့်ရှုရန်)

စီမံကိန်းလုပ်ငန်းဆောင်ရွက်နေစဉ်ကာလအတွင်း စီမံကိန်းနေရာ၏ လက်ရှိ သဘာဝပတ်ဝန်းကျင် ဆိုင်ရာ အခြေခံချက်လက်များဖြစ်သည့် ဆူညံမှုတိုင်းတာခြင်း၊ လေထု အရည်အသွေး တိုင်းတာခြင်း တို့ကို ကွင်းဆင်းတိုင်းတာခဲ့ပါသည်။ မြေအောက်ရေနှင့် စက်ရုံ၏စွန့်ပစ်ရေဆိုးတို့ စသည်တို့ကို နမူနာကောက်ယူပြီး သက်ဆိုင်ရာ ဓာတ်ခွဲခန်းများသို့ပို့ကာ စစ်ဆေးမူများပြုလုပ်ပြီး ရလဒ်များအား နောက်တွင်ပါရှိသည့် နောက်ဆက်တွဲအဆက်(၆) မှ (၈) အထိ ဖော်ပြထားပါသည်။

ထို့အပြင် အဆိုပြု စီမံကိန်းတည်နေရာနှင့် သက်ဆိုင်သည့် အခြေခံအချက်လက်များဖြစ်သည့် လူမှု စီးပွားအခြေအနေ၊ ရူပဆိုင်ရာအချက်လက်၊ ဇီဝပတ်ဝန်းကျင်ဆိုင်ရာအချက်လက်၊ ရာသီဥတုဆိုင်ရာ သတင်းအချက်လက်များ စသည်တို့ကို ရန်ကုန်တိုင်းဒေသကြီး၊ မှော်ဘီမြို့နယ်မှ ပြဋ္ဌာန်းထားသော မြို့နယ်ဆိုင်ရာ အချက်အလက်များမှ စုဆောင်းထားပါသည်။ ပတ်ဝန်းကျင် အရည်အသွေးဆိုင်ရာ အချက်အလက်များ ကွင်းဆင်းတိုင်းတာမှုအား ၂၀၁၇ ခုနှစ်၊ ဓန်နဝါရီလ (၅) ရက်နှင့် (၆) ရက်နေ့ များတွင် လုပ်ဆောင်ခဲ့ပြီး ရရှိလာသော လေအရည်အသွေးရလဒ်၊ ဆူညံမှုအတိုင်းတာမူရလဒ်၊ မြေအောက်ရေနှင့် စက်ရုံစွန့်ပစ်ရေစသည်တို့၏ ဆန်းစစ်ခြင်းရလဒ်များကို အခန်း(၅) တွင် အသေးစိတ် ဖော်ပြထားပါသည်။ (အခန်း (၅) တွင် အသေးစိတ်ကြည့်ရှုရန်)

ထို့ကြောင့် ဤကနဦး ပတ်ဝန်းကျင်ဆန်းစစ်လေ့လာမူတွင် အဆိုပြု တိရစ္ဆာန်အစာထုတ်လုပ်ခြင်း စက်ရုံစီမံကိန်း၏ လုပ်ဆောင်မူများကြောင့် ဖြစ်ပေါ် လာနိုင်သည့် ပတ်ဝန်းကျင်ဆိုင်ရာ ထိခိုက်နိုင်မှု များကို ကွင်းဆင်းလေ့လာခြင်းနှင့် စီမံကိန်းဆိုင်ရာ အကြောင်းရာများကို ဒဟတ် မြန်မာ လီမိတက်မှ စက်ရုံမန်နေဂျာ၊ အရည်အသွေး အာမခံစစ်ဆေးရေးကြီးကြပ်ရေးမှူး တို့ နှင့် ဆွေးနွေးမေးမြန်းခြင်း၊ ပတ်ဝန်းကျင်ဆိုင်ရာ အခြေခံအချက်လက်များအား အသုံးပြုပြီး စီမံကိန်းလည်ပတ်နေစဉ်ကာလနှင့် စီမံကိန်းဖျက်သိမ်းကာလတို့တွင် ဖြစ်နိုင်ခြေရှိသော ထိခိုက်နိုင်မူများကို လျော့ချရေး နည်းလမ်းများဖြင့် ရောင်လွှဲရန် နည်းလမ်းတို့ဖော်ပြထားပါသည်။

အဆိုပါ စီမံကိန်းကြောင့် ဖြစ်နိုင်ခြေရှိသည့် ပတ်ဝန်းကျင်ဆိုင်ရာ ထိခိုက်နိုင်မှု ဆန်းစစ်ချက်များအရ စက်ရုံလည်ပတ်နေစဉ် ကာလတွင် သိသာထင်ရှားမှု အလယ်အလတ် အဆင့်ရှိသည့် သက်ရောက်ထိခိုက်နိုင်မှု (၂၀) ခုနှင့် သိသာထင်ရှားမှု အနည်းအဆင့်ရှိသည့် ထိခိုက်မှု (၅) ခု ရှိသည်ကို တွေ့ရှိရပါသည်။ စက်ရံ ဖျက်သိမ်းသည့်ကာလတွင် သိသာထင်ရှားမှု အဆင့်အနည်းရှိသည့် ထိခိုက်မှု (၁၃) ခုနှင့် သိသာထင်ရှားမှု အလွန်နည်းအဆင့်ရှိသော ထိခိုက်မှု (၄) ခု ရှိသည်ကိုလည်း တွေ့ရှိပါသည်။

စက်ရုံလည်ပတ်စဉ်ကာလအတွင်း ဖြစ်နိုင်ခြေရှိသည့် ထိခိုက်သက်ရောက်မှုများမှာ-

၁။ ကောက်ပဲသီးနှံကုန်ကြမ်းများကြိတ်ခွဲခြင်း၊ ကုန်ကြမ်းများချိန်တွယ်ခြင်းနှင့် သယ်ယူပို့ဆောင် ခြင်းတို့မှ အမှုန်အမွှားများထွက်ခြင်း၊ ရေနွေးငွေ့ဘွိုင်လာလည်ပတ်ခြင်း၊ ဒီဇယ်မီးစက်အသုံးပြု ခြင်း၊ ယာဉ်ယန္တရားများသွားလာခြင်းတို့မှ ထွက်ရှိလာသောဓာတ်ငွေ့တို့ကြောင့် လေထုအရည် သွေးကို အနည်းငယ်ထိခိုက်နိုင်ခြင်း။

၂။ ကုန်ထုတ်လုပ်ရာနေရာမှ စက်ကြီးများလည်ပတ်ခြင်းနှင့် ယာဉ်ယန္တရားများသွားလာခြင်းတို့ ကြောင့် ဆူညံသံဖြစ်ပေါ်ခြင်း။

၃။ ရေနွေးငွေ့ဘွိုင်လာမှ စွန့်ပစ်ရေထုတ်လွှတ်ခြင်း၊ စားဖိုဆောင်နှင့် မိလ္လာစသည်တို့မှ စွန့်ပစ်ရေထုတ်လွှတ်ခြင်း။

၄။ ကုန်ထုတ်လုပ်ရာမှ ထွက်ရှိလာမည့် ကောက်ပဲသီးနှံဖုန်မှုန့်များ၊ စွန့်ပစ်ထုတ်ပိုးပစ္စည်းများ၊ ရုံးပိုင်းဆိုင်ရာ စွန့်ပစ်စာရွက်စာတမ်းများ၊ ပလက်စတစ်အမှိုက်နှင့် အခြား အထွေထွေရုံးသုံး စွန့်ပစ်ပစ္စည်းများ စသည့် စွန့်ပစ်အစိုင်ခဲများထွက်ခြင်း။

၅။ တိရစ္ဆာန်အစာ ထုတ်လုပ်ခြင်းလုပ်ငန်းစဉ်မှ ထွက်ရှိလာမည့်အမှုန်များ ရှူရှိုက်ထိတွေ့မိခြင်း၊ ဖြည့်စွက်စာနှင့်ဆေးဝါးများ၊ ပရီမစ်တို့၏ အနံများရှူရှိုက်မိခြင်း၊ စက်ယန္တရားကြီးများ လည်ပတ်ခြင်း မှ ဆူညံသံခံစားရခြင်း၊ မတော်တဆ လျှပ်စစ်အန္တရာယ်များ ကြုံတွေ့နိုင်ခြင်း စသည့် လုပ်ငန်းခွင် ဆိုင်ရာ ကျန်းမာရေးနှင့် ဘေးအန္တရာယ် ကင်းရှင်းရေးဆိုင်ရာ ထိခိုက်နိုင်မှုများ စသည်တို့ကို စက်ရုံ လည်ပတ်စဉ် ကာလတွင် ကြုံတွေ့နိုင်ခြင်း။

ထို့ကြောင့် အဆိုပါ စက်ရုံစီမံကိန်း၏ ဖြစ်နိုင်ခြေရှိသည့် ဆိုးကျိုးများနှင့် ဖြေလျှော့ရေး နည်းလမ်းများကို ဤကနဦးပတ်ဝန်းကျင်ဆန်းစစ်လေ့လာမှု ပြုနေစဉ်အတွင်း ထည့်သွင်း စဉ်းစား ထားခဲ့ပါမည်။ (အခန်း(၆)တွင် အသေးစိတ်ကြည့်ရှုရန်)

အဆိုပါ စီမံကိန်း၏ ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း ဆိုင်ရာ လုပ်ငန်းစဉ်များနှင့် ပတ်သက်၍ အများပြည်သူ၏သဘောထားရယူခြင်း အခမ်းအနားကို ရန်ကုန်တိုင်းဒေသကြီး၊ မှော်ဘီမြို့နယ်၊ မြောင်းတကာစက်မှုဇုန်တွင် တည်ရှိသော ဒဟတ်မြန်မာလီမိတက်၌ ၂၀၁၇ခုနှစ်၊ မတ်လ (၇) ရက်နေ့တွင် ကျင်းပပြုလုပ်ခဲ့ပါသည်။ အဆိုပါအခမ်းအနားတွင် ဒဟတ်မြန်မာလီမိတက်၏ စက်ရုံ မန်နေဂျာ ဦးသူလှဇော်မှ အဆိုပြု တိရစ္ဆာန်အစာထုတ်လုပ်ခြင်းလုပ်ငန်းစဉ်များ၊ ရင်းနှီးမြှုပ်နှံမှု ပုံစံနှင့် ၄င်းတို့၏ အနာဂတ် အစီအစဉ်များကို ရှင်းလင်းတင်ပြခဲ့ပါသည်။ ထို့နောက် E Guard Environmental Services Co., Ltd. ဒေါ်ယုဝေယံသိန်းတန် (Consultant) မှ ကနဦး ပတ်ဝန်းကျင် ဆန်းစစ် လေ့လာခြင်း၏ ရည်ရွယ်ချက်၊ စီမံကိန်းဆိုင်ရာ အခြေခံအချက်အလက်များ စုဆောင်းခြင်း၊ ပတ်ဝန်းကျင်ဆိုင်ရာ ထိခိုက်နိုင်မှုများကို တွက်ချက်ခန့်မှန်းခြင်းနှင့် ဖြေလျော့ရေးနည်းလမ်းများ အကြံပြုတင်ပြခြင်း၊ လူမှုစီးပွားတာဝန်ယူမှုအစီအစဉ် (CSR) ၊ ပတ်ဝန်းကျင်ဆိုင်ရာ စောင့်ကြပ်ကြည့်ရှုမှု အစီအစဉ်များ ပါဝင်သည့် ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုအစီအစဉ် (EMP) ပြင်ဆင်ခြင်းများကို ရှင်းလင်းတင်ပြခဲ့ပါသည်။ (အခန်း(၇)တွင် အသေးစိတ်ကြည့်ရှုရန်) ဤတိရစ္ဆာန်အစာထုတ်လုပ်ခြင်းစက်ရုံ၏ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်ကို စက်ရုံလည်ပတ်သည့် ကာလနှင့် စီမံကိန်းလွန်ဖျက်သိမ်းရေးကာလအတွင်း ဖြစ်နိုင်ခြေရှိသည့် ပတ်ဝန်းကျင်ဆိုင်ရာ ထိခိုက်နိုင်မှု အချက်လက်များကို အသုံးပြုခြင်း၊ လက်ရှိစီမံကိန်း၏ အနီးပတ်ဝန်းကျင်ဆိုင်ရာ အချက်လက်များဖြစ်သည့် လေထုအရည်သွေး၊ အသံဆူညံမူအခြေနေ၊ ရေနှင့် စက်ရုံစွန့်ပစ် ရေဆိုး အရည်အသွေး စသည်တို့၏ ရလဒ်များကို အသုံပြုခြင်း၊ စီမံကိန်းတည်နေရာ အနီးပတ်ဝန်းကျင်၏ လက်ရှိအခြေအနေများကို ကွင်းဆင်းလေ့လာခြင်း၊ စီမံကိန်း အကြောင်းရာများကို စီမံကိန်း အဆိုပြုသူတို့နှင့် ဆွေးနွေးခြင်းတို့ဖြင့် ပြင်ဆင်ရေးသားခဲ့ပါသည်။

ထို့အပြင် အဆိုပါ စီမံကိန်း၏ ပတ်ဝန်းကျင်ဆိုင်ရာစီမံခန့်ခွဲမှု အစီအစဉ် စီမံကိန်း အကောင် အထည်ဖော်ဆောင်ရွက်ရာတွင် လက်တွေ့လိုက်နာ ဖွံ့ဖြိုးတိုးတက် ကောင်းမွန်သော ပတ်ဝန်းကျင် အဖြစ် အကောင်အထည်ဖော် ဆောင်ရွက်ရန်ဖြစ်ပါသည်။ ထို့အပြင် စီမံကိန်း အကောင်အထည် ဖော်နေစဉ်အတွင်း ပတ်ဝန်းကျင်ဆိုင်ရာ ဆိုးကျိုးသက်ရောက်မှု လျော့နည်းစေရန် သင့်တော်သော ဖြေလျော့ရေးနည်းလမ်းများကို လုပ်ဆောင်ခြင်းအားဖြင့် စီမံကိန်း အကောင်အထည်ဖော် ဆောင်ရွက်ခြင်းကို အကျိုးရလဒ်ဖြစ်ထွန်း စေပါသည်။

အဆိုပါ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်တွင် (၁) ပတ်ဝန်းကျင်ထိခိုက်မှုဖြေလျော့ရေးအစီအစဉ် (၂) စံချိန်စံညွှန်းလမ်းညွှန်ချက်များ ပါဝင်သည့် ပတ်ဝန်းကျင်အရည်အသွေး စောင့်ကြပ်ကြည့်ရှုမှု အစီအစဉ် (၃) အရေးပေါ် ကိစ္စများအတွက် စီမံချက်အစီအစဉ် (၄) ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ် အတွက် ငွေကြေးခွဲဝေသုံးစွဲမှုအစီအစဉ် (၅) လူမှုစီးပွားတာဝန်ယူမူ တာဝန်သိတတ်မူ အစီအစဉ်တို့ ပါဝင်ပါသည်။ ပတ်ဝန်းကျင်ထိခိုက်မှုလျော့ချရေးအစီအစဉ်တွင် စီမံကိန်းလည်ပတ်ရေးကာလနှင့် စီမံကိန်းပိတ်သိမ်းကာလတို့တွင် တွေ့ကြုံနိုင်သည့် ဖြစ်နိုင်ခြေရှိသော ပတ်ဝန်းကျင်အပေါ် သက်ရောက်နိုင်မှုများကို တွက်ချက်ခန့်မှန်းခြင်းနှင့် သတ်မှတ်ထားသည့် သိသာသော ထိခိုက်မှုများကို ရောင်းရားနိုင်သော ဖြေလျော့ရေး နည်းလမ်းများပါဝင်ပါသည်။

စီမံကိန်းကြောင့် လည်ပတ်နေစဉ်ကာလတွင် ခန့်မှန်းတွက်ချက်ထားသော ဖြစ်နိုင်ခြေရှိသည့် ပတ်ဝန်းကျင်ဆိုင်ရာ ထိခိုက်နိုင်မှု ဆန်းစစ်ချက်များအရ သိသာထင်ရှားသော သက်ရောက် နိုင်မှုများတွင် ကုန်ထုတ်လုပ်သည့် ဧရိယာ၏ ကောက်ပဲသီးနှံကုန်ကြမ်းများ ကြိတ်ခွဲခြင်းမှတို့မှ အမှုန်အမွှားများထွက်ခြင်း၊ အငွေ့ပျံလွယ်သော ကုန်ကြမ်းများ သိုလှောင်ဧရိယာမှ အနံ့များ ထွက်ခြင်း၊ စက်ကြီးများ လည်ပတ်ခြင်းတို့ကြောင့် ဆူညံသံဖြစ်ပေါ်ခြင်း၊ ဘွိုင်လာမှ ရေပူများ စွန့်ပစ် ခြင်းကြောင့် ရေနေသတ္တဝါများကို သက်ရောက်နိုင်မှု၊ လျှပ်စစ်သုံးစွဲမှု၊ စွန့်ပစ်အစိုင်အခဲနှင့် စွန့်ပစ်ရေဆိုးထုတ်လွှတ်မှုနှင့် ဝန်ထမ်းများအပေါ် လုပ်ငန်းခွင်ဘေးအန္တရာယ် သက်ရောက်နိုင်မှုတို့ ပါဝင်ပါသည်။ အနီးပတ်ဝန်းကျင်အပေါ် အဆိုပါ သက်ရောက်နိုင်မှုများရှိသော်လည်း ထိုသက်ရောက် ထိခိုက်နိုင်မှုများကို လျော့နည်းစေမည့် လျော့ချရေးနည်းလမ်းများကို ဖယား(၈.၁)တွင် အသေးစိတ် ဖော်ပြထားပါသည်။ စက်ရုံဖျက်သိမ်းသည့်ကာလ ဖြိုဖျက်ရေးလုပ်ငန်းများ ဆောင်ရွက်ရာတွင် အခြေခံလိုအပ်မည့် လျော့ချရေးနည်းလမ်းကိုလည်း ဖော်ပြရန်လိုအပ်ပါသည်။ ထိုကြောင့် စီမံကိန်းလွန် ဖျက်သိမ်းရေး ကာလတွင် တွေ့ကြုံနိုင်သည့် ခန့်မှန်းထားသော ပတ်ဝန်းကျင်ဆိုင်ရာ ထိခိုက်နိုင်မှုများတွင် ဖြိုဖျက်ထားသော ပစ္စည်းများထွက်ရှိခြင်း၊ လျှပ်စစ်ဝါယာစွန့်ပစ္စည်းများ၊ သိသာထင်ရှားသော ဆူညံသံများ စသည်တို့ ကြုံတွေ့နိုင်ပါသည်။ ထို့ကြောင့် စီမံကိန်းလွန်ဖျက်သိမ်းရေး ကာလအတွက်

သက်ရောက်မှုများကို လျော့နည်းနိုင်မည့် နည်းလမ်းများကို ဇယား (၈.၂) တွင် ဖော်ပြထားပါသည်။ ဒဟတ်မြန်မာလီမိတတ်သည် စီမံကိန်း လည်ပတ်သည့်ကာလနှင့် စီမံကိန်းလွန်ဖျက်သိမ်းရေး ကာလ အတွက် ဇယား (၈.၃) မှ (၈.၈) အထိ တွင် ပါဝင်သော ပတ်ဝန်းကျင်ဆိုင်ရာ ပါရာမီတာ အရည်အသွေးဆိုင်ရာ အမျိုးအစား သတ်မှတ်ချက်များအတိုင်း ပတ်ဝန်းကျင် စောင့်ကြပ်ကြည့်ရှုခြင်း အစီရင်ခံစာကို ပုံမှန်တင်ပြသွားမည် ဖြစ်ပါသည်။

စက်ရံစီမံကိန်းတစ်ခု၏ စီမံကိန်းလည်ပတ်သည့် ကာလအတွက် အရေးပေါ် ကိစ္စများကို ကြိုတင် စီမံချက်များထားရှိခြင်းမှာ မတော်တဆဖြစ်ပွားမှုများ လျော့ချရန်နှင့် အရေးပေါ် ကိစ္စရပ်များ ဖြစ်ပွား ပါ က လျင်လျင်မြန်မြန်နှင့် မှန်မှန်ကန်ကန် တုံ့ပြန်နိုင်ရန် အဓိက လိုအပ်ချက်တစ်ခုအဖြစ် ပါဝင် သည်။ တိရစ္ဆာန်အစာထုတ်လုပ်သော စက်ရံစီမံကိန်းတစ်ခု၏ အရေးပေါ် အခြေအနေ တွေ့ကြုံ နိုင်မှုများတွင် ဖုန်မှုန့်မွှားများ မတော်တဆပေါက်ကွဲခြင်း၊ မီးဘေးအန္တရာယ်၊ မီးလောင် လွယ်ခြင်းနှင့် အငွေ့ပြန်လွယ်သော ဓာတုပစ္စည်းများ မတော်တဆဖိတ်စင်ခြင်းနှင့် ယိုစိမ့်မှု ဖြစ်ပွားခြင်း စသည်တို့ ဖြစ်ပွားနိုင်ပါသည်။ ထို့ကြောင့် မတော်တဆမှုများကို ရှောင်ရှားနိုင်ရန် ကြိုတင်ပြင်ဆင်ချက်များ၊ လုပ်ငန်းခွင် အရေးပေါ်တုံ့ပြန်မှု အစီအစဉ်နှင့် ကျန်းမာရေးနှင့် ဘေးအန္တရာယ် ကင်းရှင်းရေး သင်တန်းများ စသည်တို့ကို စာပိုဒ် ၈.၄ နှင့် ယေား (၈.၁၂) တွင် အသေးစိတ် ဖော်ပြထားပါသည်။ ထို့အပြင် စီမံကိန်း လည်ပတ်ရေးကာလ နှစ်ငါးဆယ်အတွက် ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု အစီအစဉ် အကောင်အထည် ဖော်ရာတွင် လိုအပ်သည့် လျော့ချရေးနည်းလမ်းများနှင့် စောင့်ကြပ်ကြည့်ရှ စစ်ဆေးမည့် အစီအစဉ်များ အကောင်ထည်ဖော်ရာတွင် လိုအပ်သည့် ခန့်မှန်း ရန်ပုံငွေအသုံးပြုမည့် ငွေကြေးခွဲဝေသုံးစွဲမှု အစီအစဉ်များကို ယေား(၈.၁၃)တွင် ဖော်ပြ ထားပါသည်။

နိဂုံးချုပ်အားဖြင့် ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်၏ ပတ်ဝန်းကျင်ဆိုင်ရာ လမ်းညွှန်မူများ၊ ပတ်ဝန်းကျင်ဆိုင်ရာဥပဒေ၊ နည်းဥပဒေ စည်းမျဉ်းစည်းကမ်းများနှင့် ချမှတ်ထားသော မူဝါဒ လမ်းညွှန်ချက်များအတိုင်း ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမူအလေ့အကျင့်များ၊ လုပ်ငန်းစဉ်များနှင့် လိုက်နာဆောင်ရွက်ကျင့်သုံးရန် တာဝန်များကို ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုတွင် ဖော်ပြတင်ပြထား ပါသည်။ စီမံကိန်းနှင့် သက်ဆိုင်သူများအား စီမံကိန်းဆိုင်ရာ အကြောင်းရာများရှင်းလင်းတင်ပြခြင်း၊ အကြုံပြုချက်များနှင့် ဆွေနွေးတင်ပြလာသော သဘောထား အကြံဉာဏ်များကို ရယူပြီး အဆိုပါ ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း အစီရင်ခံစာ၏ ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု အစီစဉ်တွင် ထည့်သွင်းရေးသားခဲ့ပါသည်။

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EXECUTIVE SUMMARY

De Heus Myanmar Limited proposed to conduct the Initial Environmental Examination (IEE) report for proposed animal feed production factory, at Plot No.306, 307,308, Myaung Dakar Industrial Zone, Hmawbi Township, and Yangon Region. The plot area of the proposed project is 5.51 acres of land.

The investor submitted a project investment proposal on June 19, 2015 to the Myanmar Investment Commission (MIC) and then, for the environmental approval and comments of the Ministry of the Natural Resources and Environmental Conservation (MONREC) on the proposal for investment in –Production and Distribution of Animal Nutrition Products" under the name of De Heus Myanmar Company Limited as a wholly owned foreign investment from the Netherland, on October 23, 2015. As per the comments of MONREC, the said project requires an IEE to meet the environmental assessment requirements of Myanmar Environmental Conservation Law. Therefore, De Heus Myanmar Co., Ltd commissioned E Guard Environmental Services for IEE report study.

The construction phase of the proposed animal feed production factory initiated in October, 2015 and then commercial running operation stage is September, 2016. The proposed duration of the investment shall be 50 years. In addition, the proposed animal feed mill factory's layout structure design area includes production tower (7 levels), finished product warehouse, raw materials warehouse, intake building, utilities (transformer room, boiler room, guardhouse and general utility room, three grain silos, three liquid tanks, firefighting pump room and water tank, car parking shelter, offices, lab and canteen facilities according to the Europe animal feed mill standard design. The major operations involved in the production of animal feed are intake of raw materials for cereal grains and then weighing, grinding. After that, mixing of the prepared (weighing) materials of feed additives, drugs, conditioning and then pellet making, cooling, sifting and coating and packaging and currently used of machineries and equipment detail can be seen in Table (1.1). The obtained final products will be stored at warehouse according to their standard code number. The proposed animal feed mill factory will produce two main feed product types such as complete and concentrate feed connect with 22 product lines. Most products are for poultry, swine and dairy cows. Products lists and product's shelf-life can be seen in Table (1.3) and (1.4).

In the operation phase of proposed animal feed production factory, major use of utilities are water for steam boiler, domestic use and office use facilities, fuel use for vehicles and emergency used of generator, men power of employees and workers for production area and office. Moreover, layout plan, overview map of proposed animal feed mill factory also mentioned. (*See details in Chapter 1*)

In the next chapter, detail information of project proponent, organization structure of De Heus Myanmar Limited, lists of management teams including BOD, director and salient feature of project and detail investment plan mentioned in chapter 2.

(See details in chapter 2)

In chapter 3, include the scope of the study of proposed project, IEE study objective and responsibility of IEE expert team of E Guard Environmental Services Co, .Ltd. *(See details in chapter 3)*

In Chapter 4, provides the brief summary of relevant national environmental legislations such as Environmental Impact Assessment Procedure (2015) and National Environmental Quality (emission) Guidelines, established by the Ministry of Natural Resources and Environmental Conservation (MONREC) and overview of current local and international environmental and social policies including related international or regional convention for the proposed project. (*See details in Chapter 4*)

For environmental baseline data were collected by onsite measurements analysis for air quality and noise level at proposed project site during operation phase. Raw water and wastewater were also collected and sent to respective laboratories and then the analyzed lab results can be seen in appendix (6) to (7). Moreover, secondary data collection of proposed project site area such as socio economic condition, physical/biological environment, and weather data were collected from official township data of Hmawbi Township, Yangon Region. Environmental quality baseline data collection conducted on 5th to 6th January, 2017 and detail analysis results of air quality, noise level, raw water and wastewater see in chapter 5.

So in this IEE study, the potential environmental impacts brought by various activities of proposed animal feed mill factory project were identified and judged by site surveying with checklist, meeting with client team, including plant manager and quality control supervisor, representatives from De Heus Myanmar Limited, and assessing the environmental baseline information for operation, and decommissioning phases along with its mitigation measure. *(See details in Chapter 5)*

According to the team's potential environmental impact assessment, there are 20 numbers of low impacts and 5 numbers of moderate significance impacts during operation phase. In decommissioning phase, there are 13 low significance impacts, 4 numbers of very low impacts.

Potential impacts during operation phase are includes:

- 1. Crushed grains dust may generate from operation of heavy machines of grinding, weighing, delivering and transportation of raw materials and gases may emit from operation of steam boiler, emergency used of diesel generator and vehicle movements
- 2. Noise pollution due to the operation of heavy machines at production area and vehicle movements
- 3. Wastewater discharge from steam boiler and domestic wastewater discharged from office facilities
- 4. Produced of Solid waste such as grains dust, packaging materials from production area and paper, plastic waste and other general office waste etc.
- 5. Potential impact of occupational health and safety hazards such as exposure of grain dusts, inhalation of odor (feed additives, drugs, premix), exposure of noise and electrical hazards will be caused by working at the operation phase of animal feed production

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Potential negative impacts and mitigation measures of the proposed factory were taken into consideration during the study. (*See detail in chapter 6*)

Public consultation meeting was hold on 7th March, 2017 at the DH animal feed mill factory, Myaung Dagar Industrial Zone, Hmawbi Township, Yangon Region in which U Thu Hla Zaw (plant manager) explained about the proposed animal feed production process, type of investment and also their future plan. And then, Daw Yu Wai Yan Thein Tan (Consultant) also explained about the objective of IEE study, baseline data collection and prediction of environmental impact and effective impact mitigation measure and preparation of EMP plan including with Environmental Monitoring Pan and CSR plan etc. (*See detail in chapter 7*).

The Environmental Management Plan (EMP) of animal feed production factory was prepared by using the finding of potential environmental impacts during operating phase and decommissioning phase, the current condition of environmental baseline data of air quality, noise level, water and wastewater quality results and surround area of project site, site visit activities at project site and discussion of project status with the proponent.

Moreover, environmental management plan is a site specific plan development to ensure that the project is implemented in an environmental sustainable manner. And also ensues the project implementation is carried out in accordance with the design by taking appropriate mitigation actions to reduce adverse environmental impacts.

The proposed Environmental Management Plan (EMP) for this project include i) environmental impact mitigation plan for operation and decommission phase (ii) environmental monitoring plan consist of specific standard guidelines (iii) emergency preparedness plan (iv) budget allocation plan for EMP (V) corporate social responsibility (CSR) Plan. In environmental impact mitigation plan which include the recommended mitigation measures for environmental issues associated with operational phase and decommission phase.

During operation phase, predicted environmental impacts are impact of crushed grains dust and gases emission from production area, impact of odor from storage area of volatile organic compounds (feed additives, drugs, premix), impact of noise from hammer mill, motors and heavy machines operation, impact on aquatic lives due to boiler discharge water, impact of electricity consumption, impact of solid waste and wastewater discharge and occupation health and safety for employees and workers. Although the number of adverse impact on surrounding environment that can be reduced to some extent by related proper mitigation measure mentioned in Table (1.8).

For decommission phase, it is necessary to outline some basic mitigation measures that will be required to be undertaken once all operational activities of the project have ceased. Therefore, anticipated environmental impact that may occur in decommission phase of this project are produced of demolishing waste, electrical cable waste, produced of significant noise of demolishing works etc. And hence, recommended mitigation measure for decommission can be seen in Table (8.2) to overcome and mitigate those impacts. De Heus Myanmar will conduct the regular environmental monitoring report regularly by examine the environmental quality parameters mentioned in Table (8.3) to (8.8) for operation phase of animal feed production. For decommission phase, required environmental monitoring plan can be seen in Table (8.8)

For a factory project, emergency preparedness is vital as quick and correct response is necessary in case of emergency to overcome and reduce of accidental case during operation phase. Common emergency situation for an animal feed mill plant may involve dust explosion, fire and flammable liquid or gas leakage and chemical release or spill. Therefore, detail emergency plan showed in subsection 8.4 and health and safety training plan also showed in Table (8.12). Moreover, the expenditure for the implementation of EMP plan showed in Table (8.13) for budget allocation of mitigation measure and monitoring plan throughout the life cycle of 50 years (*See details in Chapter 8*)

In Conclusion, the environmental management practices, procedures and responsibilities are defined here in to get full compliance with the existing environmental policy, laws, rules and instructions of the Republic of the Union of Myanmar. In addition, all the feed backs, desired and needs of local public recorded in public consultation meetings are well addressed and incorporated in formulation of EMP.

1. PROJECT DESCRIPTION

This report describes the findings of the Initial Environmental Examination (IEE) for the Production and Distribution of Animal feed Products factory by De Heus Myanmar Limited. 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.

1.1 Project Size

1.1.1 Project Background Study

The investor submitted a proposal for the said investment to the Myanmar Investment Commission (MIC) on June 19, 2015. 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 — Production and Distribution of Animal Nutrition Products" under the name of De Heus Myanmar Company Limited as a wholly owned foreign investment from the Netherland, on October 23, 2015.

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. As per the comments of MONREC, the said project requires an IEE to meet the environmental assessment requirements of Myanmar Environmental Conservation Law. Therefore, De Heus Myanmar Limited commissioned E Guard Environmental Services for IEE report study.

1.1.2 Description of the Project

The proposed animal feed factory is the 100% foreign investment by De Heus Myanmar Company Limited with an estimated authorized capital of USD (7.575) million. The proposed factory is located at Plot No.(306,307,308), Myaung Dagar Steel Industrial Zone, Hmawbi Township, Yangon Region and the total land area are 22461.5 m² (5.55 Acres). The factory aims to manufacture and distribute of animal feed nutrition products by using automatic process control system with computerized production process. The construction phase of the proposed factory initiated in October, 2015 and then commercial running operation stage is September, 2016. The proposed duration of the investment shall be 50 years (2015 to 2065). The term of the Lease shall be initial 3 years commencing from the date of signing of the Lease Agreement between U Ye Aung and De Heus Myanmar Limited for proposed project site for 5.51 acres of land and extendable for one year in 2 times as recommended by the Yangon Region Government.

1.1.3 Project Implementation Program

i) Construction Phase: Engineering and Procurement for the construction phase of De Heus Myanmar factory were established on May 2015. Construction and civil works were materialized with land filling, pilling and foundation work on October 2015. Royal Haskoning DHV Myanmar was a key player as a construction consultant while Antaco JV D&C as a main contractor. All the contractors were able to catch up the schedule accordingly by working closely together on site. The Construction project is completed as scheduled on the first week of September 2016.

ii) Operation Phase Proposed Factory Layout Structure

The designed area includes production tower (7 Levels), finished product warehouse, raw materials warehouse, intake building, utilities of transformer room, boiler room, guardhouse and general utility room, three grain silos, three liquid tanks, firefighting pump room and water tank, car parking shelter, offices, Lab and canteen facilities etc.



Figure (1. 1) Factory Layout of De Heus Myanmar Limited

Number of people 109 employees working at De Heus Myanmar Limited. Most are local people, who manage the company by their dynamic, enthusiastic, experienced, and cooperative skills. The estimated production rate is 74,779 tons per annually of feed products.

Decommissioning phase: The proposed project investment duration is 50 years and they will close out the project according to their MIC proposal.

1.2 Installation, Technology, Infrastructure, Production Processes

1.2.1 Production Process of Animal Feed (Technical Aspects)

The animal nutrition feed products (complete, concentrate) production comprised of various formulations such as poultry feed, cattle feed and swine feed according to the De Heus Myanmar's production standard. Detail process flow diagram is mentioned in Figure (1.3) and (1.4).

1.2.2 Lists of Machinery and Equipment

Automation systems for fully automatic systems control of each process machine or complete processing line have been implemented and it ensures cost-effective processing and consistent feed quality. Having entered a formula into the advanced process control system, the complete process from intake of ingredients to finished product is started. The operator will follow and monitor the entire process on-screen.

Lists of machinery and equipment required for the proposed animal feed production factory is listed in Table (1.1) and (1.2). Main equipment group name are premix intake, intake raw materials bulk trucks, wet grain storage silos, grain storage silos, intake raw materials flat storage, dosing silos, grinding and mixing, pelleting and cooling, fined product and bagging off, liquids tank and steam boiler.

No.	Code	Equipment's name	Remarks
Micro Bin and Diluting Line			
1	05.TA 01	Micro dosing Bin	
2	05.TA 02	Micro dosing Bin	
3	05.TA 03	Micro dosing Bin	
4	05.TA 04	Micro dosing Bin	
5	05.TA 05	Micro dosing Bin	
6	05.TA 06	Micro dosing Bin	
7	05.TA 07	Micro dosing Bin	
8	05.TA 08	Micro dosing Bin	

Table (1. 1) Machinery and Equipment Lists used in DH factory



No.	Code	Equipment's name	Remarks
9	05.TA 09	Micro dosing Bin	
10	05.TA 10	Micro dosing Bin	
11	05.TA 11	Micro dosing Bin	
12	05.TA 12	Micro dosing Bin	
13	05.TA 13	Micro dosing Bin	
14	05.TA 14	Micro dosing Bin	
15	05.TA 15	Micro dosing Bin	
16	05.TA 16	Micro dosing Bin	
17	05.TA 17	Micro dosing Bin	
18	05.TA 18	Micro dosing Bin	
19	05.TA 19	Micro dosing Bin	
20	05.TA 20	Micro dosing Bin	
21	05HYD01	Hydraulic Pump	
22	05HYD02	Hydraulic Pump	
23	05.WE 01	Weight Scale	
24	05.WE 02	Weight Scale	
25	05.WE 03	Weight Scale	
26	05.WE 04	Weight Scale	
27	05.WE 05	Weight Scale	
28	05.BFV 01	Butterfly Valve	
29	05.BFV 02	Butterfly Valve	
30	05.BFV 03	Butterfly Valve	
31	05.BFV 04	Butterfly Valve	
32	05.BFV 05	Butterfly Valve	
33	05.BFV 06	Butterfly Valve	
34	05.BFV 07	Butterfly Valve	
35	05.BFV 08	Butterfly Valve	
36	05.TA 90	Diluting Dosing Bin	
37	05.TA 91	Diluting Dosing Bin	
38	05.TA 92	Diluting Dosing Bin	
39	05.TA 93	Diluting Dosing Bin	



No.	Code	Equipment's name	Remarks
40	05.VE 01	Ventilator	
41	05 MI 01	Mixer	
42	05.HO 01	Hopper	
43	05.SC 01	Screw Conveyor	
44	05.SC 02	Screw Conveyor	
45	05.WE01-S1	Electro pneumatic slidegate	
46	05.BC01	Belt Conveyor	
		Intake raw materials bulktrucks	
47	10.RP01	Receiving pit	
48	10.VE01	Ventilator	
49	10.VE02	Ventilator	
50	10.VE03	Ventilator	
51	10.FI01	Insertable filter	
52	10.FI02	Insertable filter	
53	10.FI03	Insertable filter	
54	10.CC01	Chainconveyor	
55	10.CC03	Chainconveyor	
56	10.PC01	Pre cleaner	
57	10.MG01	Permanent magnet	
58	10.EV01	Bucket elevator	
59	10.EV02	Bucket elevator	
60	10.EV02-DV1	Electro pneumatic two-way divider	
61	10.EV02-DV2	Electro pneumatic two-way divider	
62	10.HO01	Hopper above weighing scale	
63	10.WE01	Weighing scale	
64	10.CC03-S1	Electro pneumatic slidegate	
65	10.CC03-S2	Electro pneumatic slidegate	
66	10.CC03-S3	Electro pneumatic slidegate	
67	10.CC03-FI01	Spotfilter	
68	10CC04-FI01	Spotfilter	



No.	Code	Equipment's name	Remarks
69	10TL01-1	Truck Lift	
70	10TL01-2	Truck Lift	
		Inter Bin Dosing	
71	15.TA01	Dosing Bin	
72	15.TA02	Dosing Bin	
73	15.TA03	Dosing Bin	
74	15.TA04	Dosing Bin	
75	15.TA05	Dosing Bin	
76	15.TA06	Dosing Bin	
77	15.TA07	Dosing Bin	
78	15.TA08	Dosing Bin	
79	15.TA09	Dosing Bin	
80	15.TA10	Dosing Bin	
81	15.TA11	Dosing Bin	
82	15.TA12	Dosing Bin	
83	15.TA13	Dosing Bin	
84	15.TA14	Dosing Bin	
85	15.TA15	Dosing Bin	
86	15.TA16	Dosing Bin	
87	15.TA17	Dosing Bin	
88	15.TA18	Dosing Bin	
89	15.TA19	Dosing Bin	
90	15.TA20	Dosing Bin	
91	15.TA21	Dosing Bin	
92	15.TA22	Dosing Bin	
93	15.TA23	Dosing Bin	
94	15.TA24	Dosing Bin	
95	15.TA25	Dosing Bin	
96	15.TA26	Dosing Bin	
97	15.TA27	Dosing Bin	



No.	Code	Equipment's name	Remarks
98	15.TA28	Dosing Bin	
99	15.TA29	Dosing Bin	
100	15.TA30	Dosing Bin	
101	15.TA31	Dosing Bin	
102	15.TA32	Dosing Bin	
103	15EV02	Bucket Elevator	
104	15EV02	Bucket Elevator	
105	15CC01	Chain Conveyor	
106	15CC02	Chain Conveyor	
107	15CC03	Chain Conveyor	
108	15CC04	Chain Conveyor	
109	15CC05	Chain Conveyor	
110	15CC06	Chain Conveyor	
111	15CC07	Chain Conveyor	
112	15CC08	Chain Conveyor	
113	15CC09	Chain Conveyor	
114	15TA01-S1	Slide Gate Motor	
115	15TA02-S2	Slide Gate Motor	
116	15TA03-S3	Slide Gate Motor	
117	15TA04-S4	Slide Gate Motor	
118	15TA05-S5	Slide Gate Motor	
119	15TA06-S6	Slide Gate Motor	
120	15TA07-S7	Slide Gate Motor	
121	15TA08-S8	Slide Gate Motor	
122	15TA09-S9	Slide Gate Motor	
123	15TA10-S10	Slide Gate Motor	
124	15TA11-S11	Slide Gate Motor	
125	15TA12-S12	Slide Gate Motor	
126	15TA13-S13	Slide Gate Motor	
127	15TA14-S14	Slide Gate Motor	
128	15TA15-S15	Slide Gate Motor	



No.	Code	Equipment's name	Remarks
129	15TA16-S16	Slide Gate Motor	
130	15TA17-S17	Slide Gate Motor	
131	15TA18-S18	Slide Gate Motor	
132	15TA19-S19	Slide Gate Motor	
133	15TA20-S20	Slide Gate Motor	
134	15TA21-S21	Slide Gate Motor	
135	15TA22-S22	Slide Gate Motor	
136	15TA23-S23	Slide Gate Motor	
137	15TA24-S24	Slide Gate Motor	
138	15TA25-S25	Slide Gate Motor	
139	15TA26-S26	Slide Gate Motor	
140	15TA27-S27	Slide Gate Motor	
141	15TA28-S28	Slide Gate Motor	
142	15TA29-S29	Slide Gate Motor	
143	15TA30-S30	Slide Gate Motor	
144	15TA31-S31	Slide Gate Motor	
145	15TA32-S32	Slide Gate Motor	
146	15WE01	Weight Scale	
		Grain storage silos	
147	20.EV01	Bucket elevator	
148	20.EV01-FI01	Spotfilter	
149	20.CC01	Chainconveyor	
150	20.CC01-FI01	Spotfilter	
151	20.CC01-S1	Electro pneumatic slidegate	
152	20.CC01-S2	Electro pneumatic slidegate	
153	20.CC01-S3	Electro pneumatic slidegate	
154	20.TA01	Grain storage bin	
155	20.TA02	Grain storage bin	
156	20.TA03	Grain storage bin	
157	20.TA01-SC01	Sweep auger	

No.	Code	Equipment's name	Remarks
158	20.TA02-SC01	Sweep auger	
159	20.TA03-SC01	Sweep auger	
160	20.TA01-S1	Electro pneumatic slidegate	
161	20.TA02-S1	Electro pneumatic slidegate	
162	20.TA03-S1	Electro pneumatic slidegate	
163	20.CC02	Chainconveyor	
164	20.EV02	Bucket elevator	
165	20.EV02-FI01	Spot filter	
		Intake raw materials flatstorage	
166	25 RP01,02- VE04	Ventilator	
167	25.RP01,02- FI04	Insertable filter	
168	25.CC01	Chainconveyor	
169	25.CC02	Chainconveyor	
170	25SC01	Screw Conveyor	
171	25.EV01	Bucket elevator	
172	25EV01-FI01	Spotfilter	
173	25.RP01	Receiving pit	
174	25.RP02	Receiving pit	
175	25.CR01	Crusher	
176	25WE01	Weight Scale	
		Dosing silos	
177	30.EV01	Bucket elevator	
178	30.EV02	Bucket elevator	
179	30SC01	Screw Conveyor	
180	30.TA01-SC01	Screwconveyor	
181	30.TA02-SC01	Screwconveyor	
182	30.TA03-SC01	Screwconveyor	
183	30.TA04-SC01	Screwconveyor	
184	30.TA05-SC01	Screwconveyor	



No.	Code	Equipment's name	Remarks
185	30.TA06-SC01	Screwconveyor	
186	30.TA07-SC01	Screwconveyor	
187	30.TA08-SC01	Screwconveyor	
188	30.TA09-SC01	Screwconveyor	
189	30.TA10-SC01	Screw conveyor	
190	30.TA11-SC01	Screwconveyor	
191	30.TA12-SC01	Screwconveyor	
192	30.TA13-SC01	Screwconveyor	
193	30.TA14-SC01	Screwconveyor	
194	30.TA15-SC01	Screwconveyor	
195	30.TA16-SC01	Screwconveyor	
196	30.TA17-SC01	Screwconveyor	
197	30.TA18-SC01	Screwconveyor	
198	30.TA19-SC01	Screwconveyor	
199	30.TA20-SC01	Screwconveyor	
200	30.TA21-SC01	Screwconveyor	
201	30.TA22-SC01	Screwconveyor	
202	30.TA23-SC01	Screwconveyor	
203	30.TA24-SC01	Screwconveyor	
204	30.TA25-SC01	Screwconveyor	
205	30.TA26-SC01	Screwconveyor	
206	30.TA27-SC01	Screwconveyor	
207	30.TA28-SC01	Screwconveyor	
208	30.TA29-SC01	Screwconveyor	
209	30.TA30-SC01	Screwconveyor	
210	30.TA31-SC01	Screwconveyor	
211	30.TA32-SC01	Screwconveyor	
212	30.TA02- SC01-S1	Electro pneumatic slidegate	
213	30.TA03- SC01-S1	Electro pneumatic slidegate	
214	30.TA06- SC01-S1	Electro pneumatic slidegate	

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No.	Code	Equipment's name	Remarks
215	30.TA07- SC01-S1	Electro pneumatic slidegate	
216	30.TA09- SC01-S1	Electro pneumatic slidegate	
217	30.TA10- SC01-S1	Electro pneumatic slidegate	
218	30.TA11- SC01-S1	Electro pneumatic slidegate	
219	30.TA12- SC01-S1	Electro pneumatic slidegate	
220	30.TA13- SC01-S1	Electro pneumatic slidegate	
221	30.TA14- SC01-S1	Electro pneumatic slidegate	
222	30.TA15- SC01-S1	Electro pneumatic slidegate	
223	30.TA16- SC01-S1	Electro pneumatic slidegate	
224	30.TA17- SC01-S1	Electro pneumatic slidegate	
225	30.TA18- SC01-S1	Electro pneumatic slidegate	
226	30.TA19- SC01-S1	Electro pneumatic slidegate	
227	30.TA20- SC01-S1	Electro pneumatic slidegate	
228	30.TA21- SC01-S1	Electro pneumatic slidegate	
229	30.TA22- SC01-S1	Electro pneumatic slidegate	
230	30.TA23- SC01-S1	Electro pneumatic slidegate	
231	30.TA24- SC01-S1	Electro pneumatic slidegate	
232	30.TA25- SC01-S1	Electro pneumatic slidegate	
233	30.TA26- SC01-S1	Electro pneumatic slidegate	
234	30.TA27- SC01-S1	Electro pneumatic slidegate	
235	30.TA28- SC01-S1	Electro pneumatic slidegate	
236	30.TA29- SC01-S1	Electro pneumatic slidegate	
237	30.TA30-	Electro pneumatic slidegate	

No.	Code	Equipment's name	Remarks
	SC01-S1		
238	30.TA31- SC01-S1	Electro pneumatic slidegate	
239	30.TA32- SC01-S1	Electro pneumatic slidegate	
240	30.EV01-FI01	Spotfilter	
241	30.CC02-FI01	Spotfilter	
242	30.CC03-FI01	Spotfilter	
243	30.CC01	Chainconveyor	
244	30.CC02	Chainconveyor	
245	30.CC03	Chainconveyor	
246	30.CC04	Chainconveyor	
247	30.CC05	Chainconveyor	
248	30.CC06	Chainconveyor	
249	30.CC07	Chainconveyor	
250	30.CC08	Chainconveyor	
251	30.CC01-S1	Electro pneumatic slidegate	
252	30.CC01-S2	Electro pneumatic slidegate	
253	30.CC02-S1	Electro pneumatic slidegate	
254	30.CC02-S2	Electro pneumatic slidegate	
255	30.CC02-S3	Electro pneumatic slidegate	
256	30.CC02-S4	Electro pneumatic slidegate	
257	30.CC02-S5	Electro pneumatic slidegate	
258	30.CC02-S6	Electro pneumatic slidegate	
259	30.CC02-S7	Electro pneumatic slidegate	
260	30.CC03-S1	Electro pneumatic slidegate	
261	30.CC03-S2	Electro pneumatic slidegate	
262	30.CC03-S3	Electro pneumatic slidegate	
263	30.CC03-S4	Electro pneumatic slidegate	
264	30.CC03-S5	Electro pneumatic slidegate	
265	30.CC03-S6	Electro pneumatic slidegate	
266	30.CC03-S7	Electro pneumatic slidegate	



No.	Code	Equipment's name	Remarks
267	30.WE01-S1	Electro pneumatic slidegate	
268	30.WE02-S1	Electro pneumatic slidegate	
269	30.WE03-S1	Electro pneumatic slidegate	
270	30.CC04-S1	Electro pneumatic slidegate	
271	30.CC05-S1	Electro pneumatic slidegate	
272	30.CC02-DV1	Electro pneumatic two-way divider	
273	30.CC02-DV2	Electro pneumatic two-way divider	
274	30.CC02-DV3	Electro pneumatic two-way divider	
275	30.CC02-DV4	Electro pneumatic two-way divider	
276	30.CC02-DV5	Electro pneumatic two-way divider	
277	30.CC02-DV6	Electro pneumatic two-way divider	
278	30.CC02-DV7	Electro pneumatic two-way divider	
279	30.CC03-DV1	Electro pneumatic two-way divider	
280	30.CC03-DV2	Electro pneumatic two-way divider	
281	30.CC03-DV3	Electro pneumatic two-way divider	
282	30.CC03-DV4	Electro pneumatic two-way divider	
283	30.CC03-DV5	Electro pneumatic two-way divider	
284	30.CC03-DV6	Electro pneumatic two-way divider	
285	30.CC03-DV7	Electro pneumatic two-way divider	
286	30.WE01	Weight Scale	
287	30.WE02	Weight Scale	
288	30.WE03	Weight Scale	
289	30.TA01	Dosingsilos	
290	30.TA02	Dosingsilos	
291	30.TA03	Dosingsilos	
292	30.TA04	Dosingsilos	
293	30.TA05	Dosingsilos	
294	30.TA06	Dosingsilos	
295	30.TA07	Dosingsilos	
296	30.TA08	Dosingsilos	
297	30.TA09	Dosingsilos	


No.	Code	Equipment's name	Remarks
298	30.TA10	Dosingsilos	
299	30.TA11	Dosingsilos	
300	30.TA12	Dosingsilos	
301	30.TA13	Dosingsilos	
302	30.TA14	Dosingsilos	
303	30.TA15	Dosingsilos	
304	30.TA16	Dosingsilos	
305	30.TA17	Dosingsilos	
306	30.TA18	Dosingsilos	
307	30.TA19	Dosingsilos	
308	30.TA20	Dosingsilos	
309	30.TA21	Dosingsilos	
310	30.TA22	Dosingsilos	
311	30.TA23	Dosingsilos	
312	30.TA24	Dosingsilos	
313	30.TA25	Dosingsilos	
314	30.TA26	Dosingsilos	
315	30.TA27	Dosingsilos	
316	30.TA28	Dosingsilos	
317	30.TA29	Dosingsilos	
318	30.TA30	Dosingsilos	
319	30.TA31	Dosingsilos	
320	30.TA32	Dosingsilos	
321	30.TA01-RD1	Rotating devices	
322	30.TA04-RD1	Rotating devices	
323	30.TA05-RD1	Rotating devices	
324	30.TA08-RD1	Rotating devices	
325	30.HYD01	Hydraulic unit	
326	30.HYD02	Hydraulic unit	
327	30.HO01	Intermediate hopper under main weighing scale	



No.	Code	Equipment's name	Remarks
328	30.HO02	Intermediate hopper under main weighing scale	
329	30.HO03	Intermediate hopper under main weighing scale	
		Grinding and mixing	
330	40.EV01	Bucket elevator	
331	40.EV01-FI01- VE1	Spotfilter	
332	40.CC01	Chainconveyor	
333	40.CC01-FI01- VE1	Spotfilter	
334	40.CC01-S1	Electro pneumatic slidegate	
335	40.CC01-S2	Electro pneumatic slidegate	
336	40.HO-01	Grinding bin	
337	40.HO-02	Grinding bin	
338	40.HO01-S1	Electro pneumatic slidegate	
339	40.HO02-S1	Electro pneumatic slidegate	
340	40.HO03	Hopper	
341	40.SC01	Screwconveyor	
342	40.SC02	Screwconveyor	
343	40.SV01-1,	Vibrating sieve	
344	40.SV01-2	Vibrating sieve	
345	40.DV01	Electro pneumatic two-way divider	
346	40.DV02	Electro pneumatic two-way divider	
347	40.DV03	Electro pneumatic two-way divider	
348	40.HO04	Two-way hopper underneath vibrating sieve	
349	40.HM01	Hammermill magnet	
350	40.FE01	Hammermill feeder	
351	40.HM01	Hammermill	
352	40.HO05	Hopper underneath hammermill	
353	40.HO06-FI01	Filter	
354	40.HO06-FI01- RV01	rotary valve	



No.	Code	Equipment's name	Remarks
355	40.HO06-FI01- VE01	Ventilator	
356	40.RV01	Rotary valve	
357	40.HO-06	Holding bin	
358	40.MI01- 1,40.MI01-2	Single shaft mixer	
359	40.ASL01	Electro pneumatic airslidegates with airduct	
360	40.TH01, 40.TH01-FI1, 40.TH01-F1- VE01	Tipping hopper with integrated filter and ventilator	
361	40.TH02, 40.TH02-FI1, 40.TH02-F1- VE01	Tipping hopper with integrated filter and ventilator	
362	40.TH01-VE1	Tipping hopper Ventilator	
363	40.HO-07	Holding bin	
364	40.CC02	Chainconveyor	
365	40.CC02-S1	Electro pneumatic slidegate	
366	40.CC02-S2	Electro pneumatic slidegate	
367	40.MM01-01, 40.MM01-02	Molasses mixer	
Pelleting and cooling			
368	50.EV01	Bucket elevator	
369	50.EV01-FI01	Spotfilter	
370	50.EV01- DV01	Electro Pneumatic two way divider	
371	50.MG01	Permanent magnet	
372	50.EV01- DV02	Electro Pneumatic two way divider	
373	50.EV01- DV03	Electro Pneumatic two way divider	
374	50.EV01- DV04	Electro Pneumatic two way divider	
375	50.EV01- DV05	Electro Pneumatic two way divider	
376	50.CC01	Chainconveyor	



No.	Code	Equipment's name	Remarks
377	50.CC01-FI01	Spotfilter	
378	50.CC01-S1	Electro pneumatic slidegate	
379	50.CC02-S1	Electro pneumatic slidegate	
380	50.CC02	Chainconveyor	
381	50.CC02-S2	Electro pneumatic slidegate	
382	50.HO-01	Press meal bin	
383	50.HO-02	Press meal bin	
384	50.HO-04	Press meal bin	
385	50.HO-05	Press meal bin	
386	50.VB01, 50.VB02	Vibrating Bottom	
387	50RD01	Rotating devices	
388	50RD02	Rotating devices	
389	50.VB01-S1	Electro pneumatic slidegate	
390	50.VB01-S1	Electro pneumatic slidegate	
391	50.HO03	Feeding hopper above pelletmill	
392	50.HO06	Feeding hopper above pelletmill	
393	50.SC01	Screwfeeder	
394	50.SC02	Screwfeeder	
395	50.CD01	Conditioner	
396	50.CD02-1	Conditioner	
397	50.CD02-2	Conditioner	
398	50.P01	Pelletmill	
399	50.P02	Pelletmill	
400	50.GP01	Grease Pump	
401	50.GP02	Grease Pump	
402	50.CO01- RV01	Rotary airlock/valve	
403	50.CO02- RV01	Rotary airlock/valve	
404	50.AV01	Airduct with electro pneumatic airslide	
405	50.CY01	Cyclone	
406	50.CY02	Cyclone	



No.	Code	Equipment's name	Remarks
407	50.CY01- RV01	Rotary airlock valve	
408	50.CY02- RV01	Rotary airlock valve	
409	50.CY01-VE01	Ventilator	
410	50.CY01-VE02	Ventilator	
411	50.CO01	Cooler	
412	50.CO02	Cooler	
413	50.CR01	Crumbler	
414	50.CC03	Chainconveyor	
415	50.CC04	Chainconveyor	
416	50.CC05	Chainconveyor	
417	50.CC06	Chainconveyor	
Finished product and bagging off			
418	60.EV01	Bucket elevator	
419	60.EV03	Bucket elevator	
420	60.SV01	Vibrating sieve for pellets	
421	60.SV03	Vibrating sieve for pellets	
422	60.CC01	Chainconveyor	
423	60.CC04	Chainconveyor	
424	60.CC01-S1	Electro pneumatic slidegate	
425	60.CC01-S2	Electro pneumatic slidegate	
426	60.CC03	Chainconveyor	
427	60.CC05	Chainconveyor	
428	60.CC03-S1	Electro pneumatic slidegate	
429	60.CC03-S2	Electro pneumatic slidegate	
430	60.CC03-S3	Electro pneumatic slidegate	
431	60.CC03-S4	Electro pneumatic slidegate	
432	60.CC05-S1	Electro pneumatic slidegate	
433	60.CC05-S2	Electro pneumatic slidegate	
434	60.CC05-S3	Electro pneumatic slidegate	



No.	Code	Equipment's name	Remarks
435	60.CC05-S4	Electro pneumatic slidegate	
436	60.CC03-DV1	Electro pneumatic two-way divider	
437	60.CC03-DV2	Electro pneumatic two-way divider	
438	60.CC03-DV3	Electro pneumatic two-way divider	
439	60.CC03-DV4	Electro pneumatic two-way divider	
440	60.TA100	Finished product silos	
441	60.TA101	Finished product silos	
442	60.TA102	Finished product silos	
443	60.TA103	Finished product silos	
444	60.TA104	Finished product silos	
445	60.TA105	Finished product silos	
446	60.TA106	Finished product silos	
447	60.TA107	Finished product silos	
448	60.TA100-S1	Electro pneumatic slidegate	
449	60.TA101-S2	Electro pneumatic slidegate	
450	60.TA102-S3	Electro pneumatic slidegate	
451	60.TA103-S4	Electro pneumatic slidegate	
452	60.TA104-S5	Electro pneumatic slidegate	
453	60.TA105-S6	Electro pneumatic slidegate	
454	60.TA106-S7	Electro pneumatic slidegate	
455	60.TA107-S8	Electro pneumatic slidegate	
456	60.HO01	Collecting hoppers above bagging off line(s)	
457	60.HO02	Collecting hoppers above bagging off line(s)	
458	60.FBC01	Feeding Belt conveyor above weight scale	
459	60.FBC02	Feeding Belt conveyor above weight scale	
460	60.FBC01-S1	Electro pneumatic slidegate	
461	60.FBC02-S1	Electro pneumatic slidegate	
462	60.WE01	Weight Scale	
463	60.WE02	Weight Scale	
464	32561	Electro pneumatic slidegate	



No.	Code	Equipment's name	Remarks
465	60.WE02-S2	Electro pneumatic slidegate	
466	60.WE01VB01	Vibrator	
467	60.WE02VB02	Vibrator	
468	60.HM01	Pneumatic hammer	
469	60.HM02	Pneumatic hammer	
470	60.SW01	Sewing Machine	
471	60.BC01	Belt conveyor	
472	60.BC02	Belt conveyor	
473	60.FBC03	Feeding Belt conveyor above weight scale	
474	60.FBC04	Feeding Belt conveyor above weight scale	
475	60.FBC03-S1	Electro pneumatic slidegate	
476	60.FBC04-S1	Electro pneumatic slidegate	
477	60.WE03	Weight Scale	
478	60.WE04	Weight Scale	
479	60.WE03-S1	Electro pneumatic slidegate	
480	60.WE04-S2	Electro pneumatic slidegate	
481	60.WE03VB01	Vibrator	
482	60.WE04VB02	Vibrator	
483	60.HM03	Pneumatic hammer	
484	60.HM04	Pneumatic hammer	
485	60.SW02	Sewing Machine	
486	60.BC03	Belt conveyor	
487	60.BC04	Belt conveyor	
488	60.FBC05	Feeding Belt conveyor above weight scale	
489	60.FBC06	Feeding Belt conveyor above weight scale	
490	60.FBC05-S1	Electro pneumatic slidegate	
491	60.FBC06-S1	Electro pneumatic slidegate	
492	60.WE05	Weight Scale	
493	60.WE06	Weight Scale	
494	60.WE05-S1	Electro pneumatic slidegate	
495	60.WE06-S2	Electro pneumatic slidegate	



No.	Code	Equipment's name	Remarks
496	60.WE05VB01	Vibrator	
497	60.WE06VB02	Vibrator	
498	60.HM05	Pneumatic hammer	
499	60.HM06	Pneumatic hammer	
500	60.SW03	Sewing Machine	
501	60.BC05	Belt conveyor	
502	60.BC06	Belt conveyor	
		Liquids	
503	110.TA01	Palm Liquid Tank 01	
504	110.TA02	Soyabeam Liquid Tank 02	
505	110.TA03	Molasses Liquid Tank 03	
506	110.TA04	Liquid Tank 04	
507	110.TA01- PU01	Plam Liquid Pump01	
508	110.TA02- PU02	Soyabeam Liquid Pump02	
509	110.TA03- PU03	Molasses Liquid Pump03	
510	110.TA04- PU04	Liquid pump 04	
511	110.TA01- SV01	Switch Vavel 01	
512	110.TA02- SV02	Switch Vavel 02	
513	110.TA03- SV03	Switch Vavel 03	
514	110.TA04- SV04	Switch Vavel 04	
515	110.TA-01- FLT.1	Flow Transmitter	
516	110.TA-02- FLT.2	Flow Transmitter	
517	110.TA-03- FLT.3	Flow Transmitter	
518	110.TA-04- FLT.4	Flow Transmitter	
519	110.TA-01- FI01	Filter	



No.	Code	Equipment's name	Remarks	
520	110.TA-02- FI02	Filter		
521	110.TA-03- FI03	Filter		
522	110.TA-04- FI04	Filter		
		Steam		
523	80.BL01	Boiler		
524	80.AS01	Ash screw		
525	80.FF01	FD Fan		
526	80.FN01	Furnace		
527	80.IF01	ID Fan		
528	80.SAF01	Secondary Air Fan		
529	80.FWP01	Boiler Feed Water Pump		
530	80.FWP02	Boiler Feed Water Pump		
531	80.MC01	Multicyclone		
532	80.WS01	Wet Scrubber		
533	80.SV	Safety Vavel		
534	80.SC01	Fuel Feeder		
535	80.HO01	FuelBunker		
536	80.WTA01	Feed water tank		
537	80.BC01	Belt conveyor		
538	80.BC02	Belt conveyor		
539	80.CPU01	Circulation Pump		
540	80.RV01	Rotary valve		
541	80.WIV01	Water Inlet Valve		
542	80.HO01-S1	Electro pneumatic slidegate		
543	A01	Air Comperssor		
544	A02	Air Comperssor		
545	AD01	Air Comperssor Dryer		
546	EV	Elevator		
Corn Dryer				



No.	Code	Equipment's name	Remarks
547	101EV01	Bucket Elevator	
548	102PR01	Precleaner	
549	103EV02	Bucket Elevator	
550	104VE01	Ventilator	
551	105RV01	Rotary Airlock/Valve	
552	201CS01	Counter Discharge	
553	202VE02	Heat Exhaust Blower	
554	203VE03	Ventilator	
555	204RV02	Rotary Airlock/Valve	
556	205BC01	Belt Conveyor	
557	206SC01	Screw Conveyor	
558	205BC01-DV1	Electro Pneumatic Two-Way Divider	
559	202VE02-S1	Electronic Pneumatic Gate Bar	
Electrical			
560	T01	Transformer	
561	G01	Generator	
562	G02	Generator	

Table (1. 2) Type of Feed Mill Lists

Estimated Machinery and Equipment Lists to be imported for De Heus Myanmar Limited		
No.	Feed Mill Equipment	Quantity
1	Bag filter-fan	1
2	Cleaner and magnet	1
3	Crumbler	1
4	Hammer mill	1
5	Mixer	1
6	Molasses mixer	1
7	Sifter	1
8	Steam set	1
9	Conditioner	1
10	Cooler (system)	1
11	Cyclone	1

Estimated Machinery and Equipment Lists to be imported for De Heus Myanmar Limited			
No.	Feed Mill Equipment	Quantity	
12	Pellet press system	1	
13	Vibrating bottoms	2	
14	Sifters after press	1	
15	Equipment (chains, buckets, etc.)	1	
16	Rotary discharges under silos	4	
17	Dosing bins and outlet hopper/funnel	25	
18	Slide gate dosing	25	
19	Grain silos (incl. fans, sweeps)	3	
20	Grain silos temperature cables	3	
21	Weighing scales	3	
22	Automation, MCC/PLC panel and cabling	1	
23	MV & transformer part	1	
24	Other transformation and IT	1	
25	Storage system above bagging line	8	
26	Bagging	1	
27	RM intake fans/filters	1	
28	Molasses tank	1	
29	Fish oil tank	1	
30	Mass flow meters & pumps	1	
31	Generator	1	
32	Boiler (3 tonn/h)	1	
33	Laboratory equipment	1	
34	Oil tank	1	
35	Utility (steam, liquid, air piping)	1	

1.2.3 Production Process of Animal Feed Product

The major operations involved in the production of animal feed are: raw materials preparation primary crushing, assorting and measuring, molasses mixing, fine crushing, pellet making and packaging.



Figure (1. 2) Automatic Process Control System and Control Room



Figure (1. 3) General Production Process Flow Diagram of Animal Feed Mill

Procedure for Production of Animal Feed Products

Import Materials: Firstly, import materials are categorized by sensory evaluation, internal analysis, or are analyzed by the outsource laboratory and final inspection of right kind materials according to the company standard (DH 20-01) from the responsible person of Quality Control department.

Storage Facilities: Mostly, import materials are stored at room temperature (environment temperature) and others vitamin, premix are stored in the cold room. The batch of raw material, medicine, and premix will be monitored for quality in order to meet the requirements for quality and food safety before being put into use.

Magnetic Separator: Before input the raw materials into dosing bin, it will passed iron fragments which are smaller remnants or arise from within the system are separated by magnets. The material is run through the magnet; the metallic particles (iron) will be retained and removed during the cleaning process.

Input Dosing Bin: Depending on the system, depending material tank, the capacity can be about 10 tons to 90 tons. Bin containers must have identification signs. This is a material transfer step required by the specific production plans. Fixed or switch bins can be used depending on actual needs.

Quantitative Balance: Balance for each batch that is 4 tons per batch. This is the stage where the grinding raw material balanced mix according to the formula weighing, including raw material weight, medication salary range, and liquid. The Micro materials (drugs, premix, and additives) after weighing need to be used within 10 days' time to avoid denaturing. Information about concentration, duration of supplemental drugs is recognized in PCS software. Request at this stage is that the balance must be regularly monitored and

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tested, calibrated. Before running production process, a different product formula will automatically apply the system against cross-contamination Table to avoid unsafe for the next.

Classification of materials (screening): Raw materials, containing impurities which will be separated by using 4 mesh sieve, in which, hard materials through the grinder and smooth materials through the mixing bin.

Grinding: In grinding step, 450 MPR hammer mill motor which can set 0-1450 rev/minutes and mesh sizes is 2.0mm-6.0mm will use for Grits grinding of raw materials which size depends on the rotational speed of the mill and mesh sizes.

Mixing : At this stage, all the necessary ingredients in feed formulations including; mixture of materials, some materials are not transferred through fine grinding (e.g. Wheat flour), vitamins and minerals, and liquid raw materials and water will be blended to prepare for pellet making step and mixing time is 210 seconds. After that, a mixture of ingredients are mixed thoroughly and enough nutrition component formula. This is also the stage of putting the liquid in the product. Some products require mixing molasses.

Pelleting: After mixing step, the obtained mixture will be made as pellet which has the hole diameter 2.5 mm to 4.0mm. Pellet technology is used for the pelleting of the feeds and the obtained pelleting feed size depends on each product, if it achieved the required pellet feeds size will move to the next stage, if not reach move into recycling. (Request at this stage is uniform color)

Cooling: At this stage, the output of pellet feeds after processing (heat) will be cooled down in order to minimize high temperature after bagging prone to mold. After cooling, the temperature shall be higher environmental temperature 5° C for pelleting feed.

Sieving: At this stage, after will be transferred through the corresponding mesh sieve (2.0 \times 7.0 mm-16.0 \times 16.0mm) to remove the pellets, which are not reached the standard size. The products which are not reached will be transferred to recycling.

Packaging product : After dust sieving, obtained final products will be moved through automatic scale and be packaged with each batch (5kg/ bag, 25kg/bag, 50kg/bag) While packing, final products QC will take samples to test each batch.

Storage & Export of Final Products: At this stage, the obtained packed feeds are stored at final product warehouse for the purpose of await and inspect the results of the laboratory test. The final products of animal feeds shall be monitored daily by warehouse staff and shall be moved by using pilling on pallets properly.

Storage and Export of Goods: Storage of 60 days for a complete compound feed, 90 days for concentrated feed and up to 6 months (180 days) for premix. Storage temperature is the ambient temperature according to the principle of first in, first out (FIFO).



Figure (1. 4) Production Process Flow Diagram for Animal Feed Products

1.2.4 Type of Animal Nutrition Feed Products

De Heus Myanmar Limited will produce two main feed product types such as complete and concentrate feed with 22 product lines. Most products are for poultry, swine and dairy cows. Estimated production target rate is 74,779 tons of feeds. Products list and product's shelf-life showed in below Table (1.3) and (1.4).

No	Group	Code	Name of product
1		6010	Broiler Pre starter
2		6020	Broiler starter
3		6030	Broiler grower
4		7700	Layer complete
5	Poultry	8000	Pullet concentrates
6		8007	Layer concentrates
7		8065	Duck layer concentrates
8		8085	Broiler concentrates
9		8010	Quail concentrates
10		5971	Dairy feed (Pellet)
11	Cattle	5972	Dairy feed (mash)
12		5200	Goat grower complete
13		5204	Goat grower concentrate
14		3825s	Power creep feed
15		3825	Creep feed
16		3835	Fattening piglet feed
17		3845	Fattening grower feed
18	Pig	3855	Fattening finisher feed
19		3408	Fattening concentrates
20		3065	Sow lactation feed
21		3035	Gestation feed
22		3411	Swine breeder concentrate

Fahla ((1 3)	Product	I iste	of De	Неше	Мх	anmar	I imit	ed
i adie (1.3	Product	LISIS	or De	neus	IVI	/annar	LIIIII	ea

Table ((1.4)	Products	Shelf Life	(2017)
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No	Code	Product Name	Feed for	Exp: of Month
1	3835	Piglet starter	Pig	90
2	3408	Swine concentrate F	Pig	120
3	3411	Swine concentrate B	Pig	120
4	3065	Sow Lactation	Pig	90

No	Code	Product Name	Feed for	Exp: of Month
5	5961	Dairy Cow feed (Lactation 1-90)	Cow	90
6	5971	Dairy Cow feed (Lactation > 90)	Cow	90
7	5972	Dairy Cow feed (Lactation day 1-90)	Cow	75
8	6010	Broiler Pre starter	Chicken	75
9	6020	Broiler starter	Chicken	90
10	6030	Broiler grower	Chicken	90
11	8007	Layer concentrates	Chicken	120
12	8065	Duck Layer concentrates	Duck	120
13	8085	Broiler concentrates	Chicken	120
14	8000	De Heus Pullet Concentrate	Chicken	120
15	8010	De Heus Quail Layer Concentrate	Quail	120
16	3835	Swine Creep feed	Pig	90

1.3 Use of Materials and Resources

1.3.1 Raw Material Requirement

The basic raw materials for the production of animal feed include oil, wheat bran, molasses, corn and other cereals, bone meal, bran of cereals, salt and limestone, vitamins and minerals. Some of raw materials are available locally and others are imported from foreign countries. The delivery plan for imported raw materials was made by the company (Warehouse, Quality Control, and Purchasing), supplier and logistic service weekly. Container trucks are used to deliver the imported raw materials. The required raw materials of grains, premix and supplements, preservative chemicals, and all micro raw materials can be seen in Table (1.5) to (1.9). Weekly order is made from the depot warehouse and daily adjustments are made for the transport of feeds to the depots from the factory and then sell to customers at depots: From the factory, the products are sold directly to customers, customers vehicles come to the factory warehouse and purchased the products.

Raw material warehouse has 2,969 square meter and mostly import raw materials are stored at room temperature (environment temperature) depending on the type of raw materials. In which, for cereal raw materials will be stored in intermediate silos with 3000 metric ton capacity for storage. Others vitamin, premix are also stored in cold room according to their Material Safety Data Sheet (MSDS) guidelines, and detail lists of premix & supplements and storage facilities are showed in Table (1.9) respectively. The batch of raw material, medicine, and premix will be monitored for quality in order to meet the requirements for quality and food safety before being put into use.

Code	Description	Source
4647	BARLEY	Import
4677	CANOLA 00	Import
4678	CORNGLUTEN 60 CP	Import
4674	DABOMB P (SOYPR.)	Import
4660	DDGS	Import
4634	DH100 PIGLET premix	Import
4635	DH200 PIG premix	Import
4630	DH300 SOW premix	Import
4632	DH400 LAYER premix	Import
4633	DH500 BROILER premix	Import
4631	DH700 COW premix	Import
839	LYSINE SULPHATE 70%	Import
4690	MEATBONEMEAL50	Import
830	METHIONIN 99%	Import
4671	SOYBEANMEAL HP 46%	Import
4680	SWEET WHEY POWDER	Import
852	THREONIN 98%	Import
853	TRYPTOPHAAN 98%	Import
4644	WHEAT 11CP	Import
4615	ENRADIN F40	In premix (Come along with premix)
04605-02	Lucanthin red 1%	In premix
4600	NATUGRAIN	In premix
4610	PANCOSMA	In premix
4601	PHYZYME TPT 1000	In premix
04601-05	PHYZYME-PR Hoog	In premix
4648	BROKEN RICE A	Local
948	CHOLINE CHLORID 60	Local
	vitamin	
4616	CITIFAC 15% (Cl-4cyc)	Local
04618-01	Cobactin 10% antibiotics	Local

 Table (1. 5) Raw Materials Lists



Code	Description	Source
191	COCONUTOIL	Local
4663	COPRA EXPELLER	Local
4640	CORN	Local
4643	CORN EXTRUD.	Local
770	Cupric sulphate, pentahydrate 25%	Local
638	DICALPHOSPH. DIHYDR	Local
	18%P	
4685	FISHMEAL	Local
4661	GREENBEAN,SHELL	Local
643	LIME FINE	Local
4621	LIMESTONES middle	Local
840	L-LYSINE-HCL 79%	Local
4606	OROGLO	Local
4662	PALMKERNEL Meal	Local
4655	RICEBRAN FF Dried	Local
4617	Saligrain G120 antibiotics	Local
680	SALT-NACL	Local
718	SODIUM-BICARBONATE	Local
204	SOYBEAN OIL GMO	Local
395	SUGAR	Local
657	UREA	Local
4654	WHEATBRAN MEAL	Local
888	ZINC OXIDE 75%	Local
4699	MOLASSE	Local/ Import
04603-01	BARLEY	Import

Code	Name	Category	Usage/day	%
0191	Refine coconut oil	Liquid	76.13	0.02%
0195	PALM OIL (Crude)	Liquid	1404.84	0.34%
0204	SOYBEAN OIL GMO	Liquid	251.94	0.06%
0395	Sugar	Micro	161.29	0.04%
0638	DICALPHOSPH. DIHYDR 18%P	Micro	501.94	0.12%
0657	UREA POL	Micro	183.87	0.04%
0670	Mangaan oxide	Micro	0.00	0.00%
0680	SALT-NACL	Micro	1726.77	0.42%
0718	SODIUM-BICARBONATE	Micro	447.10	0.11%
0770	Cupric sulphate, pentahydrate 25%	Micro	96.77	0.02%
0830	METHIONIN 99%	Micro	718.06	0.17%
0839	Lysine sulphat 70%	Micro	2134.19	0.52%
0840	L-LYSINE-HCL 79%	Micro	34.52	0.01%
0852	THREONIN 98%	Micro	348.06	0.08%
0853	TRYPTOPHAN 98%	Micro	40.97	0.01%
0888	ZINC OXIDE 75%	Micro	13.23	0.00%
0948	CHOLINE CHLORID 60	Micro	204.84	0.05%
0968	CITRIC ACID	Micro	8.71	0.00%
0977	BETAIN	Micro	0.00	0.00%
2500	Rework RM	Micro	0.00	0.00%
4602	Mycofix Secure	Micro	0.00	0.00%
4602-01	Toxfin dry	Micro	0.00	0.00%
4603-02	Feed CURB FS Dry	Micro	0.00	0.00%
4604	Feedox Dry	Micro	0.00	0.00%
4604-02	Oxy Cap E2	Micro	0.00	0.00%
4606	OROGLO VN	Micro	29.68	0.01%
4607	Lignobond	Micro	0.00	0.00%
4615	ENRADIN F40	Micro	67.42	0.02%
4615-05	Enramycin 8%	Micro	0.00	0.00%
4616	CITIFAC 15%(Cl-4cyc)	Micro	20.00	0.00%
4617	Saligrain G120	Micro	120.32	0.03%
4618-01	Cobactin 10%	Micro	21.94	0.01%
4618-02	Halquinol	Micro	1.61	0.00%
4620	Lime Fine	Micro	5281.94	1.28%
4621	LIMESTONES middle	Micro	8196.13	1.98%
4630	DH300 SOWpx 0.50% MY 16/035	Micro	86.77	0.02%
4631	DH700 COWPX 0,5% 16/036	Micro	88.71	0.02%
	DH400 LAYERpx0.50% MY			
4632	16/037	Micro	820.65	0.20%
4.600	DH500 BROILERpx 0,5% MY			0 0 - 0 /
4633	16/038	Micro	1117.74	0.27%

Table (1.6) Usage	of raw	materials	per	day
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Code	Name	Category	Usage/day	%
	DH100 PIGLETpx 1,00% MY			
4634	16/039	Micro	151.29	0.04%
4635	DH200 PIGpx 0.50% MY 16/040	Micro	331.29	0.08%
4640	CORN A	Macro	179633.87	43.39%
4640-01	CORN B	Macro	0.00	0.00%
4642	Corn Import	Macro	0.00	0.00%
4643	CORN EXTRUD.	Macro	380.97	0.09%
4644	WHEAT 11CP	Macro	17115.81	4.13%
4647	BARLEY	Macro	1751.94	0.42%
4648	BROKEN RICE A VN	Macro	15825.81	3.82%
4648-01	Brown Broken Rice	Macro	0.00	0.00%
4654	WHEATBRAN MEAL coarse	Macro	8643.23	2.09%
4655	RICEBRAN FF Dried	Macro	18271.61	4.41%
4655-01	Rice bran FF high	Macro	2199.35	0.53%
4656	RICE BRAN DEOILED	Macro	1205.81	0.29%
4660	DDGS	Macro	27081.29	6.54%
4661	GREENBEAN,SHELL 3 VN	Macro	2282.58	0.55%
4662	PALMKERNEL	Macro	8913.23	2.15%
4663	COPRA EXPELLER	Macro	0.00	0.00%
4664	PALM KERNEL EXPELLER	Macro	0.00	0.00%
4665	Sunflower Meal	Macro	28303.87	6.84%
4670	Soybean Meal Hipro	Macro	54377.10	13.13%
4671	SOYBEANMEAL HP 46%	Macro	0.00	0.00%
4674	DABOMB P (SOYPR.)	Micro	717.42	0.17%
4676	Rapeseed meal.	Macro	8204.19	1.98%
4677	CANOLA HIPRO	Macro	0.00	0.00%
4678	CORNGLUTEN 60 CP VN	Macro	479.03	0.12%
4680	SWEET WHEY POWDER	Micro	444.52	0.11%
4685	FISHMEAL 60 SEA Myanmar	Macro	251.94	0.06%
4690	MEATBONEMEAL50 VN	Macro	10258.06	2.48%
4698	Rework Raw Material MM 2	Macro	0.00	0.00%
4698-01	Rework Raw Material MM 2	Macro	0.00	0.00%
4698-02	Rework Raw Material MM 2	Macro	0.00	0.00%
4699	MOLASSE	Macro	2974.84	0.72%
	Total		414005.16	100.00%

No	Code	Material Name	Supplier Name	Source
1	4640	CORN A	-	Myanmar
2	4643	CORN EXTRUD	Thit San Oil	Myanmar
3	4644	WHEAT 11CP	U Kyu Family	Myanmar
4	4648	Broken Rice A VN	-	Myanmar
5	4654	Wheat bran Meal coarse	U Kyu Family	Myanmar
6	4655	Rice bran FF Dried	-	Myanmar
7	4661	Green Bean, Shell 3 VN	-	Myanmar
8	4662	PALMKERNEL	-	Myanmar
9	4663	COPRA EXPELLER	-	Myanmar
10	4685	FISHMEAL 60 SEA MYANMAR	-	Myanmar
11	4699	Molasses	-	Myanmar
			Mi Ba Gone	
		4621	Aung Thurain Min	
12		Limestone Middle	U Kyaw Kyaw	Myanmar
			Aye Myat Thaw	
			Mi Ba Gone	
			Aung Thurain Min	
13	643	Line Fine	U Kyaw Kyaw	Myanmar
			Aye Myat Thaw	
14	191	Coconut Oil	Royal King Star	Myanmar
			Diamond Dragon	
15	105	Palm Oil	SAS Trading	Myonmor
15	175		Aung Nu Win	iviyanniai
			Diamond Dragon	
16	204	Soybean Oil	Aung Thurain Min	Myanmar
17	395	Sugar	Nawarat	Myanmar
18	657	Urea pol	Sein Padethar	Myanmar

Table (1. 7) Raw Materials Local Supplier and Source

No	Code	Material Name	Supplier	Source	
			ADM Asia Pacific	T T1 ·	
	4644	WHEATTICP	Peter Cremer	Ukraine	
1			Ulusoy Un Sanavi Ve	Moldova	
2	4647	BARLEY	Gleancore	Australia	
3	4656	Rice Bran DE oiled	Unique Organic	India	
4	4660	DDGS	The Delong	USA	
~	4670		Mega Marine	T 1'	
5	4670	SOYBEN MEAL HP 50%	Unique Organic	India	
	4671		Cargill International	USA	
	4671	SOYBEAN MEAL HP 46%	Marubeni	Paraguay	
6			Golden Sparkles	Bolivia	
7	4674	DABOMB P(SOYPR)	Suching	Taiwan	
8	4677	CANOL 00	ADM Asia Pacific	Australia	
9	4678	CORNGLUTEN 60 CP VN	Cargill International	USA	
10	4680	SWEET WHEY POWDER	Nlnukamel	Netherland	
11	4690	MEATBONE MEAL 50VN	Cagemax	Netherland	
12	4630	DH 300 SOWpx0.50%MY 16/035	Deheus. Koudu	Netherland	
13	4631	DH 700 COWpx0.50%MY 16/036	Deheus. Koudu	Netherland	
1.4	4622		Deheus. Koudu	Netherland	
14	4632	DH 400 LAYER px0.30%MY 16/037	Biomin Vietnam	Vietnam	
15	4633	DH 500 BROILER px0.50%MY 16/038	Deheus. Koudu	Netherland	
16	4634	DH 100 PIGLET px1,00%MY 16/039	Deheus. Koudu	Netherland	
17	4635	DH 200 PIG px0.50%MY 16/040	Deheus. Koudu	Netherland	
18	4602	Mycofix Secure	Biomin Myanmar	USA	
19	83	Methionin 99%	Evonik	Singapore	

Table (1.8) Import Raw Materials Supplier and Source

Group	Material Name	Storage	Source
		Facilities	
	CITIFAc 15% (CI-4cyc)		Local
	ENDRADIN F40		In Premix
Antibiotics	Saligram G120	COOL ROOM	Local
	Cobactin 10%		Local
Vitamin	CHOLINE CHLORIDE 60	COOL ROOM	Local
	Premix DH 100 piglet		
	Premix DH 200 pig		
Premix	Premix DH 300 sow	COOL ROOM	Import
	Premix DH 400 layer		
	Premix DH 500 broiler		
	Premix DH 700 cow		
Enzyme	PHYZYME TPT 1000	COOL ROOM	In Premix
	Phyzyme-PR Hoog		In Premix
Colorings	OROGLO	COOL ROOM	Local
	Lucantin red 1%		In Premix
Others	Dabomb P (from soybean oil	COOL ROOM	Import
	extraction)		
Spice	Natugrain TS 1120 Dry	COOL ROOM	In Premix
	Cupric sulphate 25% (CuSO4)		Local
	Zinc Oxide (ZnO)		Local
	Magnesiet Gr 85/50%		In Premix
	Sodium Chloride	OUT of COOL	Local
Minerals	Sodium bicarbonate	ROOM	Local
	Limestones Middle		Local
	Lime Fine		Local
	Dicalcium phosphate		Local
	Dihydrate		
Preservative	Mold Nil Dry	OUT of COOL	In Premix
	Oxy Nil Rx Dry	ROOM	In Premix
	METHIONIN 99%		Import
	L-LYSINE-HCL 79%		Local
Amino	THREONIN 98%	OUT of COOL	Import
Acid	TRYPTOPHAN 98%	ROOM	Import
	Lysine sulphat 70%		Import
Liquids	Molasses	TANK	Local/Import
	Coconut Oil		Local
	Soybean Oil		Local

Table (1.9) Lists of Premix & Supplements and Storage Facilities

Group	Material Name	Storage	Source
		Facilities	
Solid	Palm kernel Cake	RM WH	Local
	Corn Extrud (kind of cake)		Local
	Copra Expeller (cake)		Local
	Meat bone meal 50 VN		
Protein	Fish Meal 60 SEA MM	RM WH	Local
	Canola Meal		Import
	wheat bran meal		Local
	Soybean meal HP 46%		Import
	Bareley	SILO	Import
	Wheat 11CP		Import
	Corn		Local
Grains	Rice Bran FF dried	RM WH	Local
	Broken Rice		Local
Nitrogen	Urea	COOL ROOM	Local
	Green Bean Shell 3VN	RM WH	Local
	Pancosma fruit flavor	COOL ROOM	In Premix
	Corn Gluten meal 60 CP VN	RM WH	Import
Others	Sugar	OUT of CR	Local
	Sweet whey powder	COOL ROOM	Import
	DDGS	RM WH	Import

Table (1. 10) Raw Materials (Micro) List

Sr.	Description	Brand Name
1	DICALPHOSPH DIHYDR 18%P	KIRNS
2	SODIUM-BICARBONATE	Xue Hua
3	Cupric sulphate, pentahydrate 25%	Better Pharma
4	METHIONINE 99%	Evonik
5	LYSINE SULPHATE 70%	Meihua
6	L-LYSINE-HCL 79%	Meihua
7	THREONIN 98%	Meihua
8	TRYPTOPHAAN 98%	Meihua
9	ZINC OXIDE 75%	Peacock (Kunming Xinxing
		Industry and Trade Co., Ltd)
10	CHOLINE CHLORID 60 CN	Aocter, JUJIA
11	Mycofix Secure	Biomin
12	OROGLO VN	Kemin
13	ENRAMYCINE 4%	HC Pharma

Sr.	Description	Brand Name
14	CITIFAC 15%(CI-4cyc)	Hylen
15	Saligrain G120	Biovet
16	Cobactin 10%	Better Pharma
17	DH300 SOWpx 0.50% MY 16/035	Biomin, Koudijs
18	DH700 COWpx 0,5% 16/036	Biomin, Koudijs
19	DH400 LAYERpx 0.50% MY	Biomin, Koudijs
	16/037	
20	DH500 BROILERpx 0,5% MY	Biomin, Koudijs
	16/038	
21	DH100 PIGLETpx 1,00% MY	Biomin, Koudijs
	16/039	
22	DH200 PIGpx 0.50% MY 16/040	Biomin, Koudijs
23	Sweet Whey Powder	Nukamel

Table (1. 11) Use of Chemical Lists

No	Chemical Name	Unit	Remarks
1	Lead (ii) acetate	100 g	
	Trihydate		
2	Phenolphthalein	25g	
3	Phenol Red	25g	
4	Methyl Red	25g	
5	Sodium Hydroxide	500g	
6	Hydrochloric Acid	500ml	
7	Petroleum Ether	1000ml	
8	Ethanol	1000ml	
9	Sulphuric Acid	500ml	

1.3.2 Utilities

The Utilities for proposed factory include electrical power, fuel oil for emergency used generator, biomass (rice rusk) for steam boilers and water for production and general purpose. Electric power will be used for the purpose of to run the production machinery and to provide lighting. Water will be required for general purpose and for the boiler which generates hot water to supply to the molasses tank.

1.3.3 Electricity and Fuel Requirement

The proposed project is intended to get required electricity supply form Yangon City Electricity Supply Board (YESB) and distributed by 2000 kVA transformer (Schneider).



Another source of energy 1250 kVA generator (MISUBISHI) will also be kept as the emergency generator if normal electricity supply could not provide for the proposed project. Estimate electricity usage is 4.95 Mega Watt hour per day (MW.hr/day) (six working days per week). According to the MIC proposal, an annual fuel requirement for proposed De Heus Factory is 10,812 gallons and annual electricity consumption is 2,392,928 kWh.

1.3.4 Utilities of Steam Boiler

The Steamed boiler will be used in pelleting making process for 2 or 3 times per week and rice husk is used as fuel for steam boiler. 5 Tons of rice husk will be used per day. General information of proposed boiler information is mentioned in below Table (1.12).

Description	Process
Brand Name of Steam Boiler	BASUKI
General Operation Process of	Fluidizing > Igniting > Fuel Feeding
Water Consumption per hour	1m ³ /hr
Boiler Effluent in drainage	Blow down valve > underground pipe> nearest
	drainage
Amount of Wastewater discharge	0.12m ³ /hr
Bottom Ash released per day per	14.5kg/hr (10% of fuel usage)
use	

 Table (1. 12) Utilities of Rice Husk Steam Boiler



Figure (1. 5) Rice Husk Steam Boiler Room

1.3.5 Water Requirement

The main water use in the proposed project is for operation use of boiler water and for domestic usage such as for drinking, personal washing, food preparation, and washing of utensils. Drinking water will be provided by outsource suppliers. The direct tube well water will be stored in the raw tanks, get treated, and then filtered before using in the industry. There is a separate tank for the treated water and also a tank for fire fighting.

Main source of water supply will be provided by tube well water (ground water) in which ground water will be pumped (50kw) with 6 inches PVC pipe and will be treated by oxidation tower, chlorine dosing system, de-iron filter (FRP), carbon filter, and cartridge filter. The total storage water requirement at the project site is 335 m³ of underground tank water supply

for the whole factory. There are 3 water tanks (raw water tank 55 m^3 , treated water tank (110 m^3) and firefighting water (170 m^3). Daily water consumption is 24 cubic meter per day (six days per week) and according to the MIC proposal, annual water consumption for the whole factory is 180,000 cubic meter.

1.3.6 Human Resource

De Heus Myanmar Limited have the employees more than 109 people, most are local people, who manage the company by their dynamic, enthusiastic, experienced, and cooperative skills. Currently, two shifts (24 hours) of production are running or operating. The proposed project of animal feed factory will create job opportunities of 109 persons. Management and team member detail plan of human resource is mentioned in Table (1.13).

Department	Name of	Position
Name	Management	Description
Quality Department	Ms. Khin Mi Mi Zin	QA Manager
	(Kimmy)	
	Ms. Khin Hnaung	
	(Emma)	QC Manager
Production Department	Mr. Thu Hla Zaw (Leo)	Production Manager
Accounting Department	Ms. Myat Yi Yamin Paing	Head of Accounting and
	(Yamin)	Finance Department
Logistics Department	Mr. Pyae Sone Win	Logistic Manager
	(Peter)	
Sales and Marketing	Mr. Aye Maung Zan	Commercial Director
Department	(Calvin)	
IT Department	Ms. Nyein Chan Thein	ICT Manager
	(Clara)	

Table (1. 13) Manpower at De Heus Myanmar Limited

The project owner pays the rental fee of the house for accommodation of staff and employee. Similarly, allowance for transportation or ferry is provided for the staff. Meal is provided in the canteen of the factory.

1.3.7 Generation of Waste, Emission and Disturbances

A mass balance animal nutrition feed products production is illustrated in below Figure (1.6), which presents water and energy inputs and also the outputs with respect to residue and sub-products, liquid effluents and air emissions.





Figure (1. 6) Typical Mass Balance of Animal Feed Production

There is no waste water from production process. Kitchen usage water is treated in grease trap system and release to the public drain but other domestic used water is not being treated. Average 133kg / day of non- recycle solid waste and 170kg / day of recycle waste. Professional cleaning services team provides full services to collect and keep in the designated area, categorized by hazard, iron, compose, recycle, etc. Then authorized waste management services come and collects the waste to dispose in such a way that government approves.

1.4 Site Layout Map

1.4.1 Location of Proposed Project

The proposed animal feed nutrition products factory is located at Plot (306, 307, 308), Myaung Dagar Steel Industrial Zone, Mhawbi Township, Yangon Region, the Republic of the Union of Myanmar. The proposed factory falls at the coordinates of North Latitude17°09'22.56" N and East Longitude 95°58'08.82"E. Location of the proposed project area has been shown in Figure (1.7), (1.8) and (1.9).

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Figure (1. 7) Overview Map of Project Site



Figure (1. 8) Overview Photos of Factory Layout



Figure (1.9) Overview Photos of De Heus Myanmar Animal Feed Factory

1.5 Alternative Project Site

No alternative site has been proposed aside from this area since the proposed project area is situated within Plot No.(306,307,308), Myaung Dagar Steel Industrial Zone, Mhawbi

2019

Township, Yangon Region, which has been designated as the industrial zone for the development of industrial activities by the government.

Moreover, there is also no alternative technology for production of animal feed nutrition of De Heus Myanmar Co., Ltd because the project proponent has been implemented the construction of this plant by consulting with Royal Haskoning DHV Myanmar according to the international building design code concerned on environmental facts and Europe animal feed factory standards. The present used of production technology for this project is the most modern compound feed plant in Myanmar which is the automation systems for fully automatic control of each process machines or completer processing line. Installed equipment are new and import from top European feed milling supplies included a hyper modern packing robot and extensive bulk storage solution and detail lists of machinery and equipment are showed in Table (1.1) and (1.2).

2. IDENTIFICATION OF THE PROJECT PROPONENT

2.1 Proponent Information

Investor Name	Mr. Jacobus Johannes de Heus			
Father's name	Mr.Hendrik de Heus			
ID No./Passport No.	BGKRHLL32			
Citizenship	Dutch			
Residence Address	Hergog Hendriklaan 13a, 3743 DL, Baarn, The			
Abroad	Netherlands			
Name of Principle	De Heus Animal Nutrition B.V./ De Heus			
Organization	Myanmar B.V			
Type of Business	Production and Distribution of Animal			
	Nutrition Products			
Place of Organization	Rubensstraat 175, 6717 VE, Ede, the			
	Netherlands			

Table ((2.1)) Prop	onent	Inform	nation
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2.2 Director List of De Heus Myanmar Limited

Table (2. 2) Director List of De Heus Myanmar Limited

No	Name	Position	Nationality	E-mail	Address
1	GABOR FLUIT (Mr.)	Director	Netherlands	gfluit@dehe us.com	De Heus LLC 8th Floor, Cantavil Premier Complex No.1 Hanoi Highway, An Phu Ward District 2, Ho Chi Minh city, Vietnam Tel: +84 (8) 37402745 Fax: +84 (8) 37402744 Mobile: +84 (0) 935788159 http://www.deheus.com.v n
2	JOHAN CHRISTIAA N VAN DEN BAN (Mr.)	Director	Netherlands	jban@deheu s.com	De Heus Myanmar No.12/L, Penthouse, Pyi Thu Street, Mayangone, Yangonhttp://www.deheu s.com.mm, +95 (9) 797023466
3	JAN RULOF WILLEMIN K (Mr.)	Director	Netherlands	AWillemink @deheus.co m	De Heus Myanmar No.12/L, Penthouse, Pyi Thu Street, Mayangone, YangonYangonhttp://ww w.deheus.com.mm, +95 (9) 798510695
4	KOENRAAD JACOB DE HEUS (Mr.)	Director	Netherlands	kheus@dehe us.com	De Heus Animal Nutrition B.V. P.O. Box 396 6710 BJ Ede The Netherlands Rubensstraat 175 6717 VE Ede The Netherlands
5	AYE MAUNG ZAN (Mr.)	Director	Myanmar	<u>calvin.zin@</u> <u>deheus.com</u>	De Heus Myanmar No.12/L, Penthouse, Pyi Thu Street, Mayangone, YangonYangonhttp://ww w.deheus.com.mm, +95 (9) 788259669

2.3. Organization Chart of De Heus Myanmar Limited



Figure (2.1) Organization Chart of De Heus Myanmar Limited

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2.4 Salient Features of the Project

Table ((\mathbf{r})	3)	Salient	Features	of the	Project
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Type of proposed business	Production and Distribution of Animal Nutrition Feed		
	Products		
Type of investment	100% Foreign Direct Investment		
Type of Share	Ordinary Share		
Number of Shares	5,000 share (for 1 USD per share)		
Duration of investment	50 years		
Type of land	Permit Land (Industrial Land)		
Total land area	22296.7 Square Meter (5.51 acres)		
Total building area	86,400 Square Meter		
Type of building	RC building		
Land lease year	50 years		
Construction period	12 months (October, 2015)		
Operation starting date	September, 2016.		
Address of De Heus	Plot No. (306,307, 308), Myaung Dagar Industrial		
Myanmar Limited	Zone, Mhawbi Township, Yangon Region		
Mobile	+95 9 777 770 031		
E-mail Address	jban@deheus.com/ Website : www.deheus.com.mm		

2.5 Investment Plan and Economic Feasibility

The estimated authorized capital investment is about 5.00 million USD and the initial issued capital is 2.00 million USD. The whole initial capital investment will invest in cash and required machinery and equipment, furniture and fixture and motor vehicles will buy in local and foreign markets from cash investment.

			(USD in Millions)	
No.	Description	Value	Depreciation	Depreciation
			Rate (%)	Amount
1	Feed mill equipment (Loan)	\$2.660	6.66%	\$0.18
2	Buildings (Loan)	\$1.340	6.66%	\$0.09
3	Engineering services	\$0.600	6.66%	\$0.04
4	Installation services	\$0.950	6.66%	\$0.06
5	Internal infrastructure	\$0.425	6.66%	\$0.03
6	Other	\$1.10	6.66%	\$0.07

Table (2. 4) Capital Investment


No.	Description	Value	Depreciation Rate (%)	Depreciation Amount
	Sub-Total	\$7.075		\$0.47
7	Cash (Equity)	\$0.500		
	Total	\$7.575		\$0.47

Table (2. 5) Building Estimated Cost

		U		
No.	Equipment for Building	Unit Price (USD)	Quantity	Total Value (USD)
1	Steel structure for tower	1,058,250	1	1,058,250
2	M & E works	281,750	1	281,750
	TOTAL		2	1,340,000

*Used exchange rate of 1 EUR= 1.117 USD

3. IDENTIFICATION OF THE IEE EXPERTS

3.1 Scope of the Study

The IEE study firstly established baseline environmental setting within 100 meters of the project area, including existing conditions of air quality, water quality, noise, weather and local climate, waste, landscape and social assessment. The field studies were carried out by E Guard Environmental Services having experiences in conducting environmental assessments for various types of projects in Myanmar. The E Guard team conducted field survey, assessment activities, and prepared the report.

A reconnaissance study was performed on the proposed project site 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 for the proposed project was conducted on March 7, 2017 and it included verbal disclosure of the project activities and discussion with stakeholders from Myaung Dagar Steel Industrial Zone, communities (local people, Zone Committee, government sector) in the project area at Mhawbi Township, and staff of the project management.

The specific objectives of the IEE study are as follows:

- To conduct preliminary examination of the environmental consequences of the project
- To describe the existing environmental condition of the proposed project site
- To collect detailed information about used of process, technology, equipment and machinery for proposed project
- To assess the potential environmental impacts of the proposed project
- To develop environmental management plan (EMP) with site specific environmental mitigation measures and monitoring standards guidelines for the proposed project
- To carry our public consultants to address any issues in concern with implementation of this project

3.2 Identification of IEE Study Team

The Initial Environmental Examination (IEE) with the Environmental Management Plan (EMP) for the proposed project is prepared by E Guard Environmental Services Co., Ltd. The environmental study was carried out by the study team and the following is a summary of team member's responsibilities during the study period.

No.	Name	Position	Transitional Consultant Registration Numbers	Role and Responsibility
	E Guard Environmental Services	EIA Organization	0028	IEE report preparation
1	U Saw Win	Principal Consultant	0068	IEE report review
2	U Soe Min	Board of Director	0067	IEE report review
3	Daw Yu Yaiw Yan Thein Tan	Consultant	0071	IEE report review
4	Daw Me Me Maw	Consultant	0074	Project supervision, report preparation, stakeholder engagement
5	Pyae Phyo Maung	EQ Team Leader	-	Environmental quality data analysis and reporting
6	Si Thu Lwin		-	Environmental quality survey

Table (3. 1) IEE Study Team and Their Responsibility

U Saw Win (Principal Consultant)

U Saw Win is the Principal Consultant at E Guard Environmental Services Co. Ltd. He has 27 years of professional experience in Forest Department. He also served as Environmentalist at Total Exploration & Production Myanmar, one of the leading Oil and Gas Company in Myanmar for 12 years. U Saw Win oversees all aspects of E Guard's environmental projects, including peer review, quality assurance, budgets and schedules. His professional experience includes Research in Natural Forests Growth and Yield, Air-photo interpretation, Project Formulation and Appraisal, Environmental Consultant, Environmental Management and Sustainable Development, Environmental Impact Assessment, Industry and Environmental Protection, and Life Cycle Assessment.

U Soe Min (Environmental Engineering Consultant)

U Soe Min had worked as a civil, water resources and environmental engineer in public and private organizations. He had involved in water resources development projects from investigation and feasibility studies to planning, design and construction, and environmental impact assessments. He has experiences of local and international practices on construction



management; contractual documentations; environmental equipment sales and services provisions and consulting services. Taking the role of a local environmental consultant, he is leading the local team and collaborating with international consultant firms in doing SEA and EIA projects in Myanmar. Currently, he is leading the local environmental consultant firm, E Guard Environmental Services, in preparation and facilitating for scoping and TOR, baseline studies, public consultation engagements, impact studies, impact mitigation, and EMP formulation with his local team.

Daw Yu Wai Yan Thein Tan (Senior Consultant)

Daw Yu Wai Yan Thein Tan is a senior Consultant, who holds Master of Engineering with specializing in Environmental Engineering and Management from Asian Institute of Technology in Thailand and Master of engineering with specializing in Chemical Engineering from Mandalay Technology University. She has two year associate consulting experience, which include reconnaissance surveys, environmental risk assessment and remediation. Her responsibilities are concerning with project management and compilation of the report for large scale infrastructure and development of the projects, including public and stakeholder's consultation.

Daw Me Me Maw (Associate Consultant)

Daw Me Me Maw is an Associate Consultant, who completed Master Degree specialized with Industrial Chemistry at Yadanabon University. She had involved as team leader in preparation of Initial Environmental Examination (IEE) report and preparation of environmental management plan to overcome the anticipated impact for development project for industrial sector and also involved as facilitator in public hearing consultation meeting.

U Phyo Phyoe Maung (Project Associate)

U Phyo Phyoe Maung is responsible for data analysis and interpretation of environmental baseline data. He is a specialist technician with more than 4 years of experience in environmental quality sampling and surveying tasks. He has managed and involved in air quality measurement, noise and vibration measurement, water and wastewater sampling and analysis for the project baseline data assessment.

U Sithu Lwin (Environmental Quality Sampling & Surveying Assistant)

U Sithu Lwin has more than 2 years of experiences in environmental quality sampling and surveying tasks. He specialized in on-site air and noise quality measurements, vibration measurement water and wastewater sampling sample preservation and logistics management work in assessing the environment baseline data.

E Guard Environmental Services Co., Ltd. No.11, Airport Avenue Road, 10 Miles, Pyay Road, Saw Bwar Gyi Gone Insein Township, Yangon, 11011, Myanmar Tel: (95) 1 666512, Fax: (95) 1 653332 Email: info@eguardservices.com

4. POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

4.1 Policy, Legal and Institutional Framework

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.

4.2 National Laws and Regulations

The national laws and regulations for environmental protection applicable to the proposed project are compiled and presented in Table (4.1). The Environmental Conservation Law is the main governing law. The others are the policy, constitution, regulations on environmental impact assessment and environmental management plan, Conservation of Water Resources and Rivers Law, Land Acquisition Act, The Land Nationalization Act, Building Regulations, Foreign Investment Law, Factories Act and Private Industrial Enterprise Law, etc.

Laws and Regulations	Description	
Myanmar National Environmental Policy (2019)	Mission; To achieve a clean environment, with healthy and functioning ecosystems, that ensures inclusive development and wellbeing for all people in Myanmar. Vision; To establish national environmental policy principles for guiding environmental protection and sustainable development and for mainstreaming environmental	
	according into all policies laws regulations plans	
	strategies programme and projects in Myanmar	
The Constituti	on of the Republic of the Union of Myanmar (2008)	
Sec.45	The Union shall protect and conserve natural environment.	
Sec.390 (b)	Every citizen has the duty to assist the Union carrying out the	
	environmental conservation	
The Environmental Conservation Law (2012)		
	(c) to enable to emerge a healthy and clean environment and to	
	enable to conserve natural and cultural heritage for the benefit of	
	present and future generations;	
Objectives: Section 3	(d) to reclaim ecosystems as may be possible which are starting	
	to degenerate and disappear;	
	(e) to enable to manage and implement for decrease and loss of	
	natural resources and for enabling the sustainable use	
	beneficially;	
Provisions of Duties and	(a) To specify categories and classes of hazardous wastes	
Powers relating to the	generated from the production and use of chemicals or other	
Environmental Conservation	hazardous substances in carrying out industry, agriculture,	

Table (4. 1)	Related Laws.	Rules and	Regulations
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Laws and Regulations	Description
of the Ministry: Section 7	mineral production, sanitation and other activities;
	(b) To prescribe categories of hazardous substances that may
	affect significantly at present or in the long run on the
	environment;
	(c) To promote and carry out the establishment of necessary
	factories and stations for the treatment of solid wastes, effluents
	and emissions which contain toxic and hazardous substances;
	(j) To prescribe the terms and conditions relating to effluent
	treatment in industrial estates and other necessary places and
	buildings and emissions of machines, vehicles and mechanisms;
	(m) To lay down and carry out a system of EIA and SIA as to
	whether or not a project or activity to be undertaken by any
	Government department, organization or person may cause a
	significant impact on the environment;
	(o) To manage to cause the polluter to compensate for
	environmental impact, cause to contribute fund by the
	organizations which obtain benefit from the natural
	environmental service system, cause to contribute a part of the
	benefit from the businesses which explore, trade and use the
	natural resources in environmental conservation works.
	The Ministry may, with the approval of the Union Government
	and the Committee, stipulate the following environmental
	quality standards:
	(a) suiTable surface water quality standards in the usage in
	rivers, streams, canals, springs, marshes, swamps, lakes,
	reservoirs and other inland water sources of the public;
Environmental Quality	(b) water quality standards for coastal and estuarine areas;
Standards: Section10	(c) underground water quality standards;
	(d) atmospheric quality standards;
	(e) noise and vibration standards;
	(f) emissions standards;
	(g) effluent standards;
	(h) solid wastes standards;
	(1) other environmental quality standards stipulated by the
	Union Government.
	The Ministry shall, under the guidance of the Committee,
Monitoring: Section13	maintain a comprehensive monitoring system and implement by
	itself or in co-ordination with relevant Government departments
	and organizations in the following matters:
	(a) the use of agro-chemicals which cause to impact on the



Laws and Regulations	Description
Environmental Conservatio	 environment significantly; (b) transport, storage, use, treatment and disposal of pollutants and hazardous substances in industries; (c) disposal of wastes which come out from exploration, production and treatment of minerals, industrial mineral raw materials and gems; (d) carrying out waste disposal and sanitation works; (e) carrying out development and constructions; (f) carrying out other necessary matters relating to environmental pollution. n Law, 2012: Responsibilities of project proponent/ business owner for reducing environmental impact
Section 14	A person causing a point source of pollution shall treat, emit, discharge and deposit the substances which cause pollution in the environment in accord with stipulated environmental quality standards.
Section 15	The owner or occupier of any business, material or place which causes a point source of pollution shall install or use an on-site facility or controlling equipment in order to monitor, control, manage, reduce or eliminate environmental pollution. If it is impracticable, it shall be arranged to dispose the wastes in accord with environmentally sound methods.
Section 16	A person or organization operating business in the industrial estate or business in the SEZ or category of business stipulated by the Ministry: (a) is responsible to carry out by contributing the stipulated cash or kind in the relevant combined scheme for the environmental conservation including the management and treatment of waste; (b) shall contribute the stipulated users' charge s or management fees for the environmental conservation according to the relevant industrial estate, SEZ and business organization; (c) shall comply with the directives issued for environmental conservation according to the relevant industrial estate, SEZ or business.
The	Environmental Conservation Rules (2014)
Rules 58	The Ministry shall form the EIA Report Review Body with the experts from the relevant Government departments, organizations.
Rules 59	The Ministry may assign duty to the Department to scrutinize

Laws and Regulations	Description
	the report of EIA prepared and submitted by any organization or person relating to EIA and report through the EIA Report Review Body.
Rules 61	The Ministry may approve and reply on the EIA report o IEE or EMP with the guidance of the Committee.
The Enviro	nmental Impact Assessment Procedures (2015)
Screening: Section 23	 a) The project proponent shall submit the Project Proposal to the Ministry for Screening. b) The Ministry will send the Project Proposal to the Environmental Conservation Department to determine the need for environmental assessment. c) Following the preliminary Screening and verification that the Project Proposal contains all required documents and related materials, subject to Articles 8, 9, 10, 11, 26 and 27 the Department shall make a determination in accordance with Annex 1 _Categorization of Economic Activities for Assessment Purposes', taking into account Article 25 and the additional factors listed in Article 28 in order to designate the Project as one of the following, and then submit it to the Ministry: i) An EIA Type Project, or ii) An IEE Type Project, or iii) A Non IEE or EIA Type, and therefore not required to undertake any environmental
Screening: Section 24	Ministry shall also make a determination whether an EMP shall be required in respect of any Project.
Screening: Section 29	Within fifteen (15) working days of receiving the complete Project Proposal, the Department shall determine the type of environmental assessment (EIA, IEE, or none) which the Project will require, and the Department shall inform the Project Proponent in writing as to such determination in accordance with the Ministry guidance.
National Envi	ronmental Quality (Emission) Guidelines (2015)
Objectives	To provide the basis for regulation and control of noise and vibration, air emissions, and liquid discharges from various sources in order to prevent pollution for purposes of protection of human and ecosystem health.
Section 13:	Air emissions, noise, odor, and liquid/effluent discharges will be

Laws and Regulations	Description		
Implementation Procedures	sampled and measured at points of compliance as specified in		
	the project EMP and ECC.		
	Land Acquisition Act, 1894		
(The Law	does not specifically define legislation for EIAs.)		
• Stipulates that the governme	nent holds rights to take over land provided that compensation is		
made to the original land own	er.		
• States that no private own	ership of land is permitted and that all land must be leased from		
the Union State.			
	National Land Use Policy (2016)		
	a) To promote sustainable land use management and protection		
	of cultural heritage areas, environment, and natural		
	resources for the interest of all people in the country;		
	b) To strengthen land tenure security for the livelihoods		
	improvement and food security of all people in both urban		
	and rural areas of the country;		
	c) To recognize and protect customary land tenure rights and		
Objectives	procedures of the ethnic nationalities;		
	d) To develop transparent, fair, affordable and independent		
	dispute resolution mechanisms in accordance with rule of		
	law;		
	e) To promote people centered development in land resources		
	and accounTable land use administration in order to support		
	the equilable economic development of the country;		
	t) To develop a National Land Law in order to implement the		
	above objectives of National Land Use Policy.		
	Building Regulations (2014)		
The developer should follow	the instructions made by concerned departments for the following		
activities: installation of elec	ctrical meters, installation of transformers, emergency exits, to		
develop systems for disposal	ot sewage and waste, fire safety system and matters relating to		
road and bridges.			
	Foreign investment Rules (2013)		
	I ne promoter or investor shall:		
	(a) comply with Environmental Protection Law in dealing with		
	(b) shall corry out socially responsible investment in the interest		
$\mathbf{D}_{11} = 5\Lambda$	of the Union and its people:		
Nuit 34	(c) shall co-operate with authorities for occasional or mandatory		
	inspection.		
	(d) shall exercise due diligence to be in conformity and harmony		
	with norms and standards prescribed by relevant Union Ministry		
	with norms and standards presented by relevant emon winnstry		

Laws and Regulations	Description
	in conducting construction of factories, workshops, buildings, and other activities;(e) shall enforce Safety and Health
The	Law Amending the Factories Act (2016)
	In section 14 of the Factories Act, 1951:
Section 13	(a) the expression –effective arrangements shall be made for the disposal of waste and effluent from the manufacturing process" in subsection (1) shall be substituted by the expression —the disposal of waste, effluent and fume, dust and smell from the manufacturing process shall be arranged not to harm the environment".
	(b) the expression -it shall take the approval of the designated authority" in subsection (2) shall be substituted by the expression -it shall take the approval of relevant Departments."
Section 19	After section 37 of the Factories Act, 1951, section 37-A shall be inserted as follows: -37-A The employer shall arrange in accordance with the stipulations in order not to hurt the sense of hearing and health of workers due to the noise level from the manufacturing process and in order not to cause any accidents in the factory."
Section 22	After section 43 of the Factories Act, 1951, section 43-A shall be inserted as follows: -43-A The employer shall instruct safety and health personnel, supervisors and workers, as may be necessary, attend the workplace safety and health training courses recognized by the Ministry of Labour, Employment and Social Security , for eliminating and reducing occupational accidents and occupational diseases."
Section 34	After subsection (2) of section 78 of the Factories Act, 1951, subsection (3) shall be inserted as follows: -(3) Any youth who has not got the fit certificate for employment by a registered medical practitioner shall not be employed or allowed to employ at a factory between 6 p.m. and 6 a.m."
The P	Private Industrial Enterprise Law (1990)
Basic Principles: Section 3	Private Industrial Enterprises shall be conducted in accordance with the following basic principles:-(a) to enhance the higher proportion of the manufacturing value



Laws and Regulations	Description		
	added in the gross national product and value of services, and to		
	increase the production of the respective economic enterprises		
	which are related to the industrial enterprise;		
	(b) to acquire modern technical know-how for raising the		
	efficiency of industrial enterprises and to establish the sale of		
	finished goods produced by the industrial enterprise not only in		
	the local market, but also in the foreign market;		
	(d) to cause narrowing down of the gap between rural		
	development and urban development by causing the		
	development and improvement of industrial enterprises;		
	(e) to cause opening up of more employment opportunities;		
	(f) to cause avoidance of or reduction of the use of technical		
	know-how which cause environmental pollution;		
	(g) to cause the use of energy in the most economical manner.		
The Conservation of Water Resources and Rivers Law,2 nd October (2006)			
	(a) To conserve and protect the water resources and rivers		
	systems for beneficial utilization by the public;		
	(b) to smooth and safety waterways navigation along rivers and		
Aims: Section 3	creeks;		
	(c) to contribute to the development of State economy through		
	improving water resources and rivers system;		
	(d) to protect environmental impact		
1	The Underground Water Act (1930)		
The underground water act en	The underground water act enacted on the date of 21 st June in 1930 whereas it is expedient to		

The underground water act enacted on the date of 21st June in 1930 whereas it is expedient to conserve and protect underground sources of water supply in the Union of Burma. This act prohibits sinking of a tube for the purpose of obtaining underground water except under and in accordance with the terms of a license granted by the water officer. Township Officer or subdivisional officer had power to close a license tube after exercising jurisdiction over the local area concerned and the expense of such closure shall be recoverable from the owner of the tube as if it were an arrear of land-revenue.

Myanmar Fire Brigade Law (2015)

The Pyidaungsu Hluttaw enacted this law by Law No.11/2015 on the date of 17th March, 2015 with the following objectives :

- (a) to take precautionary and preventive measures and loss of state own property, private property, cultural heritage and the live and property of public due to fire and other natural disasters
- (b) to organize fire brigade systemically and to train the fire brigade
- (c) to prevent from fire and to conduct release work when fire disaster, natural disaster, epidemic disease or any kind of certain danger occurs
- (d) to educate ,organize and inside extensively so as to achieve public corporation



Laws and Regulations	Description	
(e) to participate if in need for national security, peace for the citizens and law and order		
Section-8 Fire Safety Procedures Rule17	 The relevant Government Department or organization shall, for the purpose of precaution and prevention obtain the approval of the Fire force Department before granting permission for the following cases: a. Constructing three-storied and above buildings market and condominium buildings, b. Operating hotel, motel, guest house enterprise c. Constructing factory, workshop, storage facilities and warehouse d. Operating business expose to fire hazard by using in inflammable materials or explosive materials e. Producing and selling fire-extinguishing apparatuses f. Doing transport business, public utility vehicles train, airplane, helicopter, vessel, ship, tonkin tug 	
Rule18	The relevant government department or organization shall obtain the opinion of the Fire Services Department for the purpose of fire precaution and prevention, when laying down plans for construction for town, village and downtown or village development plans	
Boiler Law (2015)		
Chapter (2) Objectives	 The objectives of this law are as follows: (a) To obtain boilers in compliance with Myanmar Standards or International Standards (b) To prevent the country and citizens from hazards caused by boiler accidents (c) To use boilers in compliance with Myanmar Standards or International Standards within the country (d) To develop boiler technology and to produce experts capable of manufacturing, handling, repair, and maintenance of boilers (e) To optimize the use of boilers through effective utilization of fuel energy (f) To reduce the environmental, social and health impacts through long-lasting use of boilers. 	
Chapter (3) 4. With the permission of the Ministry, the inspector general can:	 (a) Notify the inspection methods and instructions according to the national or international standards for safe operations of boilers in line with this law, procedures and instructions 	



Laws and Regulations	Description
	(b) Only the results obtained from the prescribed boiler standards and inspection methods will be approved.
Chapter (4). Boiler Registration	on
5. Anybody who would like to	o use a boiler in any kind of business should be registered.
6. Boiler should be manufactu	red according to Myanmar Standards or International Standards.
7. Those who would like to a	oply for boiler registration according to Section 5 should applie to
the inspector with the applicat	tion, documents and vouchers related to boiler
8. If the application regarding registration of boiler according to Section 7, the Registration	
Officer should conduct necessary inspection and submit results of the findings to the Inspector	
General.	
9. The Inspector General should assess and inspect the submission of the Registration Officer	
according to Section 8 and co	and allow of reject for registration of the boller.
10. The Inspector General	shall define boller size according to heated surface area in
Chapter (13) Prohibitions	edules.
59 According to Section 21	nobody must alter change deface deform or make embossed
registration unnoticeable illeg	itimately
60 Nobody is allowed to repair a boiler without boiler repair certificate	
61. Nobody is allowed to main	ntain a boiler without boiler maintenance certificate.
62. Nobody must alter safety relief valve in order to exceed the allowable pressure due to his	
consent or direction given by the owner.	
63. Nobody must manufacture	e boilers against Section 25, Subsection 25 (a) and (b) enacted.
]	The Export and Import Law (2012)
	The objectives of this law are as follows:
	a) To enable to implement the economic principles of the
	State successfully.
	b) To enable to lay down the policies relating to export and
Objectives	import that supports the development of the State.
	c) To cause the policies relating to export and import of the
	State and activities are to be in conformity with the
	international trade standards.
	d) To cause to be streamlined and speedy in carrying out the
	matters relating to export and import.
Prohibitions: Section 5	No persons shall export or import restricted, pronibited and
	Without obtaining license, no person shall export or import the
Prohibitions: Section 6	specified goods which are to obtain permission
Prohibitions: Section 5	A person who obtained any license shall not violate the
	conditions contained in the license

2019



Laws and Regulations Description Myanmar Investment Law (2016) 40. Investment includes the followings: (a) Enterprise; (b) moveable property, immovable property and related property rights, cash, pledges, mortgages and liens, machinery, equipment, spare-parts, and related tools; shares, stocks, and debentures of a company; (d) intellectual property rights in accordance with applicable laws, including technical knowhow, inventions, industrial designs, and trademarks; (e) claims to money and to any performance under contract having a financial value; (f) rights under contracts, including turnkey, construction, management, production or revenuesharing contracts; and (g) assignable rights granted by relevant laws or contract including the rights of exploration, prospecting and extraction of natural resources; 41. The following investments shall be stipulated as prohibited investment: (a) business/ investment activities which may bring or cause the hazardous or poisonous wastes into the Union: (b) business/ investment activities which may bring technologies, medicines, flora and fauna and instruments which are still being tested abroad or which have not been obtained approvals for use, planting and cultivation except the investments which made for the purpose of research and development; (c) business/ investment activities which may affect the traditional culture and customs of the racial groups within the Union; (d) business/ investment activities which may affect the public health (e) business/ investment activities which may cause significant damage to the natural environment and ecosystem; and (f) business/ investment activities which manufacture goods or provide services that are prohibited in accordance with applicable laws. 42. The following investment activities shall be stipulated as restricted investment: (a) Investment activities allowed to carry out by Government only; (b) Investment activities restricted to foreign investors; (c) Investment activities allowed only in form of joint venture with a citizen owned entity or a citizen of Myanmar; and (d) Investment activities permitted with the recommendation of the relevant ministries. 50.(b)Foreign investor may lease land or building up to an initial period of 50 years commencing on the date of receipt of the permit or endorsement from the Commission

either from the Government or governmental organizations or from private land or Building owners.

(c) After the expiry of the term permitted under sub-section (b), a consecutive period of 10 years and a further consecutive period of 10 years extension to the initial period



Laws and Regulations	Description
of lease land or building may	be obtained with the approval of the Commission.
(f) The Commission shall, for the purpose of the development of the entire Union with	
the approval of Pyidaungsu Hluttaw submitted through the Government, grant a longer	
period for the rights to lease la	and or building and the rights to use land under this Law,
to investors who invest in leas	t developed and remote region.
65. The Investor -	
(f) shall not make any signific	ant alteration of topography or elevation of the land on
which he is entitled to lease on	has rights to use, without the approval of the
Commission;	
(g) shall in relation to the inve	stment business, abide by applicable laws, rules,
procedures and best standards	practiced internationally so as not to cause damage,
pollution, loss to the natural and social environment and not to cause damage to	
cultural heritage;	
(q) The investments which nee	ed to obtain prior approval under the environmental
conservation law and the proc	edures, shall take permit or endorsement of Commission
before undertaking the assessment	nent. Such Investments which obtained permit or
endorsement, shall report envi	ronmental and social impact assessment to the Commission along
the period in which the activit	ies of the investments.
75. (a) With respect to the ince	ome tax exemption, the Commission will issue a
notification with the approval	of the Union Government to designate as Zone (1), the
regions that are least-developed	ed, and as Zone (2), the regions that are moderately
developed, and as Zone (3), the	e regions that are adequately developed, and income tax
exemption may be granted to investment businesses in Zone (1) for a period of 7	
consecutive years including th	e year of commencement of the business, investment
businesses in Zone (2) for a pe	eriod of 5 consecutive years including the year of commencement
the business, and investment	
businesses in Zone (3) for a pe	eriod of 3 consecutive years including the year of
Commencement of the busine	SS.

The Public Health Law (1972)	
Purpose: To ensure the public health include not only employees but also resident people and	
cooperation with the authorized person or organization of health department.	
• The project owner will cooperate with the authorized person or organization in	
line with the section 3 and 5 of said law	
• The project proponent has to abide by any instruction or stipulation for public	
health under section 3 of said law.	
• The project proponent has to allow any inspection, anytime, anywhere if it is	

• The project proponent has to allow any inspection, anytime, anywhere if it is needed under section 5 of said law.

The Prevention and Control of Communicable Disease Law (1995)

Purpose: To ensure the healthy work environment and prevention the communicable diseases



Laws and Regulations	Description
by the cooperation with the re-	levant health department.
• The project proponend distribute the healthfur discharge the garbage law.	t has to build the housing in line with the health standards, il drinking water & using water and arrange to systematically & sewage, under clause (9) of sub-section (a) of section 3 of said
• The project proponent health and Ministry of	has to abide by any instruction or stipulation by Department of Health, under section 4 of said law.
• The project proponen hospital if the followin	t has to inform promptly to the nearest health department or g are occurred; (under section 9)
a) Mass death of anin	hals included in birds or chicken;
 b) Mass death of mou c) Suspense of occur disease; 	se; rring of communicable disease or occurring of communicable
d) Occurring of comm	nunicable disease which must be informed.
• The project proponent inspect by health office	has to allow any inspection, anytime, anywhere if it is need to er, under section 11 of said law.
The Control of Smol	ting and Consumption of Tobacco Product Law (2006)
Purpose: To ensure the creation for health and control of smoke	on of smoking area and non-smoking area in the power plant area ing.
• The project proponent area in the project area	has to keep the caption and mark referring that is non- smoking under sub-section (a) of section 9 of said law.
• The project proponent and keep the caption a of section 9 of said law	has to arrange the specific place for smoking in the project area nd mark in accordance with the stipulations under sub-section (b) 7.
• The project proponent smoke at the non-smol	has to supervise and carry out the measures so that no one shall ting area under sub-section (c) of section 9 of said law.
• The project proponent plant area, under sub-s	t has to allow the inspection of supervisory body in the power ection (d) of section 9 of said law.
Workmen's Compensation Act (1923)	

Purpose: To ensure the compensations to injured employee while implementing in line with the above law and pay the prescribed compensations in various kinds of injury.

This law focuses as follow;

The project proponent has to pay the compensation in line with the provisions of said • law based on the kind of injury and case by case under Section 13 of said law.

The Settlement of Labor Dispute Law (2012)

Purpose: To ensure negotiation and discussion between employees and project proponent, abiding the decision of tribunal.

This law focuses as follows;



Laws and Regulations Description The project proponent has to not absent to negotiation within the stipulated time for • complaint, under section 38 of said law. The project proponent has to unchanged the existing stipulations for employees within conducting period before tribunal, under section 39 of said law. The project proponent has to not close the work without negotiation, discussion on dispute in accord with this law, decision by tribunal, under section 40 of said law. The project proponent has to pay the compensation decided by Tribunal if violates any • act or any omission to damage the interest of labor by reducing of product without efficient cause, under section 51 of said Law. The Minimum Wages Law (2013) Purpose: To ensure the project owner pay the wages not less than prescribed wages and notify obviously this wages in work place, moreover to be inspected. The project proponent has to pay the wages in line with section 12 of said law. The project proponent has to notify the prescribed wages obviously in work place under • sub-section (a) of section 13 of said law. The project proponent has to correctly record the lists, schedules, documents and wages • and report these to the relevant department and give if these are asked while inspecting, in accord with the stipulations under sub-section (b) (c)(d) of section 13 of said law. The project proponent has to allow to be inspected by the inspector, under sub-section • (d) and (e) of section 13 and section 18 of said law. The project proponent has to allow holiday for medical treatment if the employee' • health is not fit to work, under sub-section (f) of section 13 of said law. The project proponent has to allow holidays without deducting from the wages if one of • the parents or one of the family dies, under sub-section (g) of section 13 of said law. Payment of Wages Law (2016) Purpose: To ensure the way of payment and avoiding delay payment to the employees. This law focuses as follows: The project proponent has to pay the wages in accord with the section 3 and 4 of said law. The project proponent has to submit the agreements of employees & reasonable ground to the department if it is difficult to pay because of force majeure included in natural disaster, under section 5 of said law. The project proponent has to abide by the provisions of section 7 to 13 in chapter (3) in ٠ respect of deduction from wages. The project proponent has to pay the overtime fees, prescribed by law, to the employees who work over working hours, under section 14 of said law. Social Security Law (2012) Purpose: The project proponent has to create the social security for the employees because the project is the business under the Myanmar Citizen Investment Law. To ensure the social



Laws and Regulations	Description
security for employees of the	project, the project owner has to register to the social security
offices and to pay the prescrib	ed fund.
• The project proponent section (a) of section 1	has to register to the respected social security office, under sub- 1 of said law
• The project proponent security included in su	has to pay the social security fund for at least four types of social b-section (a) of section 15, under section 15 of said law.
 The project proponent with the fund which he project proponent has under sub-section (b) of the project proponent 48 of said law. (but the compensation must be The project proponent section 75 to respected 	has to pay the fund which has to be paid by him and together as to be paid from their salary by the employees. Moreover the pay the cost for paying the above mentioned fund only myself of section 18 of said law. has to pay the fund for accident, under sub-section (b) of section is fund is not related to workmen compensation so if it is needed separately paid by the Workmen Compensation Act) has to make correctly and submit the list and record provided in social security office, under section 75 of said law.
Dumo and The american area to	the Leaves and Holiday Act (1951)
Purpose: The employees can t	ake the leaves and get the holidays legally and to ensure the right
to get the holidays and leaves.	
This law focuses the following matters;	
• The project proponent has to allow the leaves and holidays in line with the law.	
Prevention of Hazard from Chemical and Related Substances Law (2013)	
The PyidaungsuHluttaw enaction 2013. This law was enacted w	ted this law by Law No. 28 of 2013 on the date of 26 th August, ith the objectives of :

- a. To protect from being damaged the natural environment resources and being hazardous any living beings by chemical and related substances;
- b. To supervise systematically in performing the chemical and related substances business with permission for being safety;
- c. To perform the system of obtaining information and to perform widely educative and research for using the chemical and related substance systematically;
- d. To perform the sustainable development for the occupational safety, health and environmental conservation.

Regarding the chemical management and storage, currently, regulations governing chemicals management are divided between various Acts, mostly dating from colonial times; hence the legislation is in many respects related to the British framework. The Factory Act and the Public Health Act contain the provisions for chemicals management and storage. Some chemicals are likely to require permits.

Labor Organization Law (2011)



Laws and Degulations	Decorintion
	Description
Purpose: To ensure protect	ion the rights of the employees, having the good relationships
between the employees and	d employer and enabling to form and carry out the labor
organizations systematically a	nd independently.
The project proposition who is dismissed by section 18 of said 1	by the employer without the conformity with the labor laws under aw.
• The project propor settling a dispute b	nent has to send the representatives to the Conciliation Body in between the employer and the worker under section 19 of said law.
• The project propor in discussing with respect of employe of said law.	hent has to allow the labor organization to participate and discuss the government, the employer and the complaining employees in ee's rights or interest contained in the labor laws under section 20
• The project proport the collective barge 21 of said law.	nent has to allow the labor organization to participate in solving ains of the employees in accord with the labor laws under section
• The project prop holding the meetin procedure, regulation under section 22 of	onent has to allow the labor organization to carry out the ngs, going on strike and other collective activities in line with the ion ,by-law and directive of relevant Chief Labor Organization f said law.
Occu	pational Safety and Health Law (2019)
Purpose: To effectively imple to set occupational safety and	ement measures related to safety and health in every industry and health standards;
• The project proponer	nt has to provide adequate and relevant personal protective
equipment to workers expose workers to any (e) of section-26 of sai	free of charge and make them wear it during work so as not to y serious occupational diseases or hazards, under the sub-section d law.
• The project proponent instructions, warning s section-26 of said law.	t has to arrange and display occupational safety and health signs, notices, posters, and signboards, under the sub-section (1) of
• The worker shall wear provided by the emplo of section 30 of said la	or use at all times any protective clothes, equipment and tools over for the purpose of safety and health under the sub-section (a) aw.
• The worker shall prop parts of the machines workplace under the su	er and systematic use any equipment and tools, machines, any s, vehicles, electricity and other substances being used at the ab-section (d) of section 30 of said law.
• The worker shall take r	easonable care for the safety and health of himself/ herself and of

The Control of Smoking and Consumption of Tobacco Product Law (2006)



Laws and Regulations	Description
Purpose: To ensure the cre	ation of smoking area and non-smoking area in the power plant
area for health and control of s	smoking. This law focuses as follows;
• The project proponent	has to keep the caption and mark referring that is non- smoking
area in the project area, under sub-section (a) of section 9 of said law.	
• The project proponent has to arrange the specific place for smoking in the project area	
and keep the caption a	nd mark in accordance with the stipulations, under sub-section (b)
of section 9 of said law	ν.
• The project proponent	has to supervise and carry out the measures so that no one shall
smoke at the non-smol	king area, under sub-section (c) of section 9 of said law.
• The project proponent	has to allow the inspection of supervisory body in the power
plant area, under sub-s	ection (d) of section 9 of said law.
The S	ettlement of Labour Dispute Law (2012)
Purpose: To ensure negotia	ation and discussion between employees and project proponent,
abiding the decision of Tribun	al. This law focuses as follows;
• The project proponer	nt has to not absent to negotiation within the stipulated time for
complaint, under sect	ion 38 of said law.
• The project proponen	t has to not change the existing stipulations for employees within
conducting period bet	fore Tribunal, under section 39 of said law.
• The project proponer	nt has to not close the work without negotiation, discussion on
dispute in accord with	this law, decision by Tribunal, under section 40 of said law.
• The project proponen	t has to pay the compensation decided by Tribunal if violates any
act or any omission	to damage the interest of labour by reducing of product without
efficient cause, under	section 51 of said Law.
Employ	yment and Skill Development Law (2013)
Purpose: To ensure the job	security and to develop the employee's skill with the fund of
project owner. This law focus	es as followings;
• The project proponen	t has to appoint employees with the contract in line with the
provision of section 5	of said law.
• The project proponent	t has to carry out the training programs with the policy of Skill
Development Body to	develop the employment skill of employees who is appointed or
will be appointed, und	er section 14 of said law.
The Ethnic Rights Protection Law (2015)	
Purpose: To ensure to dis	close to residents ethnic nationalities about the project fully,
moreover to ensure to coopera	te with them. This law focuses the following matters;
The project proponent has to	disclose to the residents national races all about the project fully
under the section-5 of said law	V.
The project	proponent has to cooperate with the residents national races.
The Law Amending the Myanmar Investment Rules (2018)	



Laws and Regulations	Description	
• The project proponent has to comply with the conditions of the permit issued by MIC and applicable laws when making the investment, under rule 202.		
• The project proponent has to fully assist while negotiating with the authority for settling		
the grievance of the local community which has been affected due to investment, under rule 203.		
• The project proponent	has to submit the passport, expertise evidence or document of	
degree and profile to the MIC office for approval if decide to appoint a foreigner as a		
senior management, technician expert or consultant according to sub-section (a) of		
section 51 of Myanmar Investment Law, under rule 206		
• The rule 212 of Wiyann	har investment Rules shall be replaced as follows;	
insurance out of the following types of the insurance at any insurance business entitled		
to carry out insurance business within the Union based on the nature of the business:		
(a) Property and Business Interruption Insurance;		
(b) Engineering Insurance;		
(c) Professional Liabil	ity Insurance;	
(d) Bodily Injury Insur	ance;	
(e) Marine Insurance; or		
(f) Workmen Compensation Insurance;		
(g) Life Insurance;		
	ha Myanmar Insuranca I aw (1903)	
Purpose: The project can ca	use the damages to the environment and injuries to public so to	
ensure the needed insurances	are insured at Myanma Insurance. This law focuses the following	
matters;		
• If the project propone	nt uses the owned vehicles the project owner has to insure the	
insurance for injured p	erson under the section-15 of said law.	
• The project proponent	has to insure the insurance to compensate for general damages	
because the project m	ay cause the damages to the environment and injury to public	
under the section 16 of	said law.	
The Motor Vehicles Law (2015)		
Purpose: When the construct	ction period and if necessary in operation and production period	
for the all vehicles.		
• The project proponent	has to promise to abide by the nearly all provisions of said law	
and rules, especially a	the provisions related to air pollution, noise pollution and life	
Sarcey.	he Engineering Council Law (2013)	
Purpose: To ensure the saf	ety in technical and engineering work in the project. This law	

Purpose: To ensure the safety in technical and engineering work in the project. This law focuses the following;

• The project proponent has to appoint the employees, who obtained the registration



Laws and Pegulations	Description
Laws and Regulations	Description
certificate issued by the	e Myanmar Engineering Council, in the technical and engineering
work, under section 37	of said law.
• The project proponent	t has to ensure the employees who are engineers abide to the
provisions of Myanma	ar Engineering Council law, prohibitions included in the rules,
order and directive is	ssued under said law, conditions included in the registration
certificate issued by the	e Myanmar Engineering Council, under section 34 of said law.
	The Electricity Law (2014)
Purpose: To ensure the co	mpliance with the conditions of permission for productions of
electricity, abiding by any	stipulation, implementing with the best practices and paying
compensation in line with abo	ve law
• No permit holder sh	all operate any other electrical business except the business
contained in the permit	t, under section 45 of said law.
• No person shall oper	ate the generation, transmission, connection of electric power
without obtaining the e	electrical safety certificate, under section 47 of said law.
• No person shall conne	ct, waste, and utilize the electric power without the permission of
the permit holder, under	er section 52 of said law.
• No person shall divert	the electric current, cut-off the electric power line, destroy any
equipment being used	in any electrical business, under section 53 of said law.
	The Highways Law (2000)
• The objectives of this l	Law are as follows:
(a) to cause easier co	mmunication and transportation among Region or State, Union
Territory, Self - Adn	ninistered Region, Self-Administered Zones by constructing the
highways and to stren	ighen national solidarity and friendship and to cause all-round
development in all reg	ions and areas in economic and social sectors;
(b) to give support in	implementing the duty for security and convenience in road and
communication and qu	ickness in flow of commodities;
(c) to give support in	the modernization and development of the State by constructing
nignways within the S	tate or by constructing highways which connect with heighboring
(d) to commu out sust	matically the works of extension renair and maintenance for
durability of highways	;
(e) to supervise system	natically in respect of traffic and use of highways, under section 3
of said law.	
• Whoever commits any	y of the following acts shall, on conviction, be punished with
imprisonment for a te	rm which may extend to 6 months or with a fine[which may
extend from a minimum	m of fifty thousand kyats to a maximum of five hundred thousand
kyats or with both:	
(a) disturbing or ob- maintenance of highwa	structing the work of constructing, extension, repairing and ay;



Laws and Regulations	Description
(b) driving a vehicle t	he traffic of which and the type of wheel of which is prohibited
and a vehicle with a laden weight or using an iron rim cart wheel on highways;	
(c) planting, cutting o	r destroying tree or crops within the boundary of the highway
without permission of	Department of Highways;
(d) disturbing or obstr danger:	ucting Department of Highways in clearing of trees which cause
(e) causing to damage	the status of road, bridge and ground within the boundary of the
highway without the p	ermission of the Department of Highways.
(f) setting up signboar	d of advertisement within the boundary of the highway without
the permission of the I	Department of Highways.
(g) building and sellin	g wayside restaurants, shops within the boundary of the highway
without the permission	of the Department of Highways, under section 8 of said law.
• Whoever commits any	y of the following acts shall, on conviction, be punished with
imprisonment for a ter	m which may extend to with imprisonment for a term which may
extend to three month	hs or with a fine which may extend from a minimum of ten
(a) violating any probi	ximum of one nundred inousand kyais or with boin:
(a) of section 9 of said	law
	The Farm Land Law (2012)
Purpose: To ensure the right to use the farm land and sufficient compensation for acquisition of the farm land. This law focuses the following matters;	
• The project owner h coordination with the compensation if it is not	as to abide by the decision of relevant Ministry with the Central Administrative Body of the Farmland for paying the eeded acquisition farm land, under section 26 of said law.
• The project proponent of Farmland for the lar section (a) of section 3	has to obtain the permission of the Central Administrative Body nd use change from paddy field land to other land use under sub- 0.
• The project proponent	has to obtain the permission of the Yangon Region Government
with the recommendati	on of Yangon Region Administrative Body of Farmland for the
land use change from f	arm land other than paddy field land to other land use under sub-
	The Forest Law (2018)
Purpose: to ensure in carry	ing out the project with the permission of Ministry of Natural
Resources and Environmental	Conservation if the project land is forest land or forest covered
land. This law focuses as follo	w;
• The project proponent	has to obtain the permission of Ministry of Natural Resources
and Environmental Co	nservation before starting the work if the project land is forest
land or forest covered	under sub- section (a) of section 12
The Protection and	Preservation of Cultural Heritage Regions Law (2019)



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Laws and Regulations	Description
Purpose: To ensure the prote	ction of cultural heritage and the cultural heritage area from the
damage by the natural disaster	
• The project proponent	has to apply to get the prior permissions of the Regional or State
Conservation Commit	tee if the project has in the boundary of world cultural heritage
region or national cultu	Iral heritage region, under section 21 of said law.
• The project proponent	promises not to plough and cultivate or carry out any activity
which may cause dam	age to the cultural heritage within the boundary notified by the
Regional or State Con	servation Committee or the Regional Conservation Committee,
under section 36 of said	d law.
The Protection a	nd Preservation of Antique Objective Law (2015)
Purpose; To ensure the prote	ection of ancient monument and information about it if it was in
the project area. This law focu	ses as follow;
• The project proponent	has to inform to the village-tract or ward administrator if
any antique object	ive is found in project area under section 12 of said law.
The Protection a	nd Preservation of Ancient Monument Law (2015)
Purpose; To ensure the prote	ection of ancient monument and information about it if it was in
the project area. This law focu	ses as follows;
• The project proponent	has to report to the village-tract or ward administrators if the
project proponent will	find any ancient monument under the ground or on the ground or
under the water, under	section 12 of said law.
• The project proponent	has to obtain the prior permission of Department of Archaeology
and National Museum	if the project area is in the prescribed area of Ancient monument,
under section 15 of said	d law.
• The project proponent	has to obtain the prior permission, by written, of Department of
Ancient Research and	National Museum if the project proponent disposes the chemical
and solid waste in the	Ancient Monument area, under sub-section (f) of section 20 of
said law.	
Conservatio	n of Water Resources and Rivers Law (2006)
Purpose: The project propo	onent will avoid the disposal of stipulated materials into river-
creek.	
The project proponent has to	avoid any performing to damage to the river, creek and water
resource, under sub-section (a)) of section 8.
The project proponent has to	avoid the violation of conditions stipulated by the directorate for
prevention of water pollution,	under sub-section (b) of section 24.
Conservatio	n of Water Resources and Rivers Rule (2013)
The Ministry of Transport-	
(a) According to sub-rule	(c) of rule 10, the verified with respect to the border river. If you
found a possible loss o	f national territory, if you have to reset the boundary points of the
state in order to contin	nue to make necessary guidance and promptly submitted to the



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Laws and Regulations	Description
Union Government and	l also informed to the Ministry of Foreign Affairs.
(b) For the loss of the n	ational territory in accordance with the instructions of Union
Government to ensur	e the channel of river border conservation shall direct the
Department is required	d to perform, under sub-section (a) and (b) of section11 of said
rule.	
	Freshwater Fisheries Law (1991)
Purpose: According to the	sub-section (e) of section 2 of said law, the freshwater area
includes any river, creek, pon	d and water area so the project will be near by the river or creek
which is freshwater area the sa	fety of freshwater and aquatics. This law focuses as follow;
• The project proponent	has to avoid any water pollution and disturbing to fish &other
aquatic lives in any fre	sh-water such as river, creek under section 40 of said law.
The Petr	oleum and Petroleum Product Law (2017)
Purpose: The project will ca	arry the oil in any phase and may import it. So, to ensure to take
the license for importation, t	ransportation and storage and abide by the stipulations in the
license;	
• The project proponent	has to transport the fuel by the vehicle or vessel which is licensed
by the Ministry of Trar	nsportation and Communication under sub-section (a) of section 9
of said law.	
• The project proponen	t has to abide the procedures and conditions in carrying out
transport business exce	ept transport by pipeline which is determined by the Ministry of
Transportation and Con	nmunication under sub-section (e) of section 9 of said law.
• The project proponent	has to store the fuel in the tank which is licensed by the Ministry
of Natural Resource an	nd Environmental Conservation under sub-section (a) of section
10 of said law.	
• The project proponent	has to carry the petroleum and petroleum product by the vehicles,
vessels and barges w	which is permitted by the Ministry of Natural resource and
Environmental Conserv	vation under sub-section (b) of section 10 of said law.
• The project proponent	has to abide determining the period, form, terms and conditions,
manners of applying l	icense, permitting authority and fees to be assessed for license
under sub-section (a) a	and permit under sub-section (b), under sub-section (c) of section
10 of said law.	
• The project proponent	has to cooperate if it occurs environmental impacts in carrying
out petroleum and petr	roleum product business activities, taking action, as necessary, in
accordance with the ex	isting laws of on-site inspection, under sub-section (d) of section
10 of said law.	
• The project proponent	has to show the notice of danger on the tank or container of fuel
under section 11 of said	d law.
Yangon	City Development Committee Law (2018)
Purpose: To ensure improve	ement in the living standard of urban communities as the city



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Lowe and Deculations	Description					
Laws and Regulations	Description					
continuously improvement wi	th the leadership of the city development committee stages.					
• The project proponent has to pay the tax according to the Tax Law of Yangon Region, under sub-section (a) of section 97 of said law.						
• The project proponent chapter 23 of said law.	• The project proponent has to follow the laws for waste management, according to chapter 23 of said law.					
The project proponent said law.	has to follow the prohibition for drainage, under section 317 of					
 The project proponent said law. 	has to follow the prohibition for drainage, under section 318 of					
• The prohibition for en law.	vironmental conservation and cleaning, under section 322 of said					
Yar	ngon Freshwater Fisheries Law (2013)					
Objectives: The proponent ha	s to abide by to the following objectives;					
a. to develop the fisheries more	e systematically					
b. to prevent the extinction of	fish					
c. to protect the fish breeding	places and the destruction of their ecosystem					
d. to obtain tax-entitlement an	d fees payable to the Region					
e. to prevent from the illegal b	usiness activities					
f. to manage, supervise and en	force fishing activities in accordance with the law					
g. to fulfill the needs of the co	untry and export the surplus					
h. to perform the fishery busir	less in accordance with international regulations					
i. to produce fishery products	in good quality and safely					
j. to manage and supervise the	e fishery activities and taken necessary action in accordance with					
the laws.						
• Township officer sha registration of full-tim method, under section	Il give out the fishing registration card if one applies for the e or part-time in related fisheries in accordance with the stipulated 12 of said law.					
 In accordance with the day after paying the t law. 	s fishery law, the fishermen shall carry out the tasks at the same axes with cash down payment system, under section 18 of said					
• When one of the foll according to this fisher	owing cases occurs, the fishery activities becomes illegitimate ry law					
• the exp	iry of the permitted period					
• b. lease, tender licens abolished, under section	e or fishing gear license or fishing license are being revoked or on 40 of said law.					
• The followings are pro	hibited for anyone in the fishery waters:					
 Fishing chemica fishing 	with the explosive materials, electricity, toxic poisoning als and the damaging materials like that or ruin the business.					
- IISHINg	with the promotice fishing methods of fishing gear					



Laws and Regulations	Description				
 catching the prohibited type or size of fishes 					
• d. fishing in prohibited	• d. fishing in prohibited times and areas, under section 56 of said law.				

4.3 Authorized Institutions and Recommendations

The Ministry of Environmental Conservation and Forestry (MOECAF) was reformed as the Ministry of Natural Resources and Environmental Conservation (MONREC) on 30th March, 2016 in order to undertake both environmental and natural resources conservation and management more effectively. Under Section 3 of the Environmental Impact Assessment Procedure (2015), pursuant to section 21 of the law and Articles 52, 53 and 55 of the Environmental Conservation Rules, all projects and project expansions undertaken by any organization, which may cause impact on environmental quality that, are required to obtain prior permission. This is to be in accordance with section 21 of the Environmental Conservation Rules, having the potential to cause adverse impacts, that are required to undertake IEE or EIA or to develop an EMP, and to obtain an Environmental Compliance Certificate (ECC) in accordance with this EIA procedure.

Therefore, the comments of MONREC on the development of production and distribution of Animal Nutrition Products factory are as follows.

- 1) De Heus Myanmar Limited shall carry out as per instructions made by Ministry of Livestock, Fisheries and Rural Development to comply with God Manufacturing Practice (GMP)
- 2) De Heus Myanmar Limited shall be responsible for the preservation of the environment at and around the area of project site. In addition to this, it shall carry out as per instructions made by Ministry of Natural Resources and Environmental Conservation in which to conduct an Initial Environmental Examination (IEE) process and an Environmental Management Plan (EMP) which describe the measure to be taken for preventing, mitigation and monitoring significant environment impacts resulting from the implementation and operation of proposed project or business or activity has to be prepared and submitted and to perform activities in accordance with this EMP and be abided by the environment policy, Environmental Conservation Law and other environmental related rules and procedures.

4.4 Commitments of proponents

- To set up welfare plan such as staff medical checkup, training program and Public talk for getting knowledge, risk prevention, bonus and social security services.
- To promote Corporate Social Responsibility- (CSR) with 2% of the net profit for development of safe, economic and social environment.
- To carry out fire safety assessment and ensure adequate and appropriate fire safety measures for employees

To carry out disposing wastes according to Yangon City Development Committee regulations, protect, and preserve the project environment from pollution of air, water and land by following laws and guidelines lay down by MONREC.

4.5 National and International Guidelines for Manufacturing of Animal Feed Product

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

- Environmental Impact Assessment Procedure (2015)
- National Environmental Quality (Emission) Guidelines (2015) for Poultry Production
- World Health Organization Guidelines (WHO)
- National Ambient Air Quality Standard (NAAQS), USEPA
- American Council of Governmental Industrial Hygienists (ACGIH)
- 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
- IFC Guidelines for Environmental (Air Emissions and Ambient Air Quality)

4.6 National Environmental Quality (Emissions) Guideline for Poultry Production Animal Feed Nutrition Products Production

According to the environmental health and safety guidelines established by International Finance Corporation, and National Environmental Quality (Emissions) Guidelines, information, major environmental issues in animal feed nutrition products manufacturing include (1) Dust emissions (2) Noise generation, and (3) Solid Waste (4) Fire Hazards.

Poultry Production (Animal Nutrition Feed Production)

This guideline applies to intensive poultry production and covers the production of laying hens, broiler chickens, turkeys, ducks and game birds. Poultry production operations include feed manufacture, storage and handling, poultry raising, feeding and watering, egg and/or live bird collection, management of animal waste, and disease and pest control.

The proposed animal nutrition feed production factory shall be used the following guideline for effluent discharge wastewater from production process.

Parameter	Unit	Guideline Value
5-day Biochemical oxygen demand	mg/l	50

Table (4. 2) Effluent Levels for Poultry Production

Parameter	Unit	Guideline Value
	To be determine	ined on a case specific
Active ingredients / Antibiotics	basis	
Chemical oxygen demand	mg/l	250
Oil and grease	mg/l	10
рН	s.u. ^a	6-9
Temperature increase	°C	<3 ^b
Total coliform bacteria	100 ml	400
Total nitrogen	mg/l	10
Total phosphorus	mg/l	2
Total suspended solids	mg/l	50

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

5. DESCRIPTION OF THE SURROUNDING ENVIRONMENTAL AND SOCIAL CONDITIONS

5.1 Methodology for Data Collection and Analysis

The followings are methodologies used for Environmental Management Plan (EMP) for this IEE report preparation;

1. Onsite Measurements and Analysis – Baseline parameters such as air quality and noise quality of the existing project site during the operation phase were measured onsite. For water quality parameters was also measured on site and sample raw water and waste were sent to respective laboratories for analysis. The analyzed results are mentioned in this chapter.

Secondary data collection of the proposed project site area – Socio economic condition, physical/biological environment, and weather data are collected from official township data of Hmawbi Township, Yangon Region.

5.2 Environmental Baseline Study

The field observation for determining the environmental baseline of the proposed project area was undertaken at 5th to 6th January 2017. The survey team consists of the senior consultant, associate consultant, and environmental quality team of E Guard Environmental Services Co., Ltd. The baseline data collected regarding the environmental condition of the project area was discussed in the following sections.

	Particulars	Detail			
1)	Coordinate Point -	17° 9' 21.52" N and 95° 58' 6.30 " E			
2)	Climate Conditions -	Annual Mean Maximum Temperature:			
	(Department of Meteorology and	(32.53)°C			
	Hydrology -DMH)	Annual Mean Minimum Temperature:			
		(21.72)°C			
		Annual Rainfall: 3409.9 centimeters			
3)	Wind Speed	1.014 m/s			
4)	Present land use at the proposed site -	Industrial Land Use Type			
5)	Nearest Road -	Yangon-Pyay Road (2.80 km) from project			
		site			
6)	Nearest Water bodies -	Hlaing River (0.29 km distance from project			
		site)			
7)	Forest Area	No Exist			
8)	Wetlands	No Exist			
9)	Protective Area	No Exist			

Table (5.1) Env	vironme	ntal S	Setting	around	the]	Propos	sed P	roiect	Site
1 4010 (J. 1	, , , , , , , , , , , , , , , , , , , ,	, nonne	iiiui k	Joung	arouna	une i	riopo	Jua 1	10,000	Ditt

5.3 Physical Environment

5.3.1Climate

The proposed project is located at Myaung Dagar Steel Industrial Zone, Mhawbi Township, Yangon Region. The climate condition of Hmawbi Township is the dry season of area in which the project lays starts in December and ends in March. The raining season starts in June and ends in September and the cold season follow with the cooler, drier months of October to January. The highest temperature is 41°C and the lowest temperature is 10°C. Yearly rainfall and temperature are shown in Table (5.2).

	Rai	infall	Temperature		
Year	Year Raining Total Day Rainfall		Highest °C	Lowest °C	
2008	129	85.19	41	12	
2009	131	75.27	39	12	
2010	127	70.36	39	13	
2011	135	88.75	40	13	
2012	116	83.47	40	10	

Table (5. 2) Yearly Rainfall and Temperature of Hmawbi Township

Some Important meteorological data such as temperature, rainfall from Kaba Aye Weather Forecasting Station, for the period January, 2003 to December, 2012.

Wind Direction and Wind Speed: The following Figure describes weather condition of the project area during 5th to 6th January, 2017. According to this data, the average wind speeds is 1.014 m/s nearby the proposed project area and see in Figure (5.1).





Figure (5. 1) Wind Speed and Wind Direction Result

5.3.2 Air Quality

To determine the existing baseline ambient air quality status within the project site, 24-hours air pollutants level, which include dust (PM_{10} and $PM_{2.5}$) and gases (CO, CO₂, SO₂, NO₂, O₃) were measured at the selected site using the HAZSCANNER air monitoring station and Volatile Organic Compounds was measured at the selected site as indoor air quality using Aeroqual-(Series 500) which provide direct reading with data logging capabilities. To reveal the existing status of baseline air quality, the average ambient air qualities measured were compared with National Environmental Quality (Emission) Guideline and international ambient air quality standard (WHO, IFC, NAAQS, ACGIH) guidelines. 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.

Air Parameter	GPS Value	Location
Ambient Dust	17°09'22.56"N and 95°58'08.82"E	Within proposed site
Ambient Gases	17°14'55.40" N and 96°27'35.47" E	Within project site

Table (5. 3) Coordinate Point of Air Station

Parameters	Observed Value	Guidelines Value	Unit	Organization	Averaging Period
PM 10	83.13	50	$\mu g/m^3$	NEQ	24hrs
PM 2.5	74.20	25	µg/m ³	NEQ	24hrs
NO ₂	279.57	200	$\mu g/m^3$	NEQ	1hr
SO ₂	12.06	20	$\mu g/m^3$	NEQ	24hrs
Ozone	0.01	100	$\mu g/m^3$	NEQ	8hrs
СО	0.41	35	ppm	NAAQS	8hrs
CO ₂	293.3	5000	ppm	ACGIH	8hrs
VOC	34.06	100	mg/Nm ³	NEQ	8hrs

 Table (5. 4) Observed Ambient Air Quality Results

NEQ - National Environmental Quality (Emission) Guideline

NAAQS - National Ambient Air Quality Standards NAAQS were developed by the U.S. Environmental Protection Agency (EPA)

ACGIH - The American Council of Governmental Industrial Hygienists recommends Threshold Limit Values (TLV®) as maximum exposures for industrial environments.

Date & Time	Description	Result Value	Environmental Parameter
			Air Station Guideline
8:34am - 8.36 am	Voltage (V)	10.8	Between (12V-10.5)
(24 hrs.)	Relative Humidity RH	80.08 (%)	Present condition
	(%)		
	Temperature (%)	22.42°C	Present condition

Table (5. 5) Relative Humidity and Temperature Value

The weather condition during 5^{th} to 6^{th} January shows the average temperature of 22.42°C while the average humidity is 80.08 percent and its cloudy day. There were intermittent raining on the day between 11:30am and 1:15pm and the wind speed is 1.014 m/s.

i) Dust Emission Particulate Matters

 PM_{10} is particulate matter 10 micrometers or less in diameter and $PM_{2.5}$ is particulate matter 2.5 micrometers or less in diameter. $PM_{2.5}$ is generally described as fine particles. The major components of PM are sulfate, nitrates, ammonia, sodium chloride, black carbon, mineral dust and water. It consists of a complex mixture of solid and liquid particles of organic and inorganic substances suspended in the air. Dust emission such as Particulate Matters PM 10 and PM 2.5 was measured for 24 hours averaged on the 5th and 6th January 2017 to obtain the baseline data during the operation phase of the proposed animal feed Factory. The observed

average values for PM $_{10}$ and PM $_{2.5}$ are 83.14µg/m³ and 74.20µg/m³ respectively. When compared with NEQ (emission) guideline, ambient air quality of both PM $_{10}$ and PM $_{2.5}$ values are exceeding the accepTable limit and the transportation activities of vehicles and truck for raw materials and final products delivering activities may effect on air quality measurement during these measurement and the observed particulates matter of PM measurement for 24 hours continuously is shown in Table (5.6) and Figure (5.2).

Mostly, the particulate matters are generated from the proposed De Heus animal feed factory activities on road and off road vehicle movements and delivering of cereal and grains raw materials and transportation and delivering of raw materials and final products. Generally, the concentration of the particulate matters in the air is related to the microclimate of the area.

No.	Times	Average		Maxi	imum	Minimum	
		PM ₁₀	PM _{2.5}	PM ₁₀	PM _{2.5}	PM ₁₀	PM _{2.5}
1	12:00:00-13:00:00	3.41	6.25	23	25	2	1
2	13:01:00-14:00:00	19.55	13.95	41	33	5	1
3	14:01:00-15:00:00	25.42	11.72	54	31	10	1
4	15:01:00-16:00:00	54.87	48.30	96	119	18	1
5	16:01:00-17:00:00	43.12	60.18	132.5	151.5	2	1
6	17:01:00-18:00:00	31.37	23.77	73	65	2	1
7	18:01:00-19:00:00	113.38	88.95	213	183	20	1
8	19:01:00-20:00:00	169.65	146.65	236	202	89	77
9	20:01:00-21:00:00	466.88	442.12	1155	1132	170	160
10	21:01:00-22:00:00	89.85	74.75	161	159	52	44
11	22:01:00-23:00:00	93.97	74.78	107	84	67	54
12	23:01:00-00:00:00	95.75	87.82	107	98	69	70
13	00:01:00-01:00:00	89.98	84.17	98	92	70	64
14	01:01:00-02:00:00	90.37	81.32	100	89	64	60
15	02:01:00-03:00:00	95.28	86.70	107	96	67	63
16	03:01:00-04:00:00	92.47	87.32	105	103	63	66
17	04:01:00-00:00:00	100.00	93.48	115	104	71	68
18	05:01:00-06:00:00	113.98	105.10	129	125	81	83
19	06:01:00-07:00:00	113.57	109.65	126	125	87	75
20	07:01:00-08:00:00	66.87	67.72	88	87	44	54
21	08:01:00-09:00:00	27.97	30.57	90	63	2	7
22	09:01:00-10:00:00	14.73	8.98	37	34	2	1
23	10:00:00-11:00:00	9.85	2.08	36	21	2	1
24	11:01:00-12:00:00	13.57	3.50	33	19	2	1
	Average	83.13	74.20	139.25	129.00	44.21	39.79

Table (5. 6) Particulate Matters Measurement



PM 10

PM 2.5

Figure (5. 2) Ambient Particulate Matter Condition

Existing Gaseous Level within the Site

The ambient concentrations and indoor air quality of CO₂, CO, SO₂, NO₂, Ozone and VOC were investigated in the factory on 5th- 6th January, 2017 and were recorded as baseline data.

Gas Emission

Carbon Dioxide

Ambient CO_2 concentration was measured for 24 hours but the observed average value of CO2 level for 8hrs is within ACGIH international standard. Data for collected CO_2 value was within the range of 5000 ppm. The major source of carbon dioxide is generated from automobile exhaust, emergency use of generator, fuel gases, etc. It is a poisonous gas and causes damage to the respiratory organ.

Carbon monoxide is a colorless, odorless, tasteless gas formed primarily by the incomplete combustion of carbonaceous fuels. The major source of carbon monoxide is fuel combustion engine of mobile sources, operation of heavy truck and mainly steam boiler used of rice husk fuel for production purpose. Miscellaneous combustion sources and industrial processes contribute to a much lesser extent. The significance of carbon monoxide is effect on human and other animal health; plants are relatively insensitive, and other deleterious effects are noTable. The measurement result of CO is 0.41ppm for average 8hrs measurement and within the range of NAAQS guideline standard.

Nitrogen Dioxide

These are mostly generated from explosive manufacturing industry, automobile workshop, acid manufacturing plant, etc. It causes bronchitis and oedema of lungs, etc. Concentration of ambient NO₂ level was measured for 24 hours continuously. The average concentration for 1hr is $279.57 \mu g/m^3$. According to the standards mentioned in above Table, the level is little

exceeding the permissible value of ambient air quality for National Environmental Quality (emission) Guideline.

Sulfur Dioxide

It is generated from thermal power plants petroleum industries, oil refineries, acid manufacturing plants, etc. It causes respiratory diseases, irritation of throat and eyes, etc. In this project may emit sulfur dioxide from steam boiler process. According to the results of field surveys, the air sampling activities conducted for 24 hours continuously measurement on 5th to 6th January and the ambient air quality observed values of sulfur dioxide of proposed De Heus animal feed mill factory site are $12.0657\mu g/m^3$ within the range of standard value of National Environmental Quality (Emission), WHO and IFC guidelines.



CO2 Level for 24 Hours Measurement



NO₂ Level



CO Level 24 Hours Measurement
Summary

It was observed that the ambient air quality of CO, CO_2 and SO_2 , O_3 concentration level and indoor measurement of Volatile Organic Matter (VOC) concentration level are within the limit of NEQ (emission) guideline but particulate matter (PM_{10} , $PM_{2.5}$) and gases level of Nitrogen Dioxide (NO₂) are little exceeded the National Environmental Quality (Emission) Guideline during the study period of 5th to 6th January, 2017. And hence, it can be summarized that the ambient air quality of the surrounding area for the proposed site can be controlled by the implementation of manufacturer recommended engine maintenance programs, good driving practices, installing and maintaining emissions control devices, and implementing a regular vehicle maintenance and repair program and regular spraying water on road in the project site.

5.3.3 Topography

The proposed project area is situated in Myaung Dagar Steel Industrial Zone, Hmawbi Township, and its topographic condition is flat. The proposed project site is primarily agricultural land, but now is initiated into the industrial zone area since 2006-2008.

5.3.4 Hydrology

The nearest sensitive water body is the Hlaing River as shown in Figure (1.9).Utilization of groundwater for operation use of boiler and general use of domestic purpose is achieved by tube wells with the site. To analyze the untreated raw water was collected at the proposed factory of ground water tank and wastewater was also collected from final discharge drainage site. In wastewater collection includes boiler discharged effluent and domestic wastewater from office use during operation phase.

Ground Water

The baseline data on ground water quality were collected and measured on 20 December, 2017 with respect to WHO Guidelines for Drinking Water Standard and Laboratory analysis results can be seen in appendix (6) for groundwater. The water quality of the nearest water features which are likely to be affected by the project was studied with the aim of understanding, preventing and minimizing water pollutions in the public water sources so as to ensure human health and biodiversity. Water quality is one of the key factors affecting the environment and health. Analyzed results of groundwater result compare with WHO guideline, wastewater effluent results of the whole factory and boiler discharge water are compare with NEQ (emission) Guidelines for Poultry Production (industries specific guideline) and Boiler discharge guidelines. Table (5.8), (5.9) and (5.10) showed with respect to WHO Guideline for drinking water and National Environmental Quality (Emission) Guideline.

The collected samples (tube well water, wastewater and boiler discharge water) were tested at ISO-Tech laboratory, SGS Myanmar and Supreme Group of Companies (Supreme Water Doctors Group).

1 4010	Tuble (5.7) Coordinate Form of Water and Wastewater Concerton					
Water Parameter	GPS Value	Location				
Raw Water	17° 09' 24.32"N and 95° 58' 01.01"E	Within proposed site of Ground water tank				
		Olouliu watel talik				
Wastewater	17° 09' 21.587" N and 95° 58 ' 03.737" E	Proposed factory final				
		drainage site				

Table (5. 7)	Coordinate	Point of	Water and	Wastewater	Collection





Ground Water Sampling











* I U (5.5)	oround	mater	unu	mable mater	Sumpn

No.	Parameters	Unit	Water Quality Result	WHO Drinking water Guideline			
	Ground Water Before treatment						
On-si	te Measurement						
1	pН	pН	6.78	6.5 ~ 8.5			
2	Temperature	°C	29.0	-			
3	Electric Conductivity	μS/cm	173	30			
	(EC)						
4	Total Dissolved	mg/l	173	-			
	Solids (TDS)						
5	Salinity	Ppt	0	-			
6	Dissolved Oxygen	mg/l	6.06	-			
	(DO)						
	Laboratory Finding						
1	pН	pН	6.8	6.5 ~ 8.5			

Table (5. 8) Ground Water Quality Results

No.	Parameters	Unit	Water Quality Result	WHO Drinking water Guideline
2	Turbidity	NTU	186	5 NTU
3	Colour (True)	TCN	110	15 TCU
4	Calcium Hardness	mg/l as CaCO ₃	34	-
5	Magnesium Hardness	mg/l as CaCO ₃	16	-
6	Dissolved Oxygen	mg/l	5.4	-
	(DO)			
7	Dissolved Solids	mg/l	109	1000
8	Iron	mg/l	3.25	0.3
9	Arsenic (As)	mg/l	Nil	0.01
10	Nitrate (N.NO ₃)	mg/l	Nil	50
11	Manganese	mg/l	Nil	0.05

Although most of the water quality parameters meet the WHO standards, some of the parameter such as Turbidity, Color and Iron are out of the range. **Turbidity** in water is caused by suspended and colloidal matter, such as clay, silt, finely divided, organic and inorganic matter and other microscopic organism. Turbidity is an expression of the optical property that causes light to be scattered and absorbed rather than transmitted with no change in direction. Turbidity waters are undesirable from aesthetic point of view in drinking water supplies and may also mainly effect on products for food industries. Moreover, **Iron** contents of ground water for a tube well showed a considerable amount of 3.25 mg/l which is higher than that the WHO Guideline value of 0.3 mg/l. Generally, anaerobic groundwater may contain ferrous iron at considerable concentrations when the water is directly pumped from a well.

No.	Parameters	Unit	Water quality Result	National Environmental Quality (emission) Guideline			
	I. Wastewater Onsite Result						
On-si	te Measurement						
1	pН	pН	9.19	6 - 08			
2	Temperature	°C	51.02	-			
3	Electric Conductivity	μS/cm	227	-			
	(EC)						
4	Total Dissolved Solids	mg/l	227	-			
	(TDS)						
5	Salinity	ppt	0	-			
6	Dissolved Oxygen	mg/l	4.73	-			

Table (5. 9) Wastewater Laboratory Analysis Result



No.	Parameters	Unit	Water quality Result	National Environmental Quality (emission) Guideline
	(DO)			
		Laboratory	Finding	
1	Temperature increase	°C	25.1	< 3 ^b
	pН	s.u. ^a	8.8	6-9
2	Turbidity	NTU	91	5 NTU
3	Color (True)	TCU	15	15
4	Dissolved Solids	mg/l	412	-
5	Ammonia (NH ₃)	mg/l	0.1	10
6	Chemical Oxygen Demand (COD)	mg/l	252	250
7	Biochemical Oxygen Demand (BOD)	mg/l	160	50
8	Total Phosphorus	mg/l	0.2	2
9	Total Nitrogen	mg/l	15	10
10	Oil & Grease	mg/l	>5	10
11	Total Coliform	CFU/100 ml	13	400

According to the wastewater analysis results above shown in Table (5.9), all of the lists parameter are good and within the limit of NEQ (emission) guideline. However, physicchemical properties of wastewater effluent parameter of turbidity, Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD) and total nitrogen are exceeding the National Environmental Quality (emission) Guidelines.

No	Parameter	Unit	Water Quality Results	WHO Guideline Value
1	Iron	mg/l	7.66	1
2	рН	S.U. ^a	10.0	6-9
3	Suspended Solids	mg/l	428	50
4	Colour (True)	TCU	130	15
5	Turbidity	NTU	330	5
6	Conductivity	Micro S/cm	214	
7	Total Hardness	mg/l as CaCO ₃	14	500
8	Calcium Hardness	mg/l as CaCO ₃	10	-
9	Magnesium Hardness	mg/l as CaCO ₃	4	-
10	Total Alkalinity	mg/l as CaCO ₃	104	-

Table (5. 10) Laboratory Analysis Result of Steam Boiler Effluent Wastewater

No	Parameter	Unit	Water Quality Results	WHO Guideline Value
11	Phenolphthalein	mg/l as CaCO ₃	Nil	-
	Alkalinity			
12	Carbonate (CaCO ₃)	mg/l as CaCO ₃	Nil	-
13	Bicarbonate (HCO ₃)	mg/l as CaCO ₃	104	-
14	Chloride (as CL)	mg/l	13	250
15	Sodium chloride	mg/l	21	-
	(as Na CL)			
16	Sulphate (as SO ₄)	mg/l	20	200
17	Total Solids	mg/l	580	1500
18	Dissolved Solids	mg/l	152	1000

In addition, in terms of lab results for boiler discharged water quality of pH, turbidity, color Iron and suspended solids are little exceeding than the National Environmental Quality (Emission) Guidelines. And hence, according to above lab results wastewater treatment system for the whole factory should be installed by appropriate treatment method discussion with Wastewater Company according to the lab analysis of wastewater.

5.3.5 Noise

The Noise level was measured by using Digital Sound Level Meter for 24 hours continuously on 5th to 6th January, 2017. The average day and Night noise level in the project site area is 55.28 dB. Receptor (outside of production area at project site) noise level of day and night measurement are 48.43 dB and 46.01dB and within the comfortable range of 40-60 decibel. However, according to the Noise source monitoring at operation area (inside the production sector) of day and night noise level is exceeding the acceptable level of National Environmental Quality (Emission) Guideline. Noise Level guidelines for sources and 24 hours measurement of Noise level of De Heus Myanmar Animal Feed factory are mentioned in Table (5.11) and (5.12).

Area	Day Time Average Noise Level (dB)	Night Time Average Noise Level (dB)	NEQ Guideline (for day time)	NEQ Guideline (for night time)
Project site	83.49 ^a	85.21 ^a	70 dB	70 dB
(Operation Area)	$(50.7^{b}-105.6^{c})$	$(68.4^{\rm b}-98.4^{\rm c})$		
Project site	48.43 ^a	46.01. ^a	70 dB	70 dB
Within project site	$(42.2^{\rm b}-79.7^{\rm c})$	$(32.7^{\rm b}-76.9^{\rm c})$		

Table (5.11) Comparison of Noise Level for 24 hours Measurement
1 4010 (· · · ·	

Remark:

^a Average; ^b Min; ^c Max

NEQ (Emission) Guideline _ National Environmental Quality (Emission) Guidelines



Indoor Noise Source

Outdoor Noise Receptor

Figure (5. 4) Noise Level Measurement of Project Area

No.	Date	Time	Mean Value	Weight	Day/ Night
1	3/11/2015	11:31:41-12:31:41 55.4 A		Day	
2	3/11/2015	12:32:11-13:31:41	53.2	А	Day
3	3/11/2015	13:32:11-14:31:41	50.7	А	Day
4	3/11/2015	14:32:11-15:31:41	65.4	А	Day
5	3/11/2015	15:32:11-16:31:41	67.6	А	Day
6	3/11/2015	16:32:11-17:31:41	58.6	А	Day
7	3/11/2015	17:32:11-18:31:41	59.1	А	Day
8	3/11/2015	18:32:11-19:31:41	57.5	А	Day
9	3/11/2015	19:32:11-20:31:41	57.4	А	Day
10	3/11/2015	20:32:11-21:31:41	55.7	А	Day
11	3/11/2015	21:32:11-22:31:41	51.5	А	Night
12	3/11/2015	22:32:11-23:31:41	50.9	А	Night
13	4/11/2015	23:32:11-00:31:41	54.1	А	Night
14	4/11/2015	00:32:11-01:31:41	53.1	А	Night
15	4/11/2015	01:32:11-02:31:41	52.2	А	Night
16	4/11/2015	02:32:11-03:31:41	51.7	А	Night
17	4/11/2015	03:32:11-04:31:41	52.2	А	Night
18	4/11/2015	04:32:11-05:31:41	52.0	А	Night
19	4/11/2015	05:32:11-06:31:41	53.7	А	Night
20	4/11/2015	06:32:11-07:31:41	54.8	A	Day
21	4/11/2015	07:32:11-08:31:41	51.7	A	Day
22	4/11/2015	08:32:11-09:31:41	54.2	A	Day
23	4/11/2015	09:32:11-10:31:41	58.7	A	Day

Table (5. 12) Noise Level Measurement for 24 hours



No.	Date	Time	Mean Value	Weight	Day/ Night
24	4/11/2015	10:32:11-11:31:41	55.3	А	Day
	Average		55.28		

5.4 Biological Environment

There is no forest area, wildlife and wetlands within or around the project compound. However, the secondary data of aquatic live in paddy field at Hmawbi Township is shown in Table (5.13). According to IUCN Red List, there is no threatened fish fauna in Hlaing River.

Common Name	Scientific Name	Local Name	Photo	Remark	
Swamp Barb	Labiobarbus burmanicus	Nga Kone Ma		Listed as -Not threatened"	
Green Turtle	Chelonia mydos	Nga Pyin Thar Late	Ter	Listed as -Not threatened"	
Myanmar	Balitora	Nga Tha Lal		Listed as -Not	
Loach	burmanica	Htoe		threatened"	
Walking Cat Fish	Clarias batrachus	Nga Khu		Listed as –Not threatened"	
Red-tailed	Channa	Nga Yant		Listed as –Not	
Snakehead	gochus	Gaung To		threatened"	

Table (5. 13) Secondary Data of Aquatic Live in paddy field



Common Name	Scientific Name	Local Name	Photo	Remark
Truncated estuarine Catfish	Arius truncatus	Nga Zin Yine		Listed as -Not threatened"

No.	Species	Scientific Name	Common Name	Local Name
1.	Snake	Ptyas mucosus	Banded rat snake	Linn Myay
2	2 Erog	Polypedates leucomystax	Common tree frog	Phar-pyan
۷.	riog	Rana limnocharis	Paddy frog	Sar-phar
		Acridotheres fuscus	Jungle Myna	Taw-za-yet
		Passer domesticus	House Sparrow	Eain-Sar
		Orthotomus sutorius	Common Tailor Bird	Hnan-pyi-soak
3	Bird	Centropus sinensis	Greater Coucal	Boat
5.	Dird	Egretta garzetta	Little Egret	Byine
		Dendrocygna javanica	Lesser Whistling Duck	Sit-sa-li
		Milvus migrans	Black Kite	Son
		Streptopelia chinensis	Spotted Dove	Jo-Le-Pyauk

Table (5. 14) Secondary Data of Fauna in Hmawbi1 Township

All fauna species is very few numbers of collected specimens. It can be assumed that species number and population size are locally disappeared due to human impact. No endemic or endangered species was recorded according to IUCN Red Lists.

5.4.1 Ecological Resources

The proposed project site is not located in or near a sensitive ecosystem as the proposed project area is situated in the Myaung Dagar industrial zone. Moreover, desktop review and site visits confirmed the absence of unique or ecologically significant flora and fauna. However, the nearest water body is the Haling River.

5.5 Social Environment

Hmawbi Township is located at northwest of the city of Yangon and it is home to the Myaung Dagar Industrial zone, which have $1,016 \text{ acres } (4.11\text{m}^2)$ Zone constructed in 2006-2008.

Table (5. 15) Nearest Village at De Heus Myanmar Animal Feed Factory

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Description	Surrounding Environmental Setting Myaung Dagar Industrial Zone
Number of Population	4,200 person
Number of Households	1,100 households
Number of Villages around at Proposed De	Kan Kalay: 500 persons (128 households)
Heus Animal feed factory	Kon Kalay: 350 persons (70 households)
	Asu Lay: 200 persons (40 households)
Main occupation in Myaung Dagar Industial	Farmers (Agriculture and livestock)
Zone	

Table (5. 16) Population of Male and Female at nearest Village at Project Site

	Family	Under 18			Under 18			Total		
Village		Male	Female	Total	Male	Female	Total	Male	Female	Total
Kone Klay	155	118	106	224	216	231	447	334	337	671
Kan Klay	108	86	92	178	140	142	282	226	234	460

The proposed De Heus Myanmar Animal Feed factory rent the 5.5 acres land area for 50 years with B.O.D system and it took one year for construction activities. Most of nearest area is land vacant and their neighbor factories are poultry feed factory, Taiwan textile factory, and fertilizer factory.

Transportation: The main mode of transportation within the project area is by road. Major roads running from east to west within the project area are: Yangon-Pyay Road, east side of the Myanmar Economic Corporation (MEC). Public transport to and in Hmawbi is rather easy and safe. Private taxi services also operate in Hmawbi Township.

5.6 Socio-Economic Situation of Proposed Project Site

Population

A breakdown of male and female in Hmawbi Township is shown below.

Table (5 17	7) Po	nulation	of Male	and Fer	nale in	Hmawhi	Townshir
Table (5.17) 10	pulation	of maie		male m	TIIIIawui	rownsinp

Older than 18	Vounger than 18	Total
	rounger than ro	10141

	Male	Female	Total	Male	Female	Total	Male	Female	Total
Urban	6,905	8,483	15,388	2,616	2,962	5,578	9,521	11,445	20,966
Rural	46,472	51,895	98,367	25,920	26,249	52,169	72,392	78,114	150,536

Cultural Diversity

In the study area, almost all of the populations are Myanmar citizens. Neither the study area, nor the region is particularly culturally diverse, with the majority of both populations having been born in Myanmar. A breakdown of the population as follow:

	Kachin	Kayah	Kayin	Chin	Mon	Bumar	Rakhine	Shan	Foreign Nationaliti es	Total
Urban	20	50	300	400	87	14038	830	183	200	16108
Rural	294	2,050	16,549	1,162	200	130,160	80	2,000	2,899	155,394
Total	314	2,100	16,849	1,562	287	144,198	910	2,183	3,099	171,492

Education

Primary and Secondary Education: In the township, there are 98 state primary schools, 33 middle schools and 12 high schools operating in the vicinity of the project as shown below. These students are split into classes; they are staffed with enough teachers by local standards. The schools also employ several non-teaching staff such as administration and grounds persons.

Tertiary Education Providers: Technological University (Hmawbi) has a campus in Hmawbi Township. The university is 78.04 acres wide with 252 teachers and 5802 students. It has established links to the industry. The university offers courses that follow various streams, including engineering and information technology.

Industries of employment: The significant industries in the study area were retail trade, brick making, food services, and construction. The occupational status of the region is summarized below.

		1 dole (5. 17)	maabures of	Linproji	lent		
Government Service	Services	Agriculture	Livestock Breeding	Trade	Mechanized farming	Arbitrary	Others
2557	-	43058	10000	36000	5787	4700	69440

Table (5. 19) Industries of Employment

Land Use: Predominant land use near the project area is mainly factories, and mixed residential and commercial.

No.	Description of Land Used Pattern Number of Plots				
1	Presently Constructed Buildings				
	Already Registered Industry Business	64			
	Unregistered Industry Business	30			
2	Ongoing Constructed Building	18			
3	Warehouse				
	Warehouse with goods	4			
	Warehouse without any goods 11				
4	Vacant Land Area				
	With fence facility96				
	Without fence facility163				
5	Others 143				
Total 529					
The Number of land used acres – 508 (2011)					
	Present vacant land $-(21)$				
Remark	k Total – 529				
	Others (143)				
	(1) Industrial Zone Office				
	(1) Building House				
	(13) Occupy by government				
	(10) Land used for wastewater treatment	facility			

Table (5. 20) Land Used Pattern at Myaung Dagar Steel Industrial Zone

Source: Myanmar Industrial Association (2016)

Business and Services

Among regional towns, Hmawbi has a variety of businesses and services operating in the community with other businesses/services, based in the region. Services and facilities available include:

- post office
- beauticians

- butcher
- hairdressers
- furniture and electrical store
- restaurants
- cafes
- shoe and clothing shops
- industrial services
- pharmacy
- veterinarian
- bus service
- gift stores
- music store
- pubs and bars
- florist

Community Infrastructure, Health and Services General Health: There are generally fair health facilities available in the study area, with 50-bedded hospital. These facilities are generally under steady demand. The staff includes 14 doctors, 14 nurses, and 5 health assistants.

Electricity Supply of Hmawbi Township

The electricity demand of Hmawbi Township is higher and higher due to the normally increased in population and infrastructure. The situation of electricity distribution and electricity consumption of Hmawbi Township were shown in below Table (5.21).

		11 2	1
Supply Power	Used Power	No. of Transformer	Exceed Power
115000 MW	115000 MW	313 Nos.	-

Table (5. 21) Electricity Supply of Hmawbi Township

5.7 Cultural Features

Hmawbi Township is growing into a busy and vibrant community. The population fluctuates; however, there has been steady growth over the last decade. It tends to be a stop-over on a journey rather than a destination. It has a number of sites that are interesting; however there is no main attraction. Visitors to the town are generally visiting for work, investment or family reasons.

6. IDENTIFICATION AND ASSESSMENT OF POTENTIAL ENVIRONMENTAL IMPACTS AND ENVIRONMENTAL IMPACT MITIGATION MEASURES

6.1 Methodology for the Assessments

The assessment of each impact is based on consideration of the magnitude, duration, spatial and frequency of activities which are going to be carried out during three phases and characteristics of the project site. The assessment is qualitative and the significance of each impact is classified into 5 categories in overall.

The following methodology has been applied to assess the environmental impacts of the factory mainly on air, water, land, biodiversity, including human beings. Each source of impact has been assessed by four parameters, magnitude, duration, extent and probability and each assess point have 5 scales as mentioned below:

Table (0. 2) Impact Assessment Parameters and its scale							
Assassment	Scale						
Assessment	1	2	3	4	5		
Magnitude	Insignificant	small and	Moderate and	High and	Very high and		
(M)	-	will have no	will result in	will result in	will result in		
		effect on	minor changes	significant	permanent		
		working	on working	changes on	changes on		
		environment	environment	working	working		
				environment	environment		
Duration (D)	0-1 year	2-5 year	6-15 year	Life of	Post Closure		
				operation			
Extent (E)	Limited to	Limited to	Limited to the	National	International		
	the site	the local area	region				
Probability (P)	Very	Improbable	Probable	Highly	Definite		
	improbable			probable			

Fable ((6, 2)	Impact	Assessment Par	ameters and	Its scale
	U . 	mpace	1 1000000111011t 1 tu	uniterens una	Ito beare

Then, the significant Point (SP) is calculated by following formula.

Significant Point (SP) = (Magnitude + Duration + Extent)* Probability

Impact Significance: Based on calculated significant point, impact significance can be categorized as follows:

Explanation

Significant Point (SP) = (Magnitude + Duration + Extent)* Probability

	8
Significant Point (SP)	Impact Significance
<15	Very Low
15-29	Low
30-44	Moderate
45-59	High
60	Very high

Impact Significance

6.2 Impact Identifications

The development of infrastructure for the proposed project likely to happen changes in the local environment in terms of physical, biological and socio-economic aspects along with the perspective on both positive and negative impacts. In this IEE study, the potential environmental impacts brought by various activities of proposed animal feed mill factory project will be identified and judged by site surveying with checklist, meeting with client team, including plant manager and QA supervisor, representatives from De Heus Myanmar Limited, and assessing the environmental baseline information for construction, operation, and decommissioning phases along with its mitigation measure.

6.3 Potential Impacts

Significant impacts were determined through the following issues:

- i) Views of interested and affected local person;
- ii) Legislation
- iii) Professional adjustment of the project team include of consultant, associate consultant, international environmental impact assessment methodology

Impacts on the environment from various activities of the project can be categorized as follows;

- i) Impact on Environmental Resource
- ♣ Impact on Air Quality
- Impact of Noise Level
- ↓ Impact on Water Quality
- Impact on Soil Quality
- ii) Impact on Ecological Resources
- 🖊 Aquatic Ecology
- iii) Impact on Human Environment
- 🖊 Health and Safety
- **4** Socio-economics

- iv) Impact of Waste Disposal
- 4 Solid waste disposal
- ↓ Liquid waste disposal

6.3.1 Potential Environmental Impacts Occurred during Construction Phase

Engineering and procurement for construction phase of De Heus Myanmar Limited were established on May 2015. Construction and civil works were materialized with land filling, pilling and foundation work on October 2015. Royal Haskoning DHV Myanmar was a key player as a construction consultant while Antaco JV D&C as a main contractor. All the contractors were able to catch up the schedule accordingly by working closely together on site. The construction phase is completed as scheduled for the first week of September 2016. In order to get the a safe construction environment, the emergency team was built, emergency preparedness plan was developed, safe construction site activities were performed, firefighting drill was conducted, and first aid training was also conducted.

Since, proposed animal feed factory of De Heus Myanmar Limited is already built since 2015 and they have been implemented with good construction management practice of Europe animal feed factory standards.

Source: TCHRG 01 EHS Guideline of De Heus Myanmar Limited

6.3.2 Potential Environmental Impacts Occurred during Operation Phase

The following are the anticipated impacts during operation phases of Animal Nutrition Product production factory;

- i) Impact of Air Emission
- ii) Impact of Noise
- iii) Impact of Water (consumption and pollution)
- iv) Impact of Solid waste and liquid
- v) Electricity Consumption
- vi) Occupational Health and safety

All of the impacts during operation phase are not affected directly to local communities, but some environmental impacts are primarily related to the animal feed mill factory in which resource utilization is an issue that should be seen from a sustainable development perspective, combustion of fossil fuels, utilization of raw materials, greenhouse emission and occupational health and safety for employees working at the proposed factory.

6.4 Impact on Environmental Recourse

6.4.1 Impact on Air Quality

De Heus animal feed nutrition products manufacturing factory will use the automatic process control system. In which every processing step will be monitored by assigned person from

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the control room. The major sources of air emission in the De Heus Animal Nutrition Products Factory will be defined as below Table (6.2).

No.	Sources	Emission Parameter
1	Operational activities of Animal feed	Grains Dust, Particulate
	Production Process (Intake of raw	Matter
	materials and mixing of feed additives	
	and premixes)	
2	Storage of raw materials, feed additives,	Dust, Particulate Matter
	chemicals, molasses, drugs and premix	VOC emission and Odor
3	Biomass Steam Boiler (Rice Husk steam	PM, CO, SO2, NO _X , Fly ash
	boiler)	
4	Electricity consumption and diesel	CO, SO2 and NOx,
	Generator and Vehicle movements for	
	delivering and transporting of the raw	
	materials and final products	

Table (0.5) All Quality inpact Sources	Table ((6.3)	Air	Quality	Impact Sources
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During the operation phase, air pollution may be caused by fugitive dust, airborne dust and crush grains emission from materials storage and handling of cereal grains, grinding and crushing, weighing and mixing of premix, drugs and micro raw materials and screening etc. In addition, volatile organic compound (VOC) and odor emission will be caused by storage of raw material such as grains, feed additives, drugs and preservatives chemicals. So, the above mentioned of fugitive dust and particulate matter and VOC and odor emission impact may be a concern with the employee's health for long term inhalation. In addition, major gases emission may generate from combustion of biomass steam boiler (rice husk) which include CO, SO2, NO_X and PM as well as fly ash.

Moreover, emergency use of generator and vehicle movements and transportation of raw materials may also generate particulate matters PM_{10} , $PM_{2.5}$, CO, SO₂, NO₂, and CO₂. However, it can be concluded as the impact is not sufficient because the generator and vehicle movements will run only for a short time.

Dust emission such as Particulate Matters, PM_{10} and $PM_{2.5}$ was measured for 24 hours averaged on the 5th and 6th January 2017 to obtain the baseline data during the operation phase of the proposed animal feed Factory. According to Environmental Quality baseline results of data measured on during 5th-6th January, 2017 for 24 hours continuously, ambient level of particulate matter PM_{10} , $PM_{2.5}$ and Nitrogen dioxide NO₂ results are a little bit higher than NEQ (emission) Guidelines. However, these anticipated impacts are in manageable limits to control the air pollution with relevant mitigation measures and the proposed factory will be managed by using their HSE guidelines. Moreover, the anticipated impacts of air pollution from animal feed products factory have the plan to implement with appropriate mitigation measures.



Storage Facilities RM



Premix, drugs, feed additives



Packing of products Delivering Section Trasportation Figure (6. 1) Air Emission sources at DH Myanmar Factory

Parameters	Observed Value	Guidelines Value	Unit	Organization	Averaging Period
PM 10	83.13	50	$\mu g/m^3$	NEQ	24hrs
PM 2.5	74.20	25	μg/m ³	NEQ	24hrs
NO ₂	279.57	200	$\mu g/m^3$	NEQ	1hr
SO_2	12.06	20	$\mu g/m^3$	NEQ	24hrs
Ozone	0.01	100	$\mu g/m^3$	NEQ	8hrs
CO ₂	293.3	5000	ppm	ACGIH	8hrs

 Table (6. 4) Results of emission results in operation phase

NEQ - National Environmental Quality (Emission) Guideline

ACGIH - The American Council of Governmental Industrial Hygienists recommends Threshold Limit Values (TLV®) as maximum exposures for industrial environments.

6.4.2 Impact of Noise

During the operation phase, noise impact may be a significant impact for animal feed production sectors. The significant sources of noise impact activities are the operation of various machinery and equipment listed in Table (1.1) for feed production especially, hammer mill and grinding process, the delivering and handling of raw materials and finish products by forklifts, the operation of dust control system for dust collection purpose and the emergency used of generator, vehicles and automobile movements (short term noise) will be noise impacts sources. Moreover, operations of biomass (rice husk) steam boiler would result in occupational noise impact on employees and workers. According to the noise results of day and night time 24 hours continuously measurement, noise level of source at the operation area inside the factory is exceeding the noise level of 70 dB of NEQ (emission) guideline, so

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it can be assumed that it may be affected on employees and workers for occupational health and safety at production sector. However, personal protective equipment cover provision of noise impact measures will be provided for employees, workers.

6.4.3 Impact on Water Quality

Water Consumption

In the operation phase of animal feed production factory, there is no water use for processing purpose. However, in pelleting step will require the steam in which the required steam will be provided by a biomass steam boiler (rick husk). In which, estimated boiler feed water is 1m³ per hour and will run 3 or 4 days per week. Tube well is the main source of raw water and raw water will be treated by passing through into (i) the oxidation tower to remove oxidized materials (ii) chlorine dosing system (iii) de-iron filter (iv) carbon filter (v) cartridge filter and then the obtained treated water will be provided for the whole factory use of boiler feed water and general office facilities such as canteen, toilets and other general use. Estimated water consumption for the whole factory is 24 cubic meters per day and 8760 cubic meters per year and 50% treated water allocated on irrigation for 26% of green area (20 irrigation outlets).

Water Pollution

The effluent wastewater will generate from the cleaning of utensil for operational use, steam boiler wastewater discharge and domestic wastewater. Amount of liquid effluents discharged from the production process is minimal when compared with other industrial sectors. However, water pollution may be caused by the boiler water discharge and domestic wastewater discharge from the canteen, which have high biological oxygen demand/ chemical oxygen demand (BOD/COD), that can seriously also affected on water quality. BASUKI, biomass steam boiler (rice husk) will discharge 0.12 cubic meters per hour from blow down valve to underground pipe into the final drainage of proposed factory which have three drainage outlets connect to the public drainage through the underground concrete pipe. And hence, improper discharge of industry effluents, general office discharge of domestic wastewater and sewage effluents will impact on ground water and the nearest surface water bodies. However, the proponent has a plan to implement the wastewater treatment system at DH animal feed factory.

In this De Heus animal feed factory project, wastewater from proposed factory's final drainage before discharge into public drainage was collected on 5^{th} - 6^{th} January, 2017. The following table mentions the results of the laboratory test of waste water in this factory. As per results, BOD, COD and Total Nitrogen content of the effluents is higher than the NEQ guidelines. According to the results of analysis, the treatment system will be implemented by the project owner.

 Table (6. 5) Results of effluent levels in the final discharge

No.	Paramatars	Unit	Water	National
	rarameters	Unit	quality	Environmental



			result	Quality (emission) Guideline		
	On-site M	leasurement				
1	Total Dissolved Solids (TDS)	mg/l	227	-		
	Laboratory Finding					
1	Temperature increase	°C	25.1	< 3 ^b		
2	pН	s.U. ^a	8.8	6-9		
3	Chemical Oxygen Demand (COD)	mg/l	252	250		
4	Biochemical Oxygen Demand (BOD)	mg/l	160	50		
5	Total Phosphorus	mg/l	0.2	2		
6	Total Nitrogen	mg/l	15	10		
7	Oil & Grease	mg/l	>5	10		
8	Total Coliform	CFU/100 ml	13	400		

6.4.4 Impact on Soil Quality

During the operational phase, there is no significant impact on soil quality due to animal feed production activities because concrete road facilities have been implemented at the whole project site area. However, accidental spillage of feed additives and chemicals during delivering activities may have impact and spillage of diesel and petrol from vehicles and from the emergency generator during the filling activities may also impact on soil quality and its impact can be assumed as insignificant impact.

6.4.5 Impact on Ecological Resource

The proposed factory is located in Myaung Dagar Steel Industrial Zone and the nearest water body is a Hlaing River (0.29 kilometer). So, it can be expected that there is no direct impact on aquatic environment of Hlaing River. However, the improper management of industrial discharge wastewater of proposed factory which include hot boiler effluent water, general wastewater discharge of the office used such as domestic, and canteen and toilet facilities, may effect on the aquatic environment of nearest public drainage. In addition, the laboratory results of BOD, COD and total nitrogen parameter of wastewater discharged from the whole factory are higher the NEQ (emission) Guidelines and discharge of heated cooling water into public drainage could be affected on aquatic lives depending upon the design of the discharge structure and the temperature of the effluents.

Table (0. 0) Effect of Wastewater on Aquate Lives					
Constituent	Indicators	Effects			
Organic Matter	BOD, TOC, COD	- depletes oxygen when discharge into			
		water, leading to the death of fish and other			
		aquatic organisms			
Alkalinity/Acidity	pН	-depth of aquatic organisms at extreme pH			
		ranges affects microbial activity in			

Table (6. 6) Effect of Wastewater on Aquatic Lives



Constituent	Indicators	Effects
		biological wastewater treatment processes
		- affects the solubility of heavy metals in
		the soil and availability and/or toxicity in
		waters
Salinity	EC, TOS	-Toxic to aquatic organisms
		-affects water uptake by crops
Solidity	SAR, ESP	-affect soil structure, hard and dense
		subsoil
Heavy metals	Cadmium, chromium,	
	cobalt, copper, nickel,	-toxic to plants and animals
	lead, zinc, mercury	
Solids	TTS	-reduces soil porosity, leading to reduce
		oxygen uptake can reduce light
		transmission in water, thus compromising
		ecosystem health

Source: EPA (Australia), AS/NZ

6.4.6 Impact of waste disposal

Most activities of the animal feed products production factory will generate the relatively low level of waste. Solid waste from production sector will consists of process waste such as crushed cereal grain dust, returned unqualified products, packaging bags and packing materials, bottom ash from biomass steam boiler, other domestic waste from canteen, and office wastes. However, De Heus Myanmar animal feed industry have been general implemented the solid waste disposal system by the segregation of waste type such as paper waste, food waste, production waste and hazardous waste according to their environmental health and safety guideline. The required rubbish bins have been provided and regularly checked and monitored by assigned person of proposed factory. Before send to Yangon City Development Committee (YCDC), the proper disposal waste facilities and temporary waste disposal site have been provided in DH factory site and will be followed and monitored the solid waste disposal system with the help of Yangon City Development Committee (YCDC) guidelines. Moreover, for the purpose of hygienic canteen, kitchen facilities and standard septic type of toilets, well-cleaned and well-maintained already provided for the proposed factory site.

6.4.7 Energy Consumption and Related CO₂ emission

Though main electricity source for the factory is the national grid line, sound-proof diesel generators will be set-up in case of electricity shortages. So, 2000 kVA (Schneider) own transformer and 1250 kVA of MISUBISH brand standby generator will be used for both operation and administration appliances. The estimated total amount of electricity consumed is 3,000 kWh per day and approximately 23,929,284 kWh of annual. Voluntary Reporting of Greenhouse Gases emission (Form EIA-1605, 2007) prepared by U.S Department of Energy

expresses that Emission Factors for Purchased Electricity in Myanmar (1999-2002 base data) is 1.023 Metric tons CO_2e per MW h. According to this Figure, the proposed project will emit about **24.5** Kilotons of CO_2e annually. When compared to EBRD GHG assessments methodology guidance note values, it is quite clear that the emission of $CO_2e / is < 20k$, and accordingly it can be treated as **Medium-Low** category.

Category	Range
Negligible	no GHG assessment necessary
Low	< 20 kt/y CO ₂ -equivalent per year
Medium-Low	20 – 100 kt CO ₂ - equivalent per year
Medium-High	$100 \text{ kt} - 1 \text{ Mt CO}_2$ - equivalent per year
High	>1 Mt CO ₂ -e equivalent per year

Table (6. 7) Category of GHGs Assessmen	ıt
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(Source: EBRD GHG Assessment Methodology, 2010)

In addition, the proposed project will use annually 108,124 gallons of diesel for vehicles such as saloon car and forklift for transportation of materials and emergency use of a generator. The following Table shows the amount of CO_2 emission coming from the combustion of fuels.

No.	Туре	Amount (gallon/year)	Equivalent CO ₂ emission (Kilo tons)	Status
1	Diesel for generator	108,124	1.08	Low

Table (6.8) CO₂ Emission by the Uses of Fuel

According to above conversion, the emission of CO_2 relative to the fuel consumed by the proposed project will not harmfully effect to the environment. However, the proposed animal feed mill factory will use a lot of electrical energy mainly for lighting, running of equipment, running of pumping systems for pumping water into the storage tank. Since electricity generation involves utilization of natural resources, excessive electricity consumption will strain the resource and negatively impact on their sustainability.

6.5 Impact on Human

6.5.1 Socio-economic Benefit

The proposed project is the long-term investment in the industrial sector. Most of the impacts of the proposed project on socio-economic environment may be positive. Implementation of proposed project may create temporary employment during construction and decommissioning phases and permanent jobs in the operation phase. Subsequently, socio-economic standards of local people will be increased and eventually it may lead to the economic growth at local and regional level.

6.5.2 Occupational Health and Safety

The most significant impact of occupational health and safety hazards will be caused by working at the operation phase of animal feed production and the main issues are as follows:

- Exposure of noise to employees and workers
- Exposure of grain dust and particulate matter (respiratory hazards)
- Inhalation of Odor (Feed Additives and Chemicals)
- Electrical Hazards

During the operation phase, employees and workers of animal feed factory will be endangered or oppressed particularly by noise from operation of heavy machinery equipment and activities of delivering of various raw materials, final products, grinding, weighting, roller and conveyor belts and operation of steam boiler and dust engineering control facilities. The noise level results measured in production area during operation phase are exceeding the NEQ (emission) guideline and hence, operation machines can cause of hearing impairment on workers and employee. In addition, occupational health risks of respiratory hazards may cause by grain dust and fine airborne PM from process activities of feed production and odor from storage facilities of feed additives, drugs and premix and chemicals.

Short term effects due to exposure of grains dust may include:

- coughing and breathing difficulties
- watery or prickly eyes (conjunctivitis)
- runny or stuffy nose (rhinitis)
- skin irritation
- grain fever, organic dust toxic syndrome

Long-term effects may lead to serious respiratory complaints, including:

- asthma (coughing, wheezing and chest tightness)
- chronic bronchitis (cough and phlegm production)
- chronic obstructive pulmonary disease (a long-term illness that makes breathing difficult)
- farmer's lung (increasing shortness of breath and weight loss)

Moreover, physical hazards such as accidental slip, trip and fall may cause occupationally. For electrical hazards, technicians and workers may expose to electrical hazards due to the presence of electrical equipment throughout the whole animal feed production facilities. Thus, the appropriate personal protective equipment (PPE) for employee and workers will be provided and Environmental, health and safety guideline have been prepared in proposed factory. In addition, for health insurance, health care facilities and first aid training have been provided for all employee and workers of working in animal feed production sector. Moreover, all production area will be checked and monitored by CCTV camera and all production process will be checked and monitored by assigned person working at control room.



Figure (6. 2) Site Visit Activities and Discussion with Project Proponent

6.6 Project Activities and its Significant Impacts during Operation Phase

Table (69	Evaluation	and Perdition	n of Significant	t Impacts for	r Operation Phase
I abit (0. /	j Lvaluation		n of Significant	i inipacto ioi	operation r hase

Potential Impacts	Activity and Impact Sources	Components	Duration	Magnitude	Extent	Probability	Significance point	Significance
Impact on Air Quality								
Air Pollution	Storage of cereal grains, raw materials, feed additives, drugs and premixes , preservative chemicals	Grain Dust, Odorous VOC _{S,} PM ₁₀ PM _{2.5}	4	3	1	3	24	Low
	Milling and Handling process, Intake of raw grain processing (warehouses and production tower)	Release of crushed grain dust	4	3	2	3	27	Low
	Steam Boiler Operation	Particulate Matters, CO, SO ₂ , NO _x	4	3	2	3	27	Low
	Diesel Generator operation and Vehicle movements	CO, SO ₂ , NO _x	4	3	2	3	27	Low
Impact of odor								
Odor impact on local area	Storage room of Raw materials, Feed Additives, Drug, premix etc.	Volatile Organic Compound (VOC) and Odor	4	3	1	3	24	Low
	Temporary sites for waste disposal	Odor	4	2	1	3	21	Low

2019

Potential Impacts	Activity and Impact Sources	Components	Duration	Magnitude	Extent	Probability	Significance point	Significance
	for production waste							
Impact of Noise								
Noise Loss of public amenity and	Animal Feed Production and HeavyMachineryandequipmentOperation at factory site	Noise	4	3	2	3	27	Low
	Emergency Used of Diesel Generator	Noise	4	2	1	3	21	Low
	Operation of Steam boiler and cooling tower	Noise	4	2	1	3	21	Low
	Noise from lorry movements, vehicles and forklift for transporting purpose	Noise	4	2	1	3	21	Low
Impact on Ground Wat	er Consumption							
Water consumption of Ground Water	Use of Water for Steam Boiler	Consumption of ground water	4	3	2	3	27	Low
	General office use, domestic purpose, canteen and toilet facilities	Consumption of ground water	4	3	2	3	27	Low

Impact of Wastewater Effluents

2019

Potential Impacts	Activity and Impact Sources	Components	Duration	Magnitude	Extent	Probability	Significance point	Significance
Effluent discharge	Effluent cooling water from steam boiler	am Iron, turbidity and Organic Matter in wastewater		3	2	3	27	Low
	Discharged wastewater from office, canteen, toilet facilities	Organic Matter in wastewater	4	3	2	4	36	Moderate
Impact on Aquatic Live	es			I		I		
	Wastewater discharged from steam boiler	Temperature and organic matter	4	4	1	4	36	Moderate
	Domestic wastewater from office use	Organic matter in discharge water	4	4	1	3	27	Low
Impact of Solid Waste	(waste disposal)							
	Bottom ash from Steam Boiler	BottomAsh(particulate matter)	4	2	1	3	21	Low
	Packaging materials, plastic bags, cereal crushed grains dust, container tanks and drum for feed additives and chemicals from production sector	Production waste	4	4	1	3	27	Low

2019

Potential Impacts	Activity and Impact Sources	Components	Duration	Magnitude	Extent	Probability	Significance point	Significance
	Solid waste such as paper, plastic, domestic food waste and other offices generated from office	Office waste	4	3	1	3	24	Low
Impact of Electricity Co	onsumption							
Electricity and Fuel	Production Area	Electricity	4	3	2	4	36	Moderate
consumption General office use		consumption	4	2	2	3	21	Low
Occupational Health an	d Safety							
Exposure of dust and odor and hazardous materials	Handling of raw materials, feed additives, drug and preservative chemicals from process use purpose	Grain dust, PM, Odor and Volatile Organic Compound (VOCs)	4	3	1	4	32	Moderate
Occupational Noise	Operation area of Animal feed	Noise	4	4	1	4	36	Moderate
to employees and	Movements Vehicles	Accident	4	2	4	3	27	Low
workers	Operation of Diesel Generator	Noise	4	2	1	3	21	Low

6.7 Environmental Impact Mitigation Measures for Operation Phase

The proposed De Heus Myanmar Animal feed factory has developed the implementing of environmental management plan and appropriate mitigation measures for potential impact occurred in during operation phase and additional impact mitigation measures shall be seen in following mitigation measures.

6.7.1 Mitigation Measures for Air Quality Impact

The significant sources of dust grains and particulate matter from the mill and handling process of raw materials will be mitigated by using dust engineering control system in the production area as seen in Table (6.7). The capacity of each dust control equipment that is already installed at DH animal feed mill factory is shown in below:

- One cyclone fan with 55 kw motors
- One ventilator with 22 kW
- One big bag filter capacity 30,000 m³/hour
- Five bag filters at intake system
- Two air absorb and filter system at manual handed dosing system
- Nine pulse filters at conveyors and elevators
- One ventilation system at cooling storage room
- One ventilation system at boiler room

No.	Code	Remarks		
		Premix Intake		
1	05.DR01	Air dryer	Installed	at
			production sector	
2	05.BL01	Blower		
3	05.FI01	Insert able filter		
4	05.VE01	Ventilator		
5	05.RD01-FI01-VE01	Filter recipient with Ventilator		
6	05.RD02-FI01- VE01	Filter recipient with Ventilator		
7	05.RD03-FI01-VE01	Filter recipient with Ventilator		
		Intake raw materials bulk		
1	10.VE01	Ventilator		
2	10.VE02	Ventilator		
3	10.VE03	Ventilator		
4	10.VE04	Ventilator		
5	10.VE05	Ventilator		
6	10.FI01	Insert able filter		
7	10.FI02	Insert able filter		
8	10.CC03-FI01	Spot filter		
9	10.CC04-FI01	Spot filter		

Table (6. 10) Dust Engineering Control Equipment for Production Area

No.	Code	Code Dust Engineering Control									
		Wet grain storage silos									
1	15.EV02-FI01	Spot filter									
2	15.DR01	Vertical dryer									
	Grain storage silos										
1	20.EV01-FI01	Spot filter									
2	20.CC01-FI01	Spot filter									
3	20.EV02-FI01	Spot filter									
	Intake raw materials										
1	25.RP01-FI01	Insert able filter									
2	25.RP02-FI02	Insert able filter									
3	25.RP01-FI01-VE01	Integrated fan									
4	25.CC01	Integrated fan									
5	25.EV01-FI01	Spot filter									
	Grinding and mixing										
1	40.HO06-FI01	Filter									
2	40. HO06-FI01-VE01	Ventilator									
3	40.TH01,40.TH01-	Tipping hopper with integrated filter									
	FI1,40.TH01-F1-VE01	and ventilator									
4	40.TH02,40.TH02-	Tipping hopper with integrated filter									
	FI1,40.TH02-F1-VE01	and ventilator									
5	40.TH01-VE1	Tipping hopper ventilator									
	1	Pelleting and cooling	1								
1	50.EV01-FI01	Spot filter									
2	50.CC01-FI01	Spot filter									
3	50.CO01-RV01	Rotary airlock/valve									
4	50.CY01	Cyclone									
5	50.CY01-RV01	Rotary airlock valve									
6	50.CY01-VE01	Ventilator									
		Liquids	I								
1	110.TA-01-FI01	Filter									
2	110.TA-02-FI02	Filter									
3	110.TA-03-FI03	Filter									
4	110.TA-04-FI04	Filter									
	0.0 770.1	Steam	1								
1	80.FF01	FD Fan									
2	80.1F01	ID Fan									
3	80.SAF01	Secondary Air Fan									
4	80.MC01	Multi cyclone									
5	80.WS01	Wet Scrubber									

For steam boiler emission control measures, fan, secondary air fan, multi cyclone and wet scrubber have been fitted at production area. In addition, gases and fly ash emission from steam boiler will be taken by providing adequate stack heights as per GIIP (Good International Industry Practice) guidelines.

Recommended Air Impact Mitigation Measures

- Monitor and check installed cyclones and bag filters
- Switch off vehicles when not in operation to reduce emissions by drivers
- Install the windbreaks and covers in outside handling areas
- Replace any external bulk storage areas with silos, fitted with alarms to prevent overfilling
- Install the dust extractors e.g. cyclone and fabric filters
- Maintain a slight negative pressure within storage vessels such as bins and silos
- Provide sufficient buffer areas with placement of potted plants around parameter of the factory
- Adequate stack height must be provided as per Industrial guidelines for the proper dispersion of potential pollutants

Moreover, De Heus Myanmar animal feed factory has also implemented the dust control system for production areas and already prepared the proper storage and handling facilities for meals and flours to lessen the accumulation of dust at the project site. Additional mitigation measures for powder typed materials will be stored by using large polypropylene bags (PP bags) with handles. To reduce the likelihood of dust explosion, the extraction system will be used in the bins, silos and also to provide bags filters in the intake area and in the hammer mill to filter out the dust during processing of conveyor system. Also, screening step has already been used in the processing area to remove all dust and foreign bodies in the products. For canteen facilities, kitchen ventilation system has already installed and operated in order to remove smoke, heat, odours, and steam from cooking.

6.7.2 Mitigation Measures for Noise Impact

The following mitigation measures will be considered to reduce noise levels in the operation phase of the animal feed factory.

- i) A high standard of maintenance will be practiced for plant machinery and equipment, which helps to avert potential noise problems
- ii) Low noise equipment will be used where possible
- iii) All preventive measures such as regular operation and maintenance of pump motors, and compressor will be carried out and enclosures will be provided to abate noise levels at source
- iv) Noisy equipment will not be permitted during night hours as much as possible

For Diesel Generator

Used of Generator should be housed in a suitable acoustic enclosure. The acoustic insulation should be designed to meet mandatory standards based on a 25 dB insertion loss.

6.7.3 Mitigation Measures for Water Consumption and Pollution

Water Consumption

In operation phase, according to the estimated water consumption for the whole factory is 180,000 cubic meter per annually for the purpose of boiler water and general office uses. So, the appropriate water conservation plan will be implemented with commensurate with the magnitude and cost of water use. These programs will promote the continuous reduction in water consumption and achieve savings in the water pumping, treatment and disposal costs. Building Facility Operations

- Regularly maintain plumbing, and identify and repair leaks
- Shut off water to unused areas
- Install self-closing taps, automatic shut-off valves, spray nozzles, pressures reducing valves, and water conserving fixtures (e.g. low flow shower heads, faucets, toilets, urinals and spring loader or sensored faucets)
- Operate dishwashers and laundries on full loads, and only when needed
- Install water-saving equipment in lavatories, such as low flow toilets

Sufficient quantities of water may be used for steam boiler for production sector, and this can be reduced by the following measures;

- Repair of steam and condensate leaks and repair of all failed steam traps
- Return of condensate to the boiler house, and use of heat exchangers (with condensate return) rather than direct steam injection where process permits
- Flash steam recovery
- Minimize boiler blow down consistent with maintaining acceptably low dissolved solids in boiler water. Use of reverse osmosis boilers feed water treatment substantially reduces the need for boiler blow down
- Minimize de- aerator heating

Wastewater Effluents

- An effective wastewater treatment system for production sector that reduced for BOD, COD, total nitrogen and other organic compound will be used to reduce the impact on aquatic lives and odor.
- Currently, practice of the wastewater effluents discharge facilities of sewage for sanitation and septic system can be seen in Figure (6.3) and (6.4).

Toilet Facilities

Currently toilet facilities at De Heus Myanmar's animal feed factory, has hygienic toilets already provided and categorized by gender, marked distinctly for men and women by signs and symbols. In addition, toilet areas will also be provided with water sinks, necessary toiletries, and hand washing soaps, hand drying facilities, and waste bins. Number and type of toilets quantity can be seen in Table (6.10).

No.	Area located	Kind/ category	Quantity
		Male	4
1.	Office	Male (Urinal)	4
		Female	3
2.		Male	2
	Utility Building	Male (Urinal)	3
		Female	1
3.	Security House	Male	1
4.	Guest/Customer waiting	Both gender	1
	area		
Total			19

Table	(6.	11)	Toilet	Facil	lities
-------	-----	-----	--------	-------	--------



Figure (6. 3) Grease trap design for the grease management system



Figure (6. 4) Filtering design for sanitation and septic system (3 steps) (3 compartments)

Recommended Wastewater Effluents Impact Mitigation Measures

- Ensure that liquid waste from the proposed site is directed to the appropriate drains
- Regularly monitor effluent quality
- Maintain the equipment, pipelines in good working conditions and drainage system to avoid clogging

6.7.4 Mitigation Measures for Waste Disposal

Bottom ash from steam boiler will be utilized as land fill materials in road construction and raw materials in brick making sites nearby. At De Heus animal feed mill factory, waste categorization has been developed into at least five types of waste that includes iron, compost waste, lubricant waste, recycle waste (such as poly propylene bags (PP) and cardboards etc. All of production waste such as crushed grain dust; packaging materials and other non-hazardous waste will be collected by designated garbage bins and then sent to the temporary storage areas of solid waste in the project site area (138 square meter) which include 5 compartments for different kinds of waste categories. In addition, pet control program has also implemented at the entrance of rodents and insects. De Heus Myanmar also has an agreement services with YCDC for waste disposal facilities to collect the all production waste, office waste and domestic waste. According to the waste management practice, De Heus Myanmar Limited has provided the dedicated dustbins for paper waste, plastic waste, production waste, laboratory waste and food waste for the proper disposal of waste.

Solid Waste Management System in the Proposed Project Site

- 1. Factory design accommodates curbside separation facilities
- 2. Engaged with local municipal waste management services

Appropriate recycling methods are in practice to dispose of the wastes in the environmental friendly manner.



Figure (6. 5) Layout of Solid Waste Disposal Room



Figure (6. 6) Waste Collection Practices at DH Myanmar Limited

6.7.5 Mitigation Measures for Occupational Health and Safety

Exposure of Dust: To minimise the worker's exposure to dust, effective reduction of exposure or control of dust sources by modifying the existing process and equipment used or change the composition of materials. For example, instead of using powdered type, substituting pelletized materials would reduce the dust exposure. Also, providing PPEs and having regular medical check-up of employee and providing treatments can minimize the likelihood of having diseases or illnesses related to dust exposure. In addition, all dust control facilities (such as filter bags, fans, and cyclones) already installed at the proposed De Heus Myanmar animal feed factory must be monitored, checked and repaired. Recommended mitigation measures for exposure of dust can be seen in Table (8.1).

Recommended dust control measures are as below;

- Organize the generated dusty areas of the production area to minimize the duration, frequency and level of exposure for employees
- Ensure proper handling of materials

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- Ensure good maintenance of factory and equipment
- Provide sufficient information, instruction, and trainings for employees about the use of control measures for exposure of grain dust
- Provide Personal Protective Equipment (PPE) including, protective clothing and respiratory protective equipment

Exposure of Noise: The Occupational Safety and Health Administration (OSHA) have recommended permissible noise exposure limit for industrial workers, which is based on 90 dB (A) for 8 hours exposure a day with 5dB trading rates. The limits are mentioned in Table (6.9).

Total Time of Exposure Per Day	Noise Level
in Hours	dB(A)
8	90
6	92
4	95
3	97
5	100
1	105
1/2	110
1/4	115

Table (6. 12) Permissible Exposure Noise Limits

According to OSHA, the maximum allowable noise level for workers is 90 dB (A) for 8 hours exposure a day. Thus, adequate protective noise impact measures in the form of ear muffs/ear plugs to the workers working in high noise areas, need to provide if actual noise level monitoring results are more than 90 dB (A) at the work site for working time hours for 8 hours.

In production area of De Heus Myanmar Limited, the required personal protective equipment (PPE) must be provided for all employees and workers to overcome the noise exposure impact working at production area. Regular monitoring of the noisy machines for running in production that includes hammer mill, conveyors and other noisy equipment and will maintain and prepare procedures to reduce the noise exposure on employees and workers.

Recommendations for noise exposure impact mitigation measures for managing exposure to noise and vibration, including use of appropriate PPE, are as follows:

- Provide ear plugs or ear muffs as required. Use re-usable ear plugs when the reduction required (15-25 dBA) is not excessive. Use ear muffs where a large attenuation of up to 40 dBA is demanded.
- Where noise levels exceed allowable levels laid down in health and safety legislation, warning notices will be required either at the machine/process.
- Provide disposable ear plugs for infrequent visitors and ensure that they are never re-used.

- Provide re-usable ear plugs for those who need to work continuously for a long period in a high noise area.
- Use ear muffs with replaceable ear cushions because they deteriorate with age or may be damaged in use.
- Avoid wearing spectacles with ear muffs.
- Use soap and water or the recommended solvent for cleaning ear muffs.
- Provide ear muffs for those who may need to get in and out of a high noise area frequently
- Auxiliary diesel engine must be ensured for soundproofing.

Recommended Mitigation Measures for Occupational Health and Safety

- Consider the provision of personal protective equipment only after all measures for removing or controlling safety hazards have been provided reasonably impractical
- Ensure that sufficient personal protective equipment is provided and that they are readily available for every person who may need to use them.
- The management will ensure that all persons make full and proper use of the personal protective equipment provided
- Provide instruction and training in the proper use and care of any specific protective equipment where necessary
- Do not willfully misuse, interfere with or ill-treat any protective clothing and equipment provided.
- Ensure that the personal protective equipment is in good condition. Report immediately any damage to the management for replacement. Always keep the personal protective equipment as clean as possible.

Monitoring will be designed and implemented by accredited professionals, as part of an occupational health and safety monitoring program. Facilities will also maintain a record of occupational accidents, diseases, and dangerous occurrences and accidents. Projects will try to reduce the number of accidents among project workers (whether directly employed or subcontracted) to a rate of zero, especially accidents that could result in lost work time, different levels of disability, or even fatalities.

Moreover, the proposed De Heus Myanmar Limited have been implementing the Health and Safety guidelines for the proposed animal feed production factory and will provide the safety training and require full personal protective equipment to work safely with automatic machines in production area for employees and workers. Mostly, they may suffer the short term health problems and long term health issues due to the exposure to fugitive grains dust, feed additives, drugs and premix and preservative chemicals, exposure of noise from operation of heavy feed mill machineries and other electrical hazards. To overcome the anticipated impact of Occupational Health and Safety for workers and employees working at animal feed production phase, recommended mitigation measures can be seen in Table (8.1).
Provided Mitigation Measures for Occupational Health and Safety

The following mitigation measures are currently used in De Heus Myanmar Limited according to their Health and Safety Guidelines in which exposure of Hazardous materials/chemicals, function of PPE used in the production area, material storage guidelines, first aid guidelines and facilities are included.

i) Exposure of Hazardous Materials/Chemicals

All of the hazardous chemicals have their own safety instructions for handling and use. Therefore, De Heus Myanmar Limited should aware of all of the employees about the safety measures of hazardous chemicals through training program. In order to prevent and minimise the risks happened in the workplace due to hazardous materials, safety box will be provided in which it is nonconductive and safe enough for fire, explosion, and personal injury. Appropriate labels on all materials and clear warning signs will be displayed. Guidelines for storage and handling of hazardous materials is also included to keep the flammable materials away from oxidising agents or any reactive materials, to check regularly for any damage, leakage or spill and expiry of materials by the person in charge. Personal protective equipment provided by the factory for all employees working at the production area can be seen in Table (6.12).

No.	PPE and its Function	Features	•	
	Eye Protection	Eye google shield	Face shield	
1	Eye googles for production from chemical <u>snread or smoke</u> Face shields for production from electric welding and spread			
	Respiratory Protection	Face Masks	Dust Respirator	
2	Face mask & dust respirator for protection the dust and any air brones hazard			
3	Head Protection	Hat for protection (Maintence , WH & Operation)	Hat for QC	
	Hard hats are for protection any physical injury occur from height or any area in the work place			
	Hand Protection	lates Glove	Rubber Glove	
	Glvoes for common tasks (Cotton & Leather)			
4	Gloves for chemical handling			
	Gloves for electrical work	UT X		
	Disposable gloves			
	Foot Protection	Safety Shoe	Safety Shoe	
5	Safety footwear for protection from any physical injury occur by falling or exposing to dangerous material & areas			
	Body Protection	Clothing for Production	Clothing for QC & Laboratory	Life Jacket
	General purpose protection clothing		0	. 51
6	Life Jacket			V
6	lab coat for protection from any risk happen from chemical and other lab appratus			

Table (6. 13) PPE Facilities Provided at De Heus Myanmar Limited

ii) Electrical Hazards Safety Practice in De Heus Myanmar Limited

For electrical hazard safety, electrical maintenance workers will do regular maintenance and repair of electric supply system. Restricted electrical areas will be provided with warning signs, clearly described and visible to workers and any person who come into the factory for any purposes. In order to have the safe electric system, the required mitigation measures are mentioned below to be followed by the workers;

- Mark all energized electrical devices and lines with warning signs
- Provide appropriate labelling of service rooms housing high voltage equipment and where entry is controlled or prohibited
- Conduct detail identification and marking of all buried electrical wiring prior to any excavation work

iii) Material Storage guidelines at DH factory

Storage practices to reflect the safety of workers has been also developed in De Heus Myanmar. All the shelves in the storage areas are secured, firmly placed, and organized to prevent from any collisions that can affect the workers during working. Different materials will be stored separately by type and according to the designed layout. The potential hazardous materials in the proposed factory are the use of chemicals in the laboratory for the analysis of materials and products. De Heus Myanmar has developed the hazardous materials list according to the information available on Material Safety Data Sheet (MSDS) and control measures to those hazards and related MSDS can be seen in appendix (12).

First Aid Guidelines and Facilities

A well organized and proper first aid system is implanted to provide immediate first aid to anyone who is injured in the workplace and had also conducted the first aid training by Myanmar Red Cross Society. Adequate number of first-aid kits are listed and made available at all workplaces and contacts of medical providers, hospitals will be notified. The followings are some of the contents in a sample first aid kit.

- Bandage
- Adhesive Tape
- Antiseptic wipe
- Burn dressing and treatment items
- Cold pack
- CPR barrier
- Sterile wound dressings
- Sterile eye coverings
- Scissors, tweezer, compress

6.8 Potential Environmental Impacts Occurred during Decommissioning Phase

The following are the anticipated impacts during operation phases of Animal Nutrition Product production factory;

- i) Impact On Air Quality (Dust generation and gases emission)
- ii) Impact of Noise and Vibration
- iii) Impact on Ground water and Soil Quality
- iv) Impact of Solid Waste
- v) Occupational Health and Safety

Physical Resources

6.8.1 Impact on Air Quality

Demolition of the factory building and related infrastructure of the proposed animal feed factory may generate emission of fugitive dust caused by a combination of on-site excavation and movement of earth materials and transportation of demolition waste. A secondary source of gas emissions may include exhaust from diesel engines of 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 is short term impact and can be mitigated with appropriate mitigation measures by the contractor and the proponent of De Heus Myanmar Limited.

6.8.2 Impact of Noise and Vibration

During 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 people. Activities likely to produce noise during this phase include cutting and demolition of structures. The demolition works will lead to significant deterioration of the acoustic environment within the project site and the surrounding environs. So, the anticipated noise impact will be mitigated with appropriate facilities.

6.8.3 Impact on Soil and Ground Water Quality

The water quality of the nearby drainage systems can be affected due to solid waste and wastewater drainage from the factory and also solid waste can damage soil quality if not properly handled. In addition, even the generally non-toxic chemicals such as chlorides, sodium, sulphate and ammonia, which may be released as a result of leaching of demolition waste, are known to lead to degradation of groundwater quality. Soil quality impact will be caused during decommissioning phase, such as excavation activities of digging and filling may impacts on soil quality. The accidental spillage of diesel, petrol, oil and other hazardous waste of decommissioning activities may impact on soil quality. Oil spill equipment and adequate secondary containment should be provided and managed to reduce soil degradation.

6.8.4 Impact of Solid Waste Disposal

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. Although demolition waste is generally considered as less harmful to the environment since they are composed of inert materials, there is growing evidence that large quantities of such waste may lead to release of certain hazardous chemicals into the soil environment. Other non-hazardous solid wastes may include office, kitchen, and dormitory wastes. In addition, the sanitary wastewater from decommissioning workers can be expected for liquid waste. Its amount depends on the number of workers involved. If the domestic wastewater from demolition site is not properly disposed into nearby surface water body, health of workers and residents from downstream area will be adversely affected due to water pollution. Moreover, persons or animals may fall into excavated pit, drainage channels leading to loss of life or injury.

6.8.5 Impact on Human

Employment Opportunities

Every project with long term investment can bring changes in socio-economic conditions of the local environment. Most of the impact on socio-economic environment may be positively associated with some adverse effects. Closed out of the proposed project may create temporary employments during the decommissioning phase.

Occupational Health and Safety

During the decommissioning phase, significant physical hazards may be caused due to the engineering and demolishing activities including demolishing of building and transportation of demolishing materials of heavy equipment, machines and other materials. Demolished workers will be exposed to risks of accidents and injuries. Moreover, accidents and injuries to workers and local communities can be caused from heavy vehicles movement for the transport of construction materials and equipment. In addition, accidents such as falling objects, open pits, sharp objects lying around, and dust may all be a health risk to demolishing workers. Risk of accidents and incidents will be heightened during the activities as workers will be in direct contact with heavy machinery and equipment. Moreover, the heavy duty vehicles, machineries and equipment used for decommissioning and transportation of demolished materials can affect the noise level of the area.

6.9 Project Activities and its Significant Impacts during Decommissioning Phase

Table	(6. 14) Evaluation a	nd Perdition	of Significan	nt Impacts	for Decomn	nissioning phase
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Potential Impacts	l Impacts Activity and Impact Sources		Magnitude	Extent	Probability	Significance point	Significance
Impact on Air Quality				-			
Air Pollution	Demolition activities such as excavation activities, cutting and filling	1	3	1	4	20	Low
	Delivering of demolished materials		3	1	3	15	Low
	Emission from site traffic		2	2	3	15	Low
	Temporary used of Diesel Generator	1	3	1	3	15	Low
Impact of Noise Disturbance to surround areas	Operation of demolishing machinery and equipment	1	4	2	4	28	Low
Health on Employees, workers	Vehicles movements of transporting purpose	1	2	2	2	10	Very Low
Impact on Ground Water and Soi							
Soil Contamination Soil Erosion	Accidental leakage of oil or grease from vehicle	1	3	1	3	15	Low
Soil Disruption	Excavation activities, cutting and filling of demolishing phase	1	4	1	4	24	Low

Potential Impacts	Activity and Impact Sources	Duration	Magnitude	Extent	Probability	Significance point	Significance
	Improper management of Demolished material on site	1	4	1	3	18	Low
	Removal of Building and ancillary structure	1	4	1	4	24	Low
Impact of Solid Waste							
Solid waste generated from decommission phase	Demolished material, solid waste food waste, domestic waste at project site of proposed factory		4	2	3	21	Low
	Food waste and domestic waste from temporary site of workers at project site		2	1	3	12	Very Low
	Dismantling of machines at project site		3	1	3	15	Very Low
Occupational Health and Safety							
Incidents and accidents leading to serious injury or fatalities	Dismantling of machines, Transport of equipment, heavy demolish materials,		5	1	4	28	Low
Exposure of airborne particulate matters, fugitives dust	Dismantling of machines and removal of building and ancillary structure		3	1	4	20	Low
Occupational Noise to employees and workers	Dismantling of machines and removal of building and ancillary structure	1	3	1	4	20	Low
	Movement of vehicles	1	2	1	3	12	Very Low

6.10 Environmental Impacts Mitigation Measures for Decommissioning Phase

Potential Impacts	Recommended Mitigation Measures
Decommissioning Phase	
Air Quality	 Implement and prepare the dust suppression technique, such as applying water or non-toxic chemicals to reduce dust from vehicle movements and demolished activities Open burning on the site premise is strictly prohibited on-site Provide and enforce the appropriate use of full PPE against dust
Noise and Vibration	 Use noise control devices, such as temporary noise barriers for workers Unused equipment will be turned off and the parallel use of noisy equipment/machinery must be avoided
Ground water and Soil quality	 Plan proper site clearing or disturbance of demolished waste materials Ensure excavated materials in backfilling the trenches or landscaping activities Provide the temporary systems to minimize downstream flooding in the site demolishing works Any accidental spills of fuel ,oil or other hazardous chemicals must be cleaned up immediately
Solid Waste	 Use recycled or refurbished demolition materials where as possible Encourage waste segregation at the source Good housekeeping practices are essential within the site Storage for secured area of any hazardous materials and hazardous waste Dispose of demolished solid waste in compliance with regulations in Myanmar
Liquid Waste	 Use water prudently to reduce liquid waste volume Ensure sewage systems is functional during demolition, to prevent pollution of nearby underground and surface water sources Demolish the sewage systems properly to prevent pollutions by contents into the environment and ground water Provide adequate secondary containment for fuel storage tanks and for the temporary storage of other fluids such as lubricating oils and hydraulic fluids Train workers on the correct transfer and handling of fuels

Table (6. 15) Environmental Impacts Mitigation Measures for Decommissioning Phase

Occupational Health and	• HSE coordinator must be appointed and monitored the						
Safety	demolishing activities during demolishing phase						
	 Training of workers in lifting and materials handling techniques 						
	in decommissioning phase						
	• Planning work site layout to minimize the need for manual						
	transfer of heavy loads						
	• Using inspected and well-maintained lifting devices that are						
	appropriate for the load, such as cranes, and securing loa						
	when lifting them to higher job-site elevations.						
	 Use slip retardant foot wear 						
	 Provide temporary fall arrestors 						
	 Maintain clear traffic ways to avoid driving of heavy equipment 						
	over loose scrap						
	 Promote safe and healthy working conditions and workforc 						
	health and well-being, and prohibit any use of forced labor						
	 All excavations must be filled up after the plant closure 						

6.11 Environmental Impacts and Its Significance Summary

The assessment of each impact is based on consideration of the magnitude, duration, extent and probability of activities which are going to be carried out during operation and decommissioning phases. In operation phase, there are 5 moderate significance impacts on environment and human such as impact of wastewater effluents, impact on aquatic lives, impact of electricity consumption and occupational health and safety of generated crushed grains dust, exposure of noise, slip, trip and fall impact on employees, workers and 20 low significance impacts on environmental and human and detail impact assessment for operation phases can be seen in Table (6.8). During the decommissioning phase, all of the project activities have 13 low significance impacts and 4 very low significance impacts to environment and human. All of the impacts during operation and decommissioning phases can be minimized by using mitigation measures and implementing Environmental Management Plan.

7. RESULTS OF THE PUBLIC CONSULTATION

7.1 Public Consultation Processes

Public participation can be considered as the required element of the IEE process. In this study, various stakeholders' participation was made.

On 7th March 2017, a public consultation and disclosure ceremony was held at the proposed project site of De Heus Myanmar Factory, Myaung Dakar Steel Industrial Zone, Hmawbi Township, and Yangon Region in order to disclose the project information to the following personnel:

- Institutions (Local or Government Authorities at Hmawbi Township
- Individuals (Groups with special interests, business community etc.)
- Project Affected Persons at proposed factory site
- 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. Presentation activity photos of public hearing and consultation, ceremony are mentioned in the appendix (11). Agenda of the public hearing consultation meeting was held according to the following program:

- 1. Opening of the meeting
- 2. Opening Remarks by U Thu Hla Zaw, Plant Manager of Deheus Myanmar Limited.
- 3. Presentation of Initial Environmental Examination, IEE report study for production of De Heus Myanmar factory by Daw Yu Wai Yan Thein Tan, Consultant of E Guard Environmental Services Co., Ltd.
- 4. Recommendation and suggestion by Attendees
- 5. Giving presents to Attendees
- 6. Closing Thanks by U Thu Hla Zaw, Plant Manager of Deheus Myanmar Co., Ltd.
- 7. Closing of the meeting.

Participant List

List of people attended to the stakeholder meeting from various communities is mentioned in the below Table and scan documents of attended list were mentioned in appendix (11).

No. Category		Number of Participants
1	Government Officers	13
2	Private Company	3
Total		16

7.2 Recommend Suggestion from the Government officer and Local Community

No.	Stakeholders	Address	Their opinion and suggestion
1.	Daw Myat Thiri Tun	Staff Officer, Directorate of Industries Supervision and Inspection	 To prepare sufficient dust control system, noise and vibration control systems especially as silencer for noisy area of production area To measure not only Volatile Organic Compound(VOCs) but also Volatile Fatty Acid at Environmental quality baseline data To provide Quality Control (QC) for each product To prepare the product trade mark reregistration process for proposed production product To measure impacts whether they are because of point source or non-point source at production area
2.	Daw Aye Win Khine	Staff Officer, ECD, Yangon Region	 To send the monitoring report to ECD department regularly for environmental quality of air, water and wastewater quality, noise level and solid waste management prepared in EMP plan To participate in meeting hold at Myaung Dakar industrial zone from Environmental awareness meeting of workshop from ECD
3	U Zaw Min Oo	Officer, Myanmar Fire Service Department,	- To prepare and follow up the First Safety Certificate Process according to the

Table (7.5) Suggestion and Comments on Proposed Project

No.	Stakeholders	Address	Their opinion and suggestion
		Hmawbi Township	requirement for fire safety
4	U Maung Zaw	Administrator, Kan Kalay Village	- To inform the update information of proposed project for environmental
			conservation purpose

7.3 Project Proponent's Written Responses to Comments

 Table (7. 6) Project Proponent's Response at Public Hearing Meeting

Question and Answer and Their Opinion and suggestion at Meeting

Daw Myat Thiri Tun, Staff Officer, Directorate of Industries Supervision and inspection Question :

- To prepare sufficient dust control system, noise and vibration control systems especially as silencer for noisy area of production area
- To measure not only Volatile Organic Compound (VOCs) but also Volatile Fatty Acid at Environmental quality baseline data
- To provide Quality Control (QC) for each product
- To prepare the product trade mark reregistration process for proposed production product
- To measure impacts whether they are because of point source or non-point source at production area

Answer : U Thu Hla Zaw, Plant Manager explained that DH Myanmar animal feed factory design was constructed with Europe animal feed factory and how they are well prepared for environmental impact control measures for dust control system, noise control system, solid waste management facilities at project site. In addition, DH Myanmar will follow up and prepare the good suggestion of Daw Myat Thiri Win.

Daw Aye Win Khine, Staff Officer, Environmental Conservation Department, Yangon Region)

Question :

- To send the monitoring report to ECD department regularly for environmental quality of air, water and wastewater quality, noise level and solid waste management prepared in EMP plan
- To participate in meeting hold at Myaung Dakar industrial zone from Environmental awareness meeting of workshop from ECD.

Answer : Plant Manager, U Thu Hla Zaw said that DH Myanmar Limited will be provided by Environmental Monitoring Report to ECD department and they will attend the meeting of environmental awareness training held from ECD at Myaung Dakar Industry Zone Committee when they were invited to them. U Zaw Min Oo, Officer, Myanmar Fire Service Department, Hmawbi Township Question : To prepare and follow up the First Safety Certificate Process according to the requirement for fire safety

U Thu Hla Zaw, Plant Manager, DH Myanmar Limited

Answer: He explained that they are doing the ongoing process of Fire Safety Certificate for proposed DH animal feed factory and they will be followed for that process. In addition, Plant manager U Thus Hla Zaw also explained that they have implemented the fire safety plan, training, firefighting training for employees under the supervision of fire services departments.

U Maung Zaw, Administrator, Kan Kalay Village

Question : To inform the update information documents of proposed project for environmental conservation purpose

Answer: Plant manager said that DH Myanmar Limited will help to the local community at project site to less the environmental issue associated associate with their project.

As per outcome of public consultation for animal feed mill project of De Heus Myanmar Co., Ltd., management team of DH Myanmar committed to help the local community development as much as possible by communicating with main stakeholders in a honest and transparent way, and by reducing the environmental impacts of this project on local community in line with environmental law, rule and regulations of Myanmar.

7.4 Grievance Redress Mechanism

De Heus Myanmar Limited has the process to address the grievance from the workers and the grievance letter and grievance procedure is shown in **Figure 7.1 and 7.2 respectively.** The workers have to describe the department and subject and ID as described in the form provided by the Company (Figure 7.1). After filling up the form, workers need to put in the suggestion box. The person in charge has to collect the grievance letter from the suggestion box every day. The grievant has to meet with the Grievance manager and solve the problem. If the problem cannot be solved by Grievance Manager in this stage, the workers need to write formal complaint letter and submit to workplace coordinating committee. If the problem cannot be solved by that committee, the workers have to negotiate with the conciliation committee.

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Figure (7. 1) Grievance Letter



Figure (7. 2) Grievance Procedure

8. ENVIRONMENTAL MANAGEMENT PLAN

8.1 Institutional Requirements and Environmental Management Plan

8.1.1 Institutional Requirements

The development of the proposed project will be managed by De Heus Myanmar Limited. The project proponent appoints one Health, Safety and Environment (HSE) Coordinator and Assistants for Health, Safety and Environment (HSE) issues throughout the lifespan of the project. HSE Coordinator is responsible for implementation and monitoring of Environmental Management Plan (EMP) and Monitoring Plan as well as coordination with contractors, local authorities and the nearby communities. The HSE Team also makes regular review of EMP to cover all potential impacts, amendments and modifications. The HSE team and their duties are mentioned in the Appendix 16 and HSE guidelines in Myanmar Language are reported in Appendix 17 respectively.

8.1.2 Environmental Management Plan

The environmental management practices, procedures and responsibilities are defined herein to get full compliance with the existing environmental policy, laws, rules and regulations of the Republic of the Union of Myanmar. The Environmental Management Plan (EMP) is prepared for the proposed project covers the anticipated impacts of the said project, mitigation measures, management and monitoring plans during each of the phases:

- Operation
- Decommissioning

The Environmental Management Plan (EMP) is a site specific plan developed to ensure that the project is prepared in an environmentally sustainable manner where all contractors and subcontractors, including consultants, understand the potential environmental risks arising from the proposed project and take appropriate actions to properly manage that risk.

There are five main sections in this EMP plan and detailed EMP plan based on the project activities.

- 1) Impact Mitigation Measures Plan for Operation phase and Decommissioning phase
- 2) Environmental Monitoring Plan including with Monitoring Guidelines and Standards
- 3) Emergency Preparedness Plan and Training Program
- 4) Budget Allocation for Environmental Management Plan (EMP)
- 5) Corporate Social Responsibility (CSR) Plan

8.1.3 Objectives of EMP

The specific objectives of the EMP are to;

- Serve as a commitment and reference for the proponent to implement the EMP including the conditions of approval from the Environmental Conservation Department (ECD), Ministry of Natural Resources, and Environmental Conservation (MONREC).
- 2) Serve as a guiding document for the environmental and social monitoring activities.

3) Provide detailed specifications for the management and mitigation of activities that have the potential for negative impacts on the environment.

8.1.4 Responsibilities of the EMP

In order to ensure the sound development and effective implementation of the EMP, it will be necessary to identify and define the responsibilities. The environmental management practices, procedures, and responsibilities are defined herein to get full compliance with the existing environmental policy, laws, rules and regulations of the Republic of the Union of Myanmar. The following entities should be involved in the implementation of this EMP:

- De Heus Myanmar Limited
- ECD (Yangon Region)
- Third-Party Environmental Consultant

De Heus Myanmar Limited: The proponent will be charged with the responsibility for ensuring that the proposed development has been accomplished in an environmentally sound manner. This can be achieved by inclusion of environmental specifications in the tender specifications, selection of environmentally conscious contractors, and supervision to ensure that the objectives of this EMP are met. The implementation of Environmental Management Plan (EMP) process will prepare and follow up by appointed persons for health, safety, and environmental management under the instruction of management team of De Heus Myanmar Limited for EMP implementation facilities.

ECD (Yangon Region): The responsibility of ECD is to exercise general supervision and coordinating over all matters relating to the environment and also to be instrumental in providing guidance for recognized regulatory frameworks.

Third-Party Environmental Consultant

The environmental consultant will have to ensure that the proposed EMP is up to date and is being followed properly by the proponent. Periodic audits of the EMP will have to be done to ensure that its performance is as expected, by comparing with operating standards so that any corrective actions can be taken.

8.1.5 Structure and Responsibilities for the EMP Development and Implementation

The HSE officer is responsible to the HSE components of the project and on matters relating to the implementation of the EMP throughout construction and operation. The S&E officer will have responsibilities that include:

- Ensure a monitoring system is in place to track and report all health, safety and environmental incidents;
- Carry out a thorough initial site inspection of environmental controls prior to work commencement;
- Record and provide a written report to the General manager and production team of non-conformances with the EMP and require the HR manager Jr. HR supervisor to undertake mitigation measures to avoid or minimize any adverse impacts on environment or report required changes to the EMP;

- Direct the supervisors to stop work immediately where considered necessary, if in the view of the HSE officer, an unacceptable impact on the environment is likely to occur or an unsafe activity is occurring or likely to occur. The HSE officer will provide prior written advice to the production management team where possible, or if not, as soon as practicable, to advise of any direction given to Managing Director (MD).
- Review corrective and preventative actions to ensure the implementation of safety and environmental measures. In the event that a direction is not complied with satisfactorily, the S&E supervisor shall escalate the issue to the plant Manager.
- Implement strategies/ techniques to improve the HSE performance;
- Report to the HR Jr.Hr Supervisor (frequency to be established);
- Review and approve minor revisions to the EMP. Broad-scale revisions are to be approved by the Plant Manager;

The Health, Safety and Environmental (HSE) officer will be responsible for the selection and application of technology, management systems, and environmental risk assessment tools that will help ensure that the facility has no adverse environmental impact to the air, water, land or community. This position will also be responsible for maintaining the facility in full compliance with applicable environmental regulatory and company requirements. The appointed Quality person will be therefore be directly responsible for the development and implementation of the EMP and will be the contact point with the HSE in terms of issues related to the EMP. For certain issues such as the emergency response plan or sustainability issues, the Safety & Environmental officer will coordinate with other managers and supervise their performance on issues relating to the EMP. The appointed person will also coordinate with the manufacturing leaders/ Supervisors in order to ensure that the EMP is correctly implemented in each of the units.

8.2 Impact Mitigation and Monitoring Plan

The factory shall conduct regular monitoring of water, wastewater, air and noise (major sources of environmental impacts) to compare with the baseline data measured on January, 2017. Environmental monitoring shall be carried out regularly by examining the parameters as described in **Table (8.3)** to **(8.8)** throughout the project's lifecycle. It is necessary to appoint or assign the HSE Coordinator or Environmental Manager to perform the monitoring plan and inspect 0the HSE activities according to the existing laws and regulations.

Monitoring parameters were selected considering the impacts identified and predictions. The parameters shall expose the effectiveness of the mitigation measures and general environmental performance of the project. Monitoring of the parameters will be done in various stages of the project as follows;

- Operation Phase ; To examine the impacts that might arise as the result of normal use of the infrastructure and resources
- Decommissioning; Decommissioning is not anticipated in the foreseeable future. However, if this will happen, may entail parameters mentioned in Table (8.9).

8.2.1 Environmental Impact Mitigation Plan for the Operation Phase

According to the impact assessment of occurred in during the operation phase mentioned in chapter (6) and environmental issues associated with the operational phase primarily include the following issues:

- 1. Impact of Crushed Grains dust and gases emission
- 2. Impact of odor from storage of raw materials, feed additives, drugs and premix
- 3. Impact of Noise from operation of hammer mill, motors and heavy machines
- 4. Impact on Aquatic lives due to boiler discharge water
- 5. Impact of Electricity consumption
- 6. Impact of Solid Waste and Wastewater Discharge
- 7. Occupational Health and Safety for employees and workers

Although the proposed De Heus animal feed mill factory has a number of adverse impacts on the surrounding environment, all of impacts will be reduced to some extent by related proper mitigation measures. However, the unavoidable impacts would evolve from Occupational Health and Safety of workers in the aspect of physical hazards with long term and short term working due to crushed grains dust, inhalation of raw materials dust, odor of premix, and feed additives. So, mitigation plan of operation phase is mentioned in Table (8.1). These activities shall be carried out to show that the factory operations are in compliance with the maximum allowable environmental norms and standards.

8.2.3 Environmental Mitigation Plan for Decommissioning Phase

In this phase, it is necessary to outline some basic mitigation measures that will be required to be undertaken once all operational activities of the project have ceased. As a result of proposed plant closure, various environmental and social aspects may be affected. These are grouped as either socioeconomic impacts or environmental impacts.

Environmental Impact during the Decommissioning Phase;

- Interference with ground water and Soil quality
- Huge amount of demolishing wastes, electrical cables, electronic device waste generation and hazardous waste
- Significant noise and vibration from all demolishing activities
- Occupational Health and Safety for employees and workers

Residual **Potential Source of Impact** Responsible Time **Recommended mitigation measures** and Components Person Frame Impact Impact on Air Quality Air Pollution HSE • High efficiency cyclone and fabric filters must be installed Throughout Low Operation Officer/ Regularly monitor, check and repair all dust engineering ٠ ✓ Grains Dust and Phase Plant control system fugitives dust and odor Manger • Prepare and implement the cleaning facilities and cleaning generated from De Heus procedure for all dust control system installed at production production sector Myanmar sector ✓ Exhaust emission from Ltd. • Maintenances and checking schedule must be implement for vehicles movements and all dust control system installed at factory with frequency of diesel generator cleaning including responsibilities for tasks ✓ Fly ash and Gases • Regularly Monitor, Check and repair the filter bags and fan emission from Steam boiler (used of rice husk installed at boiler Plant and grass plantation programs must be provided at fuel) project site Diesel consumption of generator must be managed and monitored to reduce the expanse and CO2 emission Provide the water spraying facilities for inside the factory road • Impact of Odor Emission of odor from storage • All feed additives, drug and premix and other volatile raw HSE facilities room of raw materials. materials must be stored at designated temperature and storage Officer/ feed additives, drugs, premixes facilities according to their MSDS guidelines Plant Very Low and chemical preservatives Tightly closed the cover of feed additives, drugs drums and Manger • De Heus storage tank to avoid odor emission

Table (8. 2) Environmental Impact Mitigation Measures Plan during Operation Phase

Potential Source of Impact and Components	Recommended mitigation measures	Residual Impact	Time Frame	Responsible Person
	 Regularly monitor and check the storage room of solvent materials (feed additives, drugs and chemical preservatives) to prevent accidental leakage Control the temperature, humidity, and other environmental factors for storage facilities of raw materials, feed additives, premix and drugs to reduce emission Keep the dust levels low, as odor are absorbed and carried by dust particles Prevent of the odor emission from temporary storage site of solid waste at project site Provide the Ventilation systems and devices with sufficient number and capacity to prevent grease or condensation from collecting on walls and ceiling Reduce VOC emissions by ventilating the storage area through use of capture devices (i.e. hood, total enclosure device) 			Myanmar Ltd.
Impact of Noise				
 Noise Generation ✓ Operation of machineries and equipment ✓ Vehicles, lorry crane and forklift movements ✓ Operation of boiler 	 Ensure all the machineries are well maintained to reduce noise Install the silencers for fans Install the suitable mufflers on engine exhausts and compressor components Monitor the ambient and work zone noise level to conform the stipulated norms Emergency use of diesel engine must be ensured by soundproof 	Very Low	Throughout Operation Phase	HSE Officer/ Plant Manger De Heus Myanmar Ltd.

Potential Source of Impact and Components	Recommended mitigation measures	Residual Impact	Time Frame	Responsible Person
 ✓ Emergency Use of Generator 	 Noise level monitoring programs must be designed and conducted by trained specialists at production area 			
Impact on Ground Water				
Water Consumption	 Install water meter for internal control of water consumption All staff must be trained and made aware conservation practices and proper methods of water use must be placed in the toilets and other areas of water consumption 	Low		HSE Officer/ Plant Manger De Heus Myanmar Ltd.
Impact of Wastewater effluent				
Effect of sewage effluents and boiler water effluent from the factory processing	 Properly designed and installed the sewage effluents treatments facilities to prevent any hazard to public health or contamination of land, nearest surface water and ground water Ensure that lines and sewage system of factory drainage and the nearest public drainage are watertight and sufficient capacity Regular monitoring the sewage treatment facilities and follow the NEQE guideline Adequate wastewater treatment facilities must be provided so that the treated effluents conform to the regulatory standards of NEQ (emission) guideline at the project site 	Low		HSE Officer/ Plant Manger De Heus Myanmar Ltd.

Potential Source of Impact and Components	Recommended mitigation measures	Residual Impact	Time Frame	Responsible Person	
	 avoid the block of water flow Monitor the boiler effluents water temperature to meet the NEQ (emission) guideline 				
Impact on Aquatic Lives					
Boiler discharge wastewater General domestic wastewater for office use	 Regularly monitor and check the discharge temperature from boiler wastewater before directly discharge into factory's final drainage Develop the effluent water temperature record form for boiler discharge water in line with NEQ (emission) guideline Adequate treatment facilities must be provided so that the treated effluents conform to the regulatory standards of NEQ (emission) Guideline 	Low		HSE Officer/ Plant Manger De Heus Myanmar Ltd.	
Impact of Electricity Consumption					
For operation of heavy animi feed mill by using Automatic process control system and office use	 Ensure that good housekeeping measures such as turning off equipment and lights when not in use Installation of timers and thermostats to control heating and cooling Used of energy saving devices must be installed 	Low		HSE Officer/ Plant Manger De Heus Myanmar Ltd.	

Potential Source of Impact and Components	Recommended mitigation measures	Residual Impact	Time Frame	Responsible Person
Impact of Solid waste				
 Waste Disposal ✓ Crushed Grain Dust, packaging materials, food waste from canteen and office waste ✓ Hazardous Waste such as chemical waste (accidental spill and leakage of feed additives, drugs, premix and preservatives chemicals) 	 Use of less excessive and more environmentally friendly packaging materials Monitor the product losses during processing and optimize process yields Regularly inspection must be carried out of all bulk containment on site prevent leakage and product loss Train both cleaners and employees for proper good housekeeping practice at production area Minimize spills and leaks on the production line to prevent RM and feed additives from becoming wastes Regular check the temporary storage site of generated solid waste from the whole factory All employee must be followed and practiced by the principle of waste reduction, recycling, recovery and reusing Solvents and Oil waste must be collected by designated jerry cans Provide appropriate control devices in storage of solvents, diesel to avoid possible leakages Provide -site-specific" training to department members who work with chemicals at laboratory and production area. Ensure that lighting and ventilation is adequate is the chemical solvents storage area Dispose at permitted areas specially designed to receive the 	Low	Throughout Operation Phase	HSE Officer/ Plant Manger De Heus Myanmar Ltd.

Potential Source of Impact	Recommended mitigation measures	Residual	Time	Responsible
and Components		Impact	Frame	Person
	 waste Regularly check the storage and disposal areas of all hazardous chemical to prevent accidental release Provide separate storage tank or designated bin for chemical wastes Regular inspection must be carried out of all bulk containment on site prevent leakage and product loss Label the waste container as -Hazardous Waste" and attach the complete name of chemical contained in the container Any spillage of hazardous chemicals on land area of plant remise must be avoided with MSDS guideline Separate areas must prepare for rejected products, waste materials and chemicals. All waste must be disposed of any applicable environmental regulation Dispose the hazardous material to the identified respective place away from the canteen and production area Ensure that all inside and outside areas, buildings, facilities and equipment are kept clan and in good state to function as intended and to prevent contamination Used of Feed additives , drugs drum and tank must be checked and stored in water tight recipient and taken to reuse or recycling Monitor the storage area of raw materials, feed additives and 			

Potential Source of Impact and Components	Recommended mitigation measures	Residual Impact	Time Frame	Responsible Person
	 drugs storage and disposal area to prevents accidental release Provide spill mitigation equipment, double wall tanks and diking storage tanks 			
Occupational Health and Safety				
 ✓ Exposure of Grain dust related respiratory health problem ✓ Accident and incidents leading to serious injuries ✓ Exposure of Noise ✓ Exposure of Odor, VOC emissions ✓ Exposure to hazardous materials (feed additives, drugs and preservatives chemicals) ✓ Risk of increase in road accidents ✓ Electrical Hazards ✓ Risk of fire and dust explosion 	 Monitor and strict of employee and workers to wear the uniform and full personal protective equipment (PPE) during working at operation area Monitor the workplace to determine the levels of grain dust present at production are Provide the appropriate action to protect employees from dust exposures that exceed the level permitted by OSHA Arrange appropriate health check-up facilities Instruct and train all employees to use control measures properly and tell about the health risk Provided the informing and training employees on the use of control measures for exposure of grains dust Measure the PM 10 and PM2.5 concentration in production area by quarterly and compare with NEQ (emission) guideline Plant must implement the safety and health program designed to identify, evaluate, monitor and control safety and health hazards 	Low	Throughout operation phase	HSE Officer/ Plant Manger De Heus Myanmar Ltd.

Potential Source of Impact	Recommended mitigation measures	Residual	Time	Responsible
and Components		Impact	Frame	Person
	 85 dB(A) for a duration of more than 8 hours per day without hearing protection. Use of hearing protection must be enforced actively when the equipment sound level over 8 hours reaches 85 dB (A) Provide appropriate training for machine handling Ensure all rooms are well ventilated and Lighting Ensure factory laws are strictly followed Clearly display warning signs or symbols for dangerous areas at the factory Monitoring plan must be prepared by accredited professionals Regular maintenance of the road and Use of traffic signs Provide the training programs for industrial vehicles operators in the safe operation of specialized vehicle such as forklifts, including safe loading/unloading, load limits Keep Material Safety Data Sheet (MSDS) from the manufacturer for flammable combustible liquids indicating their flammable ranges in % per volume Provide spill absorbent material/ equipped with secondary containment facility for storage of hazardous materials Emergency procedures for hazardous chemical spillage must be implement Implement of engineering and administrative control measures to avoid or minimize the release of hazardous substance Work process, engineering, and administrative controls must 			

Potential Source of Impact	Recommended mitigation measures	Residual	Time	Responsible
and Components		Impact	Frame	Person
	 be designed, maintained, and operated to avoid or minimize release of biological agents into the working environments. The employee must review and assess known and suspected presence of biological agents at the work place and implement appropriate safety measures, monitoring, training, and training verification programs 			

Potential Sources of Impact	Recommended mitigation measures	Residual Impact	Time Frame	Responsible Person
Impact on Air Quality				
Transportation of demolished materials and excavation of building	 Ensuring that proper notification must be prepared prior to demolition Set up dust barriers at strategic locations Practice dust management techniques, including watering down dust Selectively Remove the potential hazardous air pollutants, such as asbestos, from existing infrastructure prior to demolition Strictly avoid the open burning of solid waste at project site 	Low	Throughout decommissio ning phase	Contractor/ HSE Officer of De Heus Myanmar Ltd.

Table (8.3) Environmental Impact Mitigation Measures Plan during Decommissioning Phase

Potential Sources of Impact	Recommended mitigation measures	Residual Impact	Time Frame	Responsible Person
	 Provide PPE against dust (i.e., Mask) 			
Impact of Noise and Vibration				
Noise short term noise nuisance and hearing loss) Operation of Demolishing activities of heavy machinery and equipment and vehicle movements for	 Prepare the planning activities in consultation with local communities before demolishing phase The proponent must be responsible for compliance with the relevant legislation with respect noise Schedule noisy activities during day time period Ensure machinery is well maintained to reduce noise generating Use of noise control devices, such as temporary noise barriers and exhaust muffling devices for combustion engines 	Low	Throughout the decommissio ning phase	Contractor/ HSE Officer of De Heus Myanmar Ltd.
Impact on Soil and Ground Water				
Soil and Ground Water pollution Accidental spillage of diesel and lubrication oil from vehicles Temporary sewage facilities	 Ensure sewage system is functional during demolition to prevent pollution of nearby underground and surface water sources Proper demolition of the sewage system to prevent pollution by contents into the 	Low	Throughout decommissio ning phase	Contractor/ HSE Officer De Heus Myanmar Ltd.

Residual Responsible **Potential Sources of Impact Recommended mitigation measures Time Frame** Person Impact environment and ground water Impact of Solid Waste Solid waste Enforce segregation of waste at the Throughout Contractor/ Low source to encourage reuse and recycling the Demolishing HSE Officer of De materials and Disposal of solid waste in compliance construction waste decommissio Heus Myanmar Ltd. with local government policy ning phase Scraps and other debris onsite Removes all equipment and debris ready to utilize the site for other uses Demolished materials waste must remove . from the site and properly disposed of in designated location Provide the adequate secondary containment for fuel storage tanks and for the temporary storage of the other fluid such as lubricating oils and hydraulic fluids Clean-up the excessive waste debris and liquid spills regularly Impact on Employees and Workers Occupational Health and Safety Monitor the decommissioning site by Throughout Very Low Contractor/ assigned person of HSE Officer Use of the

Potential Sources of Impact	Recommended mitigation measures	Residual Impact	Time Frame	Responsible Person
Incidents and accidents leading to serious injury or fatalities	 specially trained person to identify and remove waste materials from tanks, vessels, processing equipment or contaminated land as a first step in decommissioning activities to allow for safe excavation and dismantling or demolition Provide the first aid kid at decommissioning site Ensure the planning work site layout to minimize the need for manual transfer of heavy loads Implement good house-keeping practice, such as the sorting and placing loose demolition debris in established area 		decommissio ning phase	HSE Officer of De Heus Myanmar Ltd.
	away from the foot pathsUse of slip retardant footwear			

8.3 Environmental Monitoring Plan

Monitoring of the anticipated environmental and social impacts in the receiving environments is important in evaluating the effectiveness of mitigation plan and compliance with the regulatory measures in place. During the operation phase and decommissioning, monitoring will be undertaken to ensure that proposed mitigation measures for negative impacts and enhancement measures for positive impacts are implemented.

Main objectives of environment monitoring plan include;

- a) To identify and resolve environmental issues and other functions that may arise during the operation phase
- b) To implement water quality, air quality and noise impact monitoring plan during the operation phase
- c) To check and quantify the overall environmental performance, implement action plans and recommend and implement remedial actions
- d) To conduct regular reviews of monitored data as the basis for assessing mitigation measures are identified, designed and implemented;
- e) To assess and interpret all environmental monitoring, data to ascertain whether environmental control measures and practices are functioning in accordance to specifications
- f) To predict the unforeseen impacts

8.3.1 Environmental Monitoring Plan during Operation Phase

Function for the monitor manual monitor man and manifest operation i mas	Table (8. 4	g Operation Phase	during	Monitoring Plan
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Phase	Component	Parameter	Target Level	Measuremen	Area to be	Monitoring	Responsible
	Environmental Impacta			t Method	monitorea	Frequency	Person
	Environmental impacts						[
	Air Quality	1.Ambient Air Quality	Within	Relevant Air	Project site	Biannually	HSE
	Ambient Air Quality	$PM_{10}, PM_{2.5}, CO,$	NEQ Guideline and	Quality	Of downwind		Officer /
	Indoor Air quality	CO_2 , NO_2 , SO_2 ,	International	Monitoring	direction and		De Heus
		2.Indoor Air Quality	standards limit	Equipment	inside the		Myanmar
		PM10, PM2.5 and VOC	levels		production area		Ltd.
Operation							
Phase	Water Quality	Ground Water Parameter	Within WHO		Tube well	Biannually	HSE Officer/
	1.Ground Water	(see in Table (5.8) and	standards limit and	Relevant	water and	for ground	De Heus
	2. Waste Water	Wastewater Effluent	NEQ Guideline	Laboratory	Final Drainage	water,	Myanmar
		See in Table (8.6) and (8.7)	levels		channel at	Quarterly for	Ltd.
					project site and	wastewater	
					Boiler		
					discharge		
					water		
		Noise level	Within standards	Relevant	Operation area		HSE Officer/
	Noise Pollution	(dB(A) scale)	International limit/	Noise Meter	inside factory,	Biannually	De Heus
			NEQE Guideline	Equipment	Sensitive spots		Myanmar
				dB	at the project		Ltd.
					site		



Phase	Component	t	Parameter	Target Level	Measuremen t Method	Area to be monitored	Monitoring Frequency	Responsible Person
	Solid Waste		Production waste, Laboratory	Volume of solid				Waste
			waste, Rejected products,	waste (ton or Kg)	According to	Temporary	Daily	Collector/
			Boiler Down Ash,		the Hmawbi	Storage Sites		YCDC/
			Packaging waste bags and		CDC	of proposed		HSE Officer
			containers			factory		of De Heus
			Domestic refuse, Paper and					Myanmar
			general office waste and					Ltd.
			domestic waste					
	Socio-Economic	Impact						
	Occupational, H	Health	Short term affect (accidents	Zero accident cases	According to		Monthly	HSE
	and Safety		case of slip, trip and fall)	Safety training for	the	1.Project Site		Officer/
			Long term affect (inhalation of	workers and	Occupational	2. Production		Jr.Hr
			dust, noise)	accident reports,	Health and	Sector		Manager of
				community	Safety Plan			De Heus
				consultations	of the			Myanmar
					Government			Ltd.
					of Union of			
					Myanmar			
					Ministry of			
					Industry (1)			

8.3.2 Environmental Quality Monitoring Guidelines during Operation Phase

i) Air Monitoring Guidelines

Parameters	Guidelines Value	Unit	Averaging Period
Particulate Matter (PM 10)	50	µg/m ³	24hrs
Particulate Matter (PM 2.5)	25	μg/m ³	24hrs
Nitrogen dioxide (NO ₂)	200	$\mu g/m^3$	1hr
Sulfur Dioxide (SO ₂)	20	$\mu g/m^3$	24hrs
Ozone (O ₃)	100	$\mu g/m^3$	8 hour daily maximum
Volatile Organic Compounds (VOC)	100	mg/Nm ³	8hrs

Table (8.5) Air Quality Monitoring Gu	uidelines
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^a Particulate matter 10 micrometers or less in diameter

^b Particulate matter 2.5 micrometers or less in diameter

Noise Levels Monitoring Guideline

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

Table (8.	6	Noise	Levels	of NEQ $% \left({{\left({{NEQ} \right)} \right)} \right)$	(emission)	Guidelines

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

^a Equivalent continuous sound level in decibels

ii) Wastewater Effluents Standard of NEQ (emission) Guidelines

Table (8. 7) 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			
pН	S.U. ^a	6-9			
Temperature increase	°C	<3 ^b			
Total residual chlorine	mg/l	0.2			
Total Suspended Solids	mg/l	50			
Zinc	mg/l	1			

Table (8.8) Wastewater Effluent Levels for animal feed factory

Parameter	Unit	NEQ (emission)
		Guideline Value
5-day Biochemical oxygen demand	mg/l	50
Active ingredients / Antibiotics	To be determined or	n a case specific basis
Chemical oxygen demand	mg/l	250
Oil and grease	mg/l	10
рН	S.U. ^a	6-9
Temperature increase	°C	<3 ^b
Total coliform bacteria	100 ml	400
Total nitrogen	mg/l	10
Total phosphorus	mg/l	2
Total suspended solids	mg/l	50

^a Standard unit

^b At the edge of a scientifically established mixing zone which takes into account ambient water quality, receiving water use, potential receptors and assimilative capacity; when the zone is not defined, use 100 meters from the point of discharge
8.3.3 Environmental Monitoring Plan during Decommissioning Phase

Table (8.9	Environmental	Monitoring	Plan during	Decommissionin	g Phase
					,	0

Phase	Component	Parameter	Target Level	Measurement	Area to be	Monitoring	Responsible
	Environmental II	macts		Method	monitored	Frequency	Person
		npueto					
	Air Quality	PM ₁₀ , PM 2.5,	Within Ambient	Relevant Air	Receptor's	Once after the	Contractor/
		CO, NO_{2}, SO_{2}	standards level	Quality	Areas near	Decommission-	De Heus
			of	Monitoring	project site	ing Activities	Myanmar
			NEQE	Equipment			Ltd.
			Guideline and				
			International				
			Standards				
Decommissioning	Wastewater	Site Runoff and	Within	As per	At	Once, after	Contractor/
Phase	Quality	Wastewater	standards of	Guidelines of	demolishing	Decommission-	De Heus
1 mase		Discharges	NEQ Guideline	NEQ	project site	ing activities	Myanmar
		parameter in	for Site Runoff	Guideline			Ltd.
		NEQ (emission)					
		Guideline					
	Noise	Noise level	Within	Relevant Noise	Sensitive	Twice, During	Contractor/
	Pollution	(dB(A) scale)	standards limit	Meter Equipment	spots	Decommissioni	De Heus
			levels/ NEQ			-ng Phase	Myanmar
			Guideline				Ltd.

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Phase	Component	Parameter	Target Level	Measurement Method	Area to be monitored	Monitoring Frequency	Responsible Person
	Solid waste	Demolition debris,	Volume of solid	Kg	Disposal sites	Weekly	Contractor/
		including concrete,	waste		of		De Heus
		metal, drywall,			decommission		Myanmar
		wood, glass,			ing phase of		Ltd.
		adhesives, sealants			project site		
		and fasteners and					
		other hazardous					
		demolished					
		materials					
	Socio-economic	impacts					
	Socio-	Employment's	Within standard	Samples	Entire site	Once after	Contractor/
	economic	compensation,	limit levels,			decommissio	De Heus
	aspects	Pensions, local	Grievance			ning phase	Myanmar Ltd.
		economy, gender	Redress				
		issues	Mechanism*				
			(ECD)				

8.4 Emergency Preparedness Plan and Training Programs

The emergency preparedness is vital, as quick and correct response is necessary in case of emergency to reduce injuries, harm and other damage. The proposed factory of production and distribution of animal nutrition feed products will be used electricity intensive activities and steam boiler for pelleting process. Care should be given for during processing activities in order to prevent man-made errors and accidental cases (e.g., dust explosion, electricity shock, and fire hazards).

Common emergency situation may involve:

- Dust Explosion
- Fire
- Flammable liquid or gas leakage and chemical release or spill

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

1) Assignment of responsibilities: All senior staff such as a line/production manager or safety officer should 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 (4) ensuring all emergency equipment is well maintained.

2) 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 should

- a) Identify and list out all possible emergency situations in the workplace
- b) Assess the effects and impacts of the 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

Training for Emergencies

The type, amount and frequency of training varies, depending upon the tasks employees are expected to perform. Although training must be provided to employees at least annually, safety meetings and drills should be conducted at more frequent intervals.

Regardless of the specific type of facility, training should include, though not be limited to the following;

- Hazard recognition and prevention (fire, explosion, etc.)
- Proper use of fire extinguishers
- Emergency reporting procedures
- Preventive maintenance
- Hazardous materials spill response
- First Aid

i) For Dust explosion

For a dust explosion to occur in a gain elevator or mill, the following key elements must exit simultaneously

- 1. Grain dusts, as the primary fuel
- 2. Oxygen
- 3. An ignition source
- 4. A confined space

When the first three elements come together, in a explosive mixture, the rapidly expanding heated gases build until the pressures exceed the strength of the confined space.

Conditions under which a grain dust explosion occurs result from the following;

- A complex combination of dust particle sizes
- The concentration of dust particles in the air
- The energy of the ignition source
- The moisture content of the dust (or percent of relative humidity of the air)
- The actual composition of the dust

When these conditions are present and the concentration of suspended dust exceeds the lower explosive limits of that particular dust, an explosion results.

The Table (8.9) indicates that various grains have different explosive properties. When dusts generated from grains are not properly handled, the conditions for an explosion can develop.

Type of dust	Maximum Pressure (kPA)1	Maximum Rate of Pressure Rise	Igr Temp Cloud (°C) 3	nition perature Layer (°) 4	Minimum Ignition Energy (J)5	Lower Explosive Limit (g/m3)6
		(MPa/s)2				
Alfalfa	455	7.6	460	200	0.32	100
Cereal grass	360	3.5	550	220	0.80	200
Corn	655	41.0	400	250	0.04	55
Flax shive	560	5.5	430	230	0.08	80
Grain dust,	790	38.0	430	220	0.03	55
winter wheat,						
corn, oats	640	18.0	440	220	0.05	50
Rice	540	5.5	540	190	0.10	60
Soy flour	655	26.0	380	350	0.05	50
Wheat flour 6	680	41.0	470	220	0.05	55
Wheat straw						

Table (8. 10) Explosive Properties of Common Grain Dusts

Source: U.S. Bureau of Mines 1961. This Table is presented only to illustrate that grains are of varying volatility; it is not offered as a formula for calculations. 1(kPA) is a symbol representing the maximum pressure rise; 2(MPa/s) is a symbol representing the rate of pressure rise; $3(^{\circ}C)$ is a symbol for cloud where the auto-ignition in a combustible cloud is measured in degrees Celsius; $4(^{\circ})$ is a symbol for layer where the layer ignition temperature is measured in degrees Celsius; 5J is the symbol for the minimum ignition energy of a combustible mixture; 6(g/m3) is the symbol for the lower explosive limit of a given dust

When grain is moved, grain dust is produced. The more that grain is handled, the more dust is produced. The more dust produced in a confined space, the greater the chance of exceeding the lower explosive limit of the dust. As shown in Table (8.9) each type of grain and the dust it produces has its own lower explosive limit. The more the lower explosive limit is exceeded, the greater the likelihood of an explosion.

To produce a grain dust explosion, there must be a source of ignition. Table (8.10) presents typical sources of ignition that have been identified in previous grain elevator explosions.

High Probability of Occurrence	Low Probability of Occurrence					
Hot bearings	Electrical					
Welding and cutting	Static electricity					
Belt slippage and misalignment	Lightning					
Foreign objects caught in machinery	Metal and stone sparks					
	Spontaneous combustion					

Table (8. 11) Dust Cloud Ignition Sources

To address grain dust explosion potential, OSHA has established a number of requirements that must be met by all relevant facilities. One of the most important requirements regards training.

The training must address the following topics;

- Safety precautions associated with the facility
- Hazard recognition related to dust accumulation and common ignition sources
- Preventive measures related to dust accumulation and common ignition sources
- Specific safety procedures and practices appropriate to the employee's job, including, but not limited to, the following:
- Cleaning procedures for grinding equipment
- Clearing procedures for choked legs
- Housekeeping procedures
- Preventive maintenance procedures

ii) Fire Prevention and Protection

The fire prevention and protection program must address the following topics:

Prevention _ policies, practices and procedures designed to keep the conditions necessary for a fire from coming together

- Hot work permits
- Lockout/tagout policies
- Design specifications for storage of flammable materials

Severity reduction _ policies, practices and procedures designed to reduce the spared of fire and bring the fire to a quick end.

- Emergency plans
- Alarm systems
- Portable fire extinguishers
- Fire Protection Equipment

Cleanup—policies, practices and procedures designed to return the affected area to an operational level and reduce other losses created by improper cleanup

- First aid
- Removal of debris to an appropriate waste site
- Equipment and facility repair

Fire Protection Equipment

Explosion Suppression Systems

Explosion suppression systems should be used in unusually hazardous areas such as elevator legs, boots and head, or in areas such as bins, distributors and tanks.

Portable Fire Extinguishers

All buildings within a facility must have fully charged and operable portable fire extinguishers. If employees are expected to use portable extinguishers or other firefighting equipment against incipient fires, they must be trained to use the equipment. Training must include the following:

• Correct type of extinguisher to use on different classes of fire

• Proper techniques for use of the equipment to extinguish a fire

Standpipes and Hoses

All areas within a facility that are above 75 feet from ground level and in which combustible materials other than grain are stored should have wet or dry standpipes and hoses installed.

Automatic Sprinkler Systems

Automatic sprinkler systems are recommended in areas containing combustible materials.

Fire Hydrants

All grain and feed mill facilities should have adequate public or private fire hydrants on site. Each fire hydrant should have an adequate water supply.

ABCs of Firefighting

In a grain dust fire, it is critical to avoid the use of extinguishing methods that will spread the dust into suspension or dust cloud. The formation of a dust cloud during a fire could result in an explosion. Water from a hose under high pressure can throw up large quantities of dust. Water under low pressure, such as a fog or fine mist, is less likely to create a dust cloud.

The first steps in fighting a fire are determining the contents or materials burning in the fire and the extent (size) of the fire. The following are basic considerations for firefighting:

- Equipment that is operating should be shut down.
- Portable extinguishing equipment should be available in areas where the potential for fire is high.
- Employees must be trained in the use of any firefighting equipment that they are expected to use.
- Appropriate alarm systems should be in place
- A fire should be isolated. If personnel cannot isolate the fire, they should evacuate the area.
- Extinguishing methods must be appropriate for the fire
- Warm or burning materials must be removed as soon as possible
- Equipment should be restarted only after the fire area has been inspected and cleared by qualified personnel.

Fire Safety and Evacuation Plan

Fire Evacuation plans should include the following information

- Emergency escape routes must be clearly shown on floor plans and workplace maps
- Employers must know that their employees know the emergency escape routes
- Procedures for employees who must remain to operate critical equipment before evacuating
- Identification and assignment of personnel responsible for rescue or emergency medical aid

Fire Safety Plans should include the following information:

- 1. Procedure for reporting a fire or other emergency
- 2. Site plans indicating the following
 - The Occupancy assembly point
 - The locations of fire hydrants
 - The normal routes of fire department vehicles access
- 3. Floor Plans identifying the locations of the following
 - Exits
 - Primary evacuation routes
 - Secondary evacuation routes
 - Accessible egress routes
 - Areas of refuge
 - Exterior area for assisted rescue
 - Manual fire alarm boxes
 - Portable fire extinguishers
 - Occupant-use hose stations
 - Fire alarm annunciators and controls

The following American National Fire Fighting Association (NFFA) Standards must be following.

Table (8. 12) American National Fire Fighting Association (N	IFFA) Standards
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No.	Parameters	Proposed Capacity	Remark
1.	Maximum water	14 bar	
	pressure		
2.	Fire water flow	12.0 liters/m ² /min	
3.	Deluging rate	10.0 liters/m ² /min	
4.	Foam rate	190 liters/min	for oil storage area

Emergency evacuation Drill: An exercise performed to train staff and occupants and to evaluate their efficiency and effectiveness in carrying out emergency excavation procedures **Employee Training and Response Procedures**: Employee shall be trained in the fire emergency procedure described in their fire evacuation and fire safety plans and training should be based on these plans;

Frequency: Employee shall receive training in the contents of fire safety and evacuation plans and their duties as part of new employee orientation and at least annually thereafter. Records shall be kept and made available to the fire code official upon request.

Employee Training Program: Employee shall be trained in fire prevention, evacuation and fire safety in accordance with the following sections.

- Fire Prevention Training Employee shall be apprised of the fire hazards of the materials and processes to which they are exposed. Each employee shall be instructed in the proper procedures for preventing fires in the conduct of their assigned duties
- Evacuation Training Employees shall be familiarized with the fire alarm and evacuation signals, their assigned duties in the event of an alarm or emergency, evacuation routes, areas of refuge, exterior assembly areas and procedures for evacuation
- Fire Safety Training Employee assigned fire-fighting duties shall be trained to know the locations and proper use of porTable fire extinguishers or other manual firefighting equipment and the protective clothing or equipment required for its safe and proper use.

Site Fire Control

- 1. Alert other people through fire alarm
- 2. If small, control using an extinguisher
- 3. Contact fire brigade if not under immediate control
- 4. Attend to human life in immediate danger
- 5. For electrical fires turn off power before fighting

- 6. Once out of the building, stay out. Do not allow people to go back into the burning building to collect valuables. While evacuating the building, close doors (but do not lock) to slow down the spread of fire
- 7. Obey all instructions
- 8. Proceed to an emergency evacuation area (Muster Point)

Fire Safety Plan and Firefighting System Prepared in De Heus Myanmar Limited

For fire safety plan, De Heus Myanmar Limited has a plan to keep sufficient amount of fire extinguishers, in case of emergency fire problems in factory building. Firefighting training plan is also prepared for all employees by using the instructions, techniques and guidelines in concern with fire emergency matters according to the guidelines of Myanmar Fire Services Department. Moreover, smoking inside the building is strongly prohibited to avoid unwanted fire problems and fire water will be stored by capacity of (170 m^3) of ground water tank. In Figure (8.7) it can be seen for the preparedness of firefighting system and firefighting equipment, adopted in the Animal Feed factory of De Heus Myanmar Limited.



Figure (8. 1) Fire Safety Facilities at De Heus Myanmar Animal Feed Factory

In addition, Fire safety is one of the most important factors that are necessary for De Heus Myanmar factory to minimise and avoid the loss of life and property. Fire drill also installed since the construction phase and gave guidance to workers about fire safety and the proper calculation of fire fighting system, setting prevention measures, and implementing emergency response were also prepared. In order for preventing fire, the proper fire alarm system will be implemented and have regular, well maintenance and checking. Exist ways, emergency exist fire evacuation place also prepared in proposed factory. Checking and inspection of water of supply, fire extinguishers, and fire houses sufficient water also performed at project site of De Heus Myanmar Limited.

iii) Hazardous Chemicals and Fuel Spills

- 1. Turn off the engines and equipment and notify Environmental Manager
- 2. No engine or equipment is started until clean up completed
- 3. Secure the spill area and ensure that there are no sources of ignition
- 4. Clean up the spill using absorbent material from site spill kit
- 5. Dispose of contaminated materials as per procedure

In evaluating the hazards of chemicals and communicating the information to employees, the employer must do the following:

- Develop a written hazard communication program
- Label containers of chemicals in the workplace
- Make safety data sheets (SDSs) concerning hazardous chemicals in the workplace easily accessible to employees
- Inform and train employees about the hazardous chemicals in their working environment

Since chemical manufacturers and importers must evaluate the chemicals they produce or import, employers may rely upon those evaluations. However, if the employer chooses not to rely upon those evaluations, then the employer must make its own evaluations.

Written Hazard Communication Program

The written hazard communication program must, among other things, include the following:

- List all hazardous chemicals in the workplace
- Describe how the employer complies with the requirements for:
 - Labeling hazardous chemicals
 - Providing MSDSs
 - Furnishing information to and training for employees

The written program must be available upon request to employees and their representatives.

Labels

The distributor must label each container with the identity of the hazardous chemical(s), appropriate warnings, and name and address of the manufacturer of the chemical. The employer must, in turn, label each container of hazardous chemicals in its workplace similarly.

If the container is stationary, the employer may use signs, placards, etc., in lieu of labels. The important thing is that there is clear understanding as to what is in each container. If the container is portable and used only to transfer a chemical from its stationary container, the portable container does not have to be labeled.

Material Safety Data Sheets

The chemical manufacturer, importer and distributor must provide employers with an MSDS for each chemical they produce or import. Employers must ensure that the SDSs are readily accessible to the employees on every work shift.

Among other things, the MSDS for each chemical must identify the chemical with the name used on the label of its container and must provide information such as, but not limited to, the following:

- Chemical and common names of ingredients that present a known health hazard, particularly carcinogens
- Chemical and common names of ingredients that present a physical hazard
- Characteristics such as the vapor pressure and flash point
- The potential for fire, explosion and reactivity
- Signs and symptoms that may indicate that an employee has been exposed to the hazardous chemical
- Primary routes of entry (how the chemical could enter the body)
- Permissible exposure limits from OSHA and other agencies
- Precautions for safe handling, such as:
 - Hygienic practices
 - Protective measures for equipment repair
 - Cleanup of spills and leaks
- Control measures such as:
 - Engineering controls
 - Work practices
 - Personal protective equipment
- Emergency and first aid procedures
- The name, address and telephone number of the manufacturer, importer or other party who can provide information on the chemical and relevant emergency procedures

Employee Information and Training

Employees must be informed about any operations in their work area where hazardous chemicals or materials are present. They must also be informed about the locations and availability of the hazard communication program, list of chemicals and SDSs.

Employees must receive training on the following:

- Methods for detecting the presence or release of a hazardous chemical, such as monitoring devices and the visual
- appearance or odor of the chemical
- Physical and health hazards of chemicals in their work area
- How to protect themselves using work practices, emergency procedures and personal protective equipment
- How to interpret the information on the labels and MSDSs

8.4.1 Emergency Preparedness Plan at DH factory

De Heus Myanmar Ltd. has developed an emergency response plan in order to provide a safe and healthy work environment for its workers and to manufacture safe products for consumers and the environments. The response plan covered the fire safety and emergency preparedness such as fire prevention, fire fighting, medical emergency guidelines, evacuation guidelines in case of exposing to disasters and hazardous situations. All workers must be aware of their respective roles in the plan through trainings as well.

Fire safety is one of the most important factors that is necessary for De Heus Myanmar factory to minimise and avoid the loss of life and property, and also not to affect the environment badly. De Heus Myanmar had conducted the fire drill since the construction started and gave guidance to workers about fire safety.

The proper calculation of fire fighting system, setting, prevention measures, and implementing emergency response were also done since construction. In order for preventing fire, the proper fire alarm system should be implemented and have regular, well maintenance and checking. Exist ways and emergency exist should be clearly signed and directed. No smoking is allowed in the areas which have high possibility of causing fire.

Fire evacuation place should be set and available. Fire extinguishers, fire hoses should get checked in designated checking in time. Sufficient water should be available to supply for fire fighting and regular inspection on the water supply and water safety should be performed. (Instruction for dealing with fire MTIS 18, version 00, 01/10/2016 DH20).

In addition, the emergency preparedness plan prepared by the client for both employee emergency response plan and natural disasters can be seen in the Appendix 15.

8.4.2 Health and Safety Training Plan for Worker at De Heus Animal Feed Factory

Health and Safety Training plan currently applied and provided in De Heus Myanmar Limited to all employees and workers by trainings internally and externally. Specific trainings are recommended and conducted according to the health and safety guidelines to enhance worker's health and to prevent all potential risks and hazards might occur in the factory. All required trainings related to health and the respective departments propose safety or operational parts, top management makes decision and HR organizes and conducts the trainings and detail-training plan of DH Myanmar is showed in Table (8.12).

No.	Health and Safety Guidelines	Training needs
1.	Management	 General fire and emergency response plan, evacuation. All training materials and procedures covering health and safety for workers and employees
2.	Machine safety and noise management	 Training for machine operations to all operators Use of PPE and proper use of any necessary protection Maintenance and Emergency procedures
3.	Environment safety	- Understanding and training on recognition and maintenance not to affect environment
4.	Material storage and safety	 Safety use of related devices and machines Use of necessary protections in working areas Sanitation work
5.	Fire Safety	 Fire fighting and evacuating training and practices Fire fighting materials/ devices use
6.	First Aid	 first aid / CPR/ AED training from providers (Outsource) training on hazard of pathogens
7.	Hazard materials management	 basic understanding of potential hazards from exposure to chemicals use of PPE prevention and control measures to avoid any potential risks Chemical safely handling
8.	Hygiene and Sanitation	 Training of awareness between cleaning and sanitation to all workers Sanitation Operation training in related workers in the workplace

Table (8. 13) Training Plan Used in De Heus Myanmar Animal Feed Factory

8.5 Cost Estimation for EMP Plan

The following Table shows the expenditures for the implementation of Environmental Management Plan for operation phase annually. It can change according to the situation and the below Table (8.13) mentions the allocation of budget for mitigation measures and monitoring plan throughout the life cycle of 50 years.

No.	Item	Unit	Frequency/	Unit Cost	Cost			
			times	(USD)	(USD)			
	(A) Mi	tigation Me	asures					
1	Maintenance Dust Control			Lump sum	3,500			
	System							
2	Grass plantation within the area			Lump sum	1,500			
	of factory compound							
3	Wastewater Treatment			Lump sum	5,000			
4	Noise Impact Control Measures			Lump sum	2,500			
5	Purchase of Personal Protective	Nos.		Lump sum	4,000			
	Equipment (PPE)							
6	Medical Check-up and Health			Lump sum	3,500			
	Insurances							
7	Emergency Preparedness for fin	re hazards						
	Fire Extinguishers				3,000			
	PPE and First Aid Kits			Lump sum				
	Fire Alarm System							
8	Solid waste disposal	Month	12	10	1,200			
	Subtotal				24,200			
	(B	3) Monitori	ng					
1.	Air Quality	Year	2	500	1,000			
2.	Noise Quality	Year	2	100	200			
3.	Water Quality		See in	Lump sum	1,200			
	1. Ground Water	Year	monitoring					
	2. Wastewater		Table					
4.	Environmental Auditing	Year	1	1,000	1,000			
	Subtotal				3,400			
(C) Environmental Supervision and Advisors								
1.	HSE Coordinator	Month	12	800	9,600			
2.	HSE Assistant	Month	12	400	4,800			
	Subtotal				14,400			
	Contingency				2000			
Grand Total								

Table (8.14) Cost	Estimat	ion for	EMP	Implement	ation
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The budget allocation and budget estimation of environmental impact mitigation, environmental monitoring and environmental supervision and advisors may change and it may depend on currency fluctuation, time and real problem situation. Therefore, additional requirements cost for EMP budget plan will be followed up by real situation and 2 to 3% of factory operation budget will be applicable for environmental management plan implementation.

8.6 Corporate Social Responsibility (CSR) Plan

De Heus Myanmar Limited has a plan to implement and donate 2 percent of the profit (2%) per year for Corporate Social Responsibility (CSR) and employee welfare arrangement.

Area	Priority Item	Detailed Targets
Community Involvement and Development	Donation to local community	 Donate to local charities with a worthy cause Actively participate in community events Encourage staff to participate, and to form a community engagement team to actively support community events Embedding understanding and consciousness about human rights issues among the employees Development of sexual harassment and -power harassment" (workplace bullying & harassment) prevention efforts
Human Rights	Raising awareness of human rights	• Establish a workplace culture where human rights issues do not arise
Compliance to law	CSR Procurement	 Sharing values regarding the promotion of CSR activities with business partners and avoiding procurement risks with key partners Effect extensive compliance and adherence to laws and regulations with regard to procurement tasks Continuous compliance to environmental regulations

 Table (8. 15) CSR Plan at DH Proposed Animal Feed Factory

No.	Activity	Responsible party	Plan activities 2020	% of net profit (estimated for 2018- 2019)
1	Contribution	De Heus,	Myanmar	28%
	to develop	Project	PIGS	
	Education		Project	
	sector		education	
			and	
			10 000	
			Swine	
			Farmer	
	Contribution	De Heus,	SAPA	32%
	to develop	Project	project	
	Education	-		
	sector			
2	Contribution	De Heus,	Eye	6%
	to develop	CSR	Screening	
	Health sector	D II	program	
	Contribution	De Heus	Donation	0.3%
	to develop		to Mon	
4	Social sector		Flood area	100/
4	Contribution	De Heus,	Solar	19%0
	to protect	Factory	system,	
	environment			
			Factory	

Table (8. 16) Detailed CSR plan by De Heus Myanmar Limited

Source: De Heus Myanmar Limited

CONCLUSION AND RECOMMENDATION

This Initial Environmental Examination (IEE) report and Environmental Management Plan (EMP) has been prepared for manufacturing of animal feed nutrition Products at plot No.306, 307, 308, Myaung Dakar Steel Industrial Zone, Hmawbi Township, Yangon Region. The main objective of the study is to identify the major environmental impacts due to the implementation of the project activities in all three phases (construction phase, operation phase and decommissioning phase). However, the construction phase of proposed project initiated in October, 2015 and commercial running operation stage is September, 2016. Therefore, assessment of potential environmental impacts and preparing of environmental management plan with recommended impact mitigation measures were prepared for operation phase and decommissioning according to the compliance with environmental impact assessment procedure (2015) and National Environmental (Emission) Guidelines.

In this IEE report study, baseline environmental data collection and site visit activities conducted on 5^{th} to 6^{th} January, 2017. According to the data interpretation for ambient air quality, noise level, ground water and wastewater quality results were compared with National and Environmental Quality (emission) guideline and international guideline standards.

Result for ambient air quality of SO₂, CO,CO₂, O₃ and VOCs are within the NEQ (emission) guideline but, PM10, PM 2.5 and NO₂ results are little higher than NEQ (emission) guidelines due to the transportation activities of vehicles and truck in the production area during measuring at project area. The observed average values for PM $_{10}$, PM $_{2.5}$ is $83.14\mu g/m^3$,74.20 $\mu g/m^3$ and average result of NO2 is $279.57\mu g/m^3$ respectively. Therefore, the generated emission of proposed factory should be controlled by the implementation of proponent as recommended the engine maintenance programs, good driving practices, installing and maintaining emissions control devices, and implementing a regular vehicle maintenance and repair program.

For water quality baseline data, ground water from tube well, wastewater from factory's final drainage and boiler discharge water that before discharging into factory's drainage were collected at proposed animal feed factory during operation phase. According to the laboratories analysis results, most of parameters for ground water quality are within the WHO drinking water quality guideline but, level of turbidity, color and iron are exceeding the WHO guidelines.

However, raw water (tube well) will be treated by passing through into (i) the oxidation tower to remove oxidized materials (ii) chlorine dosing system (iii) de-iron filter (iv) carbon filter (v) cartridge filter. And then the obtained treated water will be provided for the whole factory use of boiler feed water, general office facilities such as canteen, toilets and other general purpose. For wastewater analysis results of boiler effluents and general wastewater from factory's drainage site that shown in Table (5.9) and (5.10), all of the lists parameter are good and within the limit of NEQ (emission) guideline. However, physic-chemical properties of wastewater effluent parameter of turbidity, Chemical Oxygen Demand (COD),

Biochemical Oxygen Demand (BOD) and total nitrogen are exceeding the National Environmental Quality (emission) Guidelines. In addition, in terms of lab results for boiler discharged water quality of pH, turbidity, color, iron and suspended solids are higher than the National Environmental Quality (Emission) Guidelines. So, effective wastewater treatment system should be installed at proposed De Heus animal feed factory by discussing with Wastewater Treatment Company. In addition, all of wastewater effluents from production area and office facilities in line with National Environmental Emission guidelines.

For Noise level measurement for 24 hours at project site during operation phase, the noise level of receptor (outside of production area near the factory' boundary inside project site) is within the noise standard limit of NEQ (emission) guideline but noise level at production area is exceeding the NEQ (emission) guideline. Therefore, noise reduction system and facilities should be prepared at production area to overcome the noise impact that may effect on all employees and workers working in production area.

The assessment of each impact is based on consideration of the magnitude, duration, extent and probability of activities which are going to be carried out during operation and decommissioning phases. In operation phase, there are 5 moderate impacts on environment and human such as impact of wastewater effluents, impact on aquatic lives, impact of electricity consumption and occupational health and safety of generated crushed grains dust, exposure of noise, slip trip and fall impact on employees, workers and 20 low impacts on environmental and human and detail impact assessment for operation phases can be seen in Table (6.6).

During the decommissioning phase, all of the project activities have 13 low impacts significance and 4 very low significance impacts to environment and human. All of the impacts during operation and decommissioning phases can be minimized by using mitigation measures and implementing Environmental Management Plan. EMP is a site specific plan developed to ensure that the project is implemented in and environmental sustainable manner where all contractors and subcontractors, including consultants, understand the potential environmental risks arising from the proposed project and take appropriate actions to properly manage that risk. Moreover, CSR program of proposed animal feed factory already provided in management and it is important to CSR program should be accomplish not only by financial assistance but also by technical assistance and manpower to improve good relationship with local communities. All of the CSR activities and contribution programs should be declared to public by means of local media, company annual report or company's website on a regular basis. The effective implementation of the mitigation measures proposed will ensure towards good environmental management within the proposed project area. Furthermore, the environmental monitoring plan prepared as part of the EMP will provide adequate opportunities to address any residual impacts during the operation phase.

In conclusion, it has been Figured out that, the proposed animal feed factory is going to generate local employment opportunities and enhance capabilities and working skills of employees. Consequently, their socio-economic standard is expected to be improved and undertaking corporate social responsibilities (CSR) as recommended. The study further

concluded that positive impacts will be of immense benefit to the local community and national development as well.

Recommendations for future works

The following recommendations have been made for efficient and effective implementation of environmental conservation, health and safety and social responsibilities through the lifespan of the proposed project.

- ✓ Follow the comments and suggestions made by ECD after reviewing this IEE report.
- \checkmark Once EMP is approved by concerned authorities, strict implementation is essential.
- ✓ For full and proper implementation of EMP, well understanding and supports by proponent and authority is deem necessity.
- ✓ Well experienced and knowledgeable HSE Manager and HSE Assistants shall be appointed.
- ✓ Daily, monthly and annual action plan shall be formulated based on this EMP and practiced at operation level.
- ✓ Necessary care and environmentally sound practices should be taken for activities out of factory site particularly on raw material collection and transport.
- ✓ Keep full records of environmental management activities and present to annual independent third party environment audit.
- \checkmark Follow the audit report and comments.
- ✓ Abide environmental policy, laws, rules and instructions of the Republic of the Union of Myanmar.

Finally, the proponent should follow the comments and suggestions made by ECD after reviewing this IEE report. Once EMP is approved by concerned authorities, effective implementation of EMP by the project proponent is essential. The proponent should abide environmental policy, laws, rules and instructions of the Republic of the Union of Myanmar

References

- 1. MIC Proposal of De Heus Myanmar Limited
- 2. Secondary Hmawbi Township data, ESIA report of studied in Hmawbi township, Yangon Region
- 3. DH 01-1 Heath, Safety and Environmental guidelines, De Heus Myanmar limited
- 4. National Environmental Quality (Emission) Guidelines for Poultry Production (2015)
- 5. Environmental Impact Assessment Guidelines (2014)
- 6. Environmental Impact Assessment Procedures (2015)
- 7. IFC International Finance Corporation, Environment, Health and Safety Guidelines, Construction and Decommissioning, World Bank group, 2007.
- 8. IFC International Finance Corporation, Environment, Health and Safety Guidelines, Occupational Health and Safety, World Bank group, 2007.
- 9. A Guide to Safety and Health in Feed and Grains Mills, N.C. Department of Labor Occupational Safety and Health Division
- 10. Scoping the Environmental Impact of Animal Feed Manufacture
- 11. Hazard Communication Pictograms, Occupational Safety and Health Administration
- 12. https://www.osha.gov/dsg/hazcom/pictograms/index.html
- 13. Specifications for accident prevention signs and tags, regulations (standards 29-CFR), Occupational Safety and Health Administration
- 14. https://www.osha.gov/pls/oshaweb/owadisp
- 15. http://www.hse.gov.uk/food/dustexplosion.htm)
- 16. www.epa.vic.gov.au
- 17. https://www.deheus.com/

APPENDIX

Appendix 1MIC Permit

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Appendix 2 ECD Comments for De Heus Animal Feed Mill Factory

Confidentia THE REPUBLIC OF THE UNION OF MYANMAR MYANMAR INVESTMENT COMMISSION No.(1), Thusar Read, Yankin Township, Yanpan Tel: 01-658127 8002A-2(FF-129/2015(9pg 6) PH. UI-658136 Dall November 2015 Decision of the Myanmar Investment Commission on the Subject | Proposal for "Production and Distribution of Animal Natrition Products" under the name of De Heus Myammar Limited. Reference: Dr Heus Mynamar Lamited Letter (lated (19-6-2015)) The Myanmar Investment Commission, at its meeting (18/2015) held on (23-10-2015) had approved the proposal for investment in "Production and Distribution of Annual Numition Products" onlyr the name of Dr Heus Myanmar Limited submitted as a wholly owned foreign investment from The Netherlands, Hence, the "Permit" is herewith issued in accordance with Chapter VIL σ. section 13(b) of the Republic of the Linion of Myanmar Foreign Investment Law and Chapter VIII, Rule 49 of the Foreign Investment Rules relating in the Republic of the Union of Myanmar Poreign Investment Law, Terms and conditions to the "Permit" are stated in the following paragraphs. The permitted duration of the project shall be 50 (lifty) years. The term, £. . of the Lease shall be mittel 3 (three) years commending from the date of signing of the Lease Agreement between D Ye Aung and De Heus Mynimus Linuted for 5.51 acces of land in Myanny Dakar Industrial Zone and extendable tor 1 (one) year in 2 (rwo) times as recommended by Yangon Region Government. De Hees Myanmar Limited shall subsuit to Mythamar Investment 4. Commission for approval on extension after the lease term of 5 (five) years. The annual cent for the land shall be US\$ 111,430.00 calculated at the rate of USS 5 per square meter per year of the total land mechaning 22,298,20 square meters (5.51 acres). In assuing this "Permit," the Commission has granted the following eventpations and telliefs as per section 27 (a), (b), (c) and (k) of the Foreign 1 confidential

Investment Law. Other exemptions and reliefs under section 27 shall have to be applied upon the actual performance of the project;

- (a) As per section-27(a), income tax exemption for a period of five consecutive years including the year of commencement on commercial operation;
- (b) As per section 27(h), exemption or relief from customs duty or other internal taxes or both on machinery, equipment, instrument, machinery components, spare parts and materials used in the business which are imported as they are actually required for use during period of construction of business;
- (c) As per section-27(i), exemption or relief from customs duty or other internal taxes or both on raw materials imported for production for the first three-year after the completion of construction of business;

7. De Heus Myanmar Limited shall have to sign the Lease Agreement for land with U Ye Aung. After signing the Lease Agreement, (5) copies shall have to be forwarded to the Commission.

8. De Heus Myanmar Limited in consultation with the Department of Company Registration, Directorate of Investment and Company Administration shall have to be registered. After registration, (5) copies each of Certificate of Incorporation and Memorandum of Association and Articles of Association shall have to be forwarded to the Commission.

9. De Heus Myanmar Limited shall use its best efforts for timely realization of works stated in the Proposal. If none of such works has been commenced within one year from the date of issue of this "Permit" it shall become null and void.

10. De Heus Myanmar Limited has to abide by Chapter X, Rule 58 and 59 of the Foreign Investment Rules for construction period.

11. As per Chapter X, Rule 61 of the Foreign Investment Rules, extension of construction period shall not be granted more than twice except it is due to unavoidable events such as natural disasters, instabilities, riots, strikes, emergency of State condition, insurgency and outbreak of wars.

12. As per Chapter X, Rule 63 of the Foreign Investment Rules, if De Heus Myanmar Limited cannot construct completely in time the construction period or extension period, the Commission will have to withdraw the permit issued to the investor and there is no retund for the expenses of the project.

13. The investor or promoter shall apply the commencement date of commercial operation with Report Form (11) for their manufacturing business to the Commission in accord with Rule 97.

14. De Heus Myanmar Limited shall endeavour to meet the targets for production stated in the proposal as the minimum target.

15. The Commission approves periodical appointments of foreign experts and technicians from abroad as per proposal and also in accordance with Chapter XI, section 24 and section 25 of the Foreign Investment Law and the De Heus Myanmar Limited has to follow the existing Labour Laws for the recruitment of staff and labour in accordance with Chapter XIII, Rule 84 of the Foreign Investment Kales.

16. In order to evaluate foreign capital and for the purpose of its registration in accordance with the provisions under Chapter XV, section 37 of the Foreign Investment Law, it is compulsory to report as early as possible in the following manner:-

- (a) the amount of foreign currency brought into Myanmar, attached with the necessary documents issued by the respective bank where the account is opened and defined under Chapter XVI, Rules 134 and 135 of the Foreign Investment Rules;
- (b) the detailed lists of the type and value of foreign capital defined under Chapter I, section-2(i) of the Foreign Investment Law, other than foreign currency.

17. Whenever De Heus Myanmar Limited brings in foreign capital defined under Chapter I, section-2(i) of the Foreign Investment Law, other than foreign currency in the manner of paragraph 15(b) mentioned above, the Inspection Certificate endorsed and issued by an internationally recognized

Inspection Firm with regard to quantity, quality and price of imported materials shall have to be attached.

18. De Heus Myanmar Limited has the right to make account transfer and expend the foreign currency from its bank account in accordance with Chapter XVI, Rule 136 of the Foreign Investment Rules and for transfer of local currency generated from the business to the local currency account opened at the bank by a citizen or a citizen-owned business in the State and right to transfer back the equivalent amount of foreign currency from the foreign currency bank account of citizen or citizen-owned business by submitting the sufficient documents in accordance with Chapter XVII, Rule 145 of the Foreign Investment Rules.

19. De Heus Myanmar Limited shall report to the Commission for any alteration in the physical and financial plan of the project. Cost overrun, over and above the investment amount pledged in both local and foreign currency shall have to be reported as early as possible.

20. De Heus Myanmar Limited shall carry out as per instructions made by Ministry of Livestock, Fisheries and Rural Development to comply with Good Manufacturing Practice (GMP).

21. De Heus Myanmar Limited shall be responsible for the preservation of the environment at and around the area of the project site. In addition to this, it shall carry out as per instructions made by Ministry of Environmental Conservation and Forestry in which to conduct an Initial Environmental Examination (IEE) Process and an Environmental Management Plan (EMP) which describe the measure to be taken for preventing, mitigation and monitoring significant environmental impacts resulting from the implementation and operation of proposed project or business or activity has to be prepared and submitted and to perform activities in accordance with this EMP and be abided by the environmental policy, Environmental Conservation Law and other environmental related rules and procedures.

22. After getting permit from Myanmar Investment Commission, De Heus Myanmar Limited shall have to be registered at the Directorate of Industrial Supervision and Inspection.

23. De Heus Myanmar Limited shall have to abide by the Fire Services Department's rules, regulations, directives and instructions. Moreover, fire prevention measures shall have to undertake such as water storage tank, fire extinguishers and provide 'raining to use the fire fighting equipments.

24. Payment of principal and interest of the loan (if any) as well as payment for import of raw materials and spare parts etc., shall be made either out of the local sales of De Heus Myanmar Limited.

25. De Heus Myanmar Limited in consultation with Myanma Insurance, shall effect such types of insurance defined under Chapter XII, Rule 79 and 80 of the Foreign Investment Rules.

sego? (Zay Yar Aung) Chairman

Managing Director

De Heus Myanmar Limited

- cc: 1. Office of the Government of the Republic of the Union of Myanmar
 - 2. Ministry of Home Affairs
 - 3. Ministry of Foreign Affairs
 - 4. Ministry of Livestock, Fisheries and Rural Development
 - 5. Ministry of Environmental Conservation and Forestry
 - 6. Ministry of Electric Power
 - 7. Ministry of Immigration and Population
 - 8. Ministry of Industry
 - 9. Ministry of Commerce
 - 10. Ministry of Finance
 - 11. Ministry of National Planning and Economic Development

- 6 -

- 12. Ministry of Labour, Employment and Social Security
- 13. Central Bank of Myanmar
- 14. Office of the Yangon Region Government
- 15. Director General, Department of Environmental Conservation
- 16. Director General, Fisheries Department
- 17. Director General, Immigration and National Registration Department
- 18. Director General, Directorate of Industrial Supervision and Inspection
- 19. Director General, Directorate of Trade
- 20. Director General, Customs Department
- 21. Director General, Internal Revenue Department
- 22. Director General, Directorate of Investment and Company Administration
- 23. Director General, Department of Urban and Housing Development.
- 24. Director General, Directorate of Labour
- 25. Director General, Fire Service Department
- 26. Managing Director, Myanma Electric Power Enterprise
- 27. Managing Director, Myanma Foreign Trade Bank
- 28. Managing Director, Myanma Investment and Commercial Bank
- 29. Managing Director, Myanma Insurance
- 30. Chairman, Republic of the Union of Myanmar Federation of Chambers of Commerce and Industry (UMFCCI).

Appendix 3Temporary License for Boiler Use



ဘွိုင်လာယာယီအသုံးပြုခွင့်လက်မှတ်

(လုပ်ထုံးလုပ်နည်း အဝိုဒ် ၆ အဝိုဒ်ခွဲ (ဆ)]

03990 100 / 1000 / 100 - 62 (00)

Mr. Johan Christiaan Van Den Ban, De Heus Myanmar Linsted. De Heus Myanmar Animal Feed Factory ၊ အား ကြားလိုင်လာတွေ ၃.၀၆. ၃၀၇ ၊ ၃၀၀ ၊ အော်ကာကာကို ရှင်၊ ဆော်ကြီး ၊ ကိုမ္မကို တိုင်လာတွေ ၃.၀၆. ၃၀၇ ၊ ၃၀၀ ၊ အော်ကာကာကိုရှင်၊ ဆော်ကြီး ၊ ကိုမ္မကို ပါတာ သို့မဟုတ်ကွိုင်လာအမှတ် နိုင်ငံခု ထုတ်လုပ်သည့်ကွိုင်လာအမှတ် နိုင်ငံခု ထုတ်လုပ်သည့်ကွိုင်လာအမှတ် နိုင်ငံခု သို့မဟုတ်ကွိုင်လာမှတ်ပုံတင်အမှတ် ေ <u>နော်ပုံတာကြာ</u> ဖြစ်သော အရာအကျွှော်သည့် ကို ခွင့်ပြုဖိအား <u>စိုးရာ</u> ဖြင့်လက်မှတ်ထုတ်ပေးသည့်နေ့မှ (၆)လအသုံးပြုခွင့် ရှိသည်။ ယင်းကာလအပိုင်းအခြားကျော်လွန်သည့်အခါ ထုတ်ပေးထားသည့် ဤယာယီအသုံး ပြုခွင့်လက်မှတ် ပျက်ပြယ်စေရမည်။

conoberniequ ရှိကုန်တိုင်းခေသကြီ 9000 · · · · · · · · ·

/ ေလြသင်း / ဘိုုင်လာစစ်ဆေးရေးမှူး ကိစ္စောက်ညွှန်ကြားရေးမှူး (ဘိုုင်လာစစ်ဆေးရေး) ရန်ကုန်တိုင်းစေသကြီး၊

မှတ်ချက် ။ ။ ဘွိုင်လာဥပဒေပုဒ်မ ၁၅ ပါပြဌာန်းထားသည့် သက်ဆိုင်ရာအစိုးရဌာန အဖွဲ့ အစည်းက လိုအပ်၍တောင်းဆိုသည့်အခါ ဤလက်မှတ်ကို တင်ပြရမည်။ 2019



ဘွိုင်လာယာယီအသုံးပြုခွင့်လက်မှတ်

{ လုပ်ထုံးလုပ်နည်း အပိုဒ် ၆ အပိုဒ်ခွဲ (ဆ) } ကာ စာအမှတ်<mark>း(ဝဘ္ဘ္) အင်္ဂလွန်နှင့် မန</mark>ားချာ

Me. Johan Christiaan Man Den Ben De Heus Myanman	.udi
. အာကောင် တော်ဂုံ ကန္ဘတ်. (၃၀န၃၀၈) စောင်းတကာခက်မွှေနေ	
.095 M. Q.745. 1. R. F. R. F. 63.22 B.	
ကုမ္ပဏီ၊	နိုင်ငံမှ
ထုတ်လုပ်သည့်ဘွိုင်လာအမှတ်	ပါသော
သို့မဟုတ်ဘွိုင်လာမှတ်ပုံတင်အမှတ် မ.စ၅၇၅၃ဖြစ်သောဒိုအခွားကျွ	တ်ဘွိုင်လာကို
ခွင့်ပြုဖိအားဘမိုအန္မြင့်လက်မှတ်ထုတ်ပေးသည့်နေ့မှ (၆)လအသ	ုံးပြုခွင့်ရှိသည် ။
ယင်းကာလအပိုင််းအခြားကျော်လွန်သည့်အခါ ထုတ်ပေးထားသည့် ဤယာယီအသုံး	ပြုခွင့်လက်မှတ်
ပျက်ပြယ်စေရမည်။	



ရက်စွဲ။ . 49... 9... 40.28.....

ဆးရေးမှ

။ ဘွိုင်လာဥပဒေပုဒ်မ ၁၅ ပါပြဌာန်းထားသည့် သက်ဆိုင်ရာအစိုးရဌာန အဖွဲ့ မှတ်ချက် ။ အစည်းက လိုအပ်၍တောင်းဆိုသည့်အခါ ဤလက်မှတ်ကို တင်ပြရမည်။

Appendix 4 Boiler Inspection Record

de heus th	Boiler maintenance record		Section : 17F03 Revision : 00 Date : 01/09/2016 Page : 1 of 1
		Maintenance and	Calibration Procedure - M
Date	Description	Worker	Remarks
09.12.2016	Repairing warter leakage at Boiler	Aung Thwin	Day Shift
26.12.2016	Repaired the shutter door at the steam boiler room	Aung Thwin	Night Shift
03.01.2017	Assited the boiler bed temperature low due to poor quality of rice husk	Ye Min Paing	Night Shift
04.01.2017	Checked and cleaned the damper ID Fan at boiler	Aung Thwin	Day Shift
05.01.2017	Checked the operation parts at boiler such as slite gate, solenoid valve, damper	Ye Min Paing	Night Shift
06.01.2017	Checked the operation parts at boiler such as slite gate, solenoid valve, damper	Ye Min Paing	Night Shift
07.01.2017	Cutting and welding of sand (open and close)valve arm at boiler	Aung Thwin	Day Shift

ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော် ဘွိုင်လာဥပဒေ စက်မှုဝန်ကြီးဌာန ပုဒ်မ၃၅ စက်မှုကြီးကြပ်ရေးနှင့်စစ်ဆေးရေးဦးစီးဌာန ပုဒ်မခွဲ(ဂ) ဘွိုင်လာပြုပြင်ရန်ညွှန်ကြားစာ စာအမှတ်၊ - ၂၀၁၈- ၁၉ (ြည်) (၁ - ၃ δέ gé sé quốc \$: 3002 Mr. Johan Chustian Van Denben 1 De Heus Myanmar 14 ဘွိုင်လာတည်နေရာ အာဘာသောင် စင်္ဂ်ာ၊ (၃၀၆-၃၀၇) ၊ ရောင်းတကာ စက်မ္ဘက်၊ ရောင်ကြီဖြို့မှာ 5 ဘွိုင်လာအမှတ်၊ မစ -ရီ-၁-၃- အမျိုးအစား ---<u>နာကဝ ကျွတ်</u> -- စစ်ဆေးသည့်နေ့ ------ပြုပြင်ရန်/ ပြောင်းလဲရန်/ ဖြည့်စွက်ရန်/ စဉ် ယိုယွင်းချက်များ အသစ်လဲရန် ညွှန်ကြားချက်များ Sand In Bed Ubes (92) is use mon (16) nois a la for open of ger ge DH ญัญ (2)กว่า อย่างอายิ: איישר ער איישט אין אי איי איי איי איי איי (14) vi: 2f. 8: prof 2000000 QE grocio (p so & mm, t. s mm) いのうき、 (のものうちのいからいい) 52501672225-ယိုပ်ခွင်း ကျွတ်၊မွှား တမ်ဖ် တွေ မြှပါက ချိန်းဟာ asen: 69: 57 36. 23 86. 15 orolon25: OCENS. အထက်ပါပြုပြင်ခြင်းများ ဆောင်ရွက်ပြီးစီးပါက သက်ဆိုင်ရာစစ်ဆေးရေးမှုဖုထံ အကြောင်းကြားရမည်။ A5001 မြည်နယ်/တိုင်းဒေသကြီး ဘွိုင်လာစစ်ဆေးရေးမှူး ^{စုတိ}ယညွှန်ကြားရေးမှုး လာစစ်ဆေးရေး) (ဘွိုင်လာစစ်ဆေးရေး) ိမ်းစေသကြီး ရန်ကုန်တိုင်းဒေသကြီး ဘွိုင်လာစစ်ဆေးရေးမှုူးချုပ် ရက်စွဲ၊ 20.9 Jose

2019

Appendix 5 CSR Plan



de heus Human Rights Raising awareness of Establish a workplace culture where human rights issues do not arise human rights Sharing values regarding the promotion of CSR activities with business partners and avoiding procurement risks with Compliance key partners Effect extensive compliance and to Law adherence to laws and regulations with regard to procurement tasks Continuous **CSR** Procurement compliance to environmental regulations Respectfully, J.J Sigh Johannes Jacobus de Heus Managing Director For and on behalf of the board of directors of De Heus Myanmar Ltd. De Heur Antimal Nutrition B.V. Fubmatmari 175 6717 VE Ede-Wageningen P.O. Box 396 6710 BJ Ede The Netherlands Tel. +83 818 675 440 Fex +81 818 675 509 Webstawww.ceheus.com VAT no: NL-0082.84.220.801 Chamber of Commerce no. 16011201 BankarFascoork Internetional Utracht Acc.no. 1009 28 305 BIC NABO NL 3 U IBAN NL 33 RABO 0500923805 to a company of Royal De Heus





Laboratory Technical Consultant: U Saw Christopher Maung B. So Engg: (Civil), Dip S.E (Delt) Lociuver of YIT (Read), Consultant (Y.C.D.C), LWSE 001, Formar Member (UNICEF, Water guality monitoring & Surveitance Myanmar)

W1216 526

WTL-RE-001 Issue Date - 01-12-2012 Effective Date - 01-12-2012 Issue No - 1.0/Page 1 of 2

WATER QUALITY TEST RESULTS FORM

Client	E.G.used
Nature of Water	Provato Cr. II. Ma
Location	Raw Water (De Hew Myanman Arimol Fred Rocky
Date and Time of collection	Myaung Ta Kar Industrial Zone, Hmawbi Township.
Date and Time of collection	20.12.2016 (11:24 AM)
Date and Time of arrival at Laboratory	21.12.2016
Date and Time of commencing examination	22.12.2016
Date and Time of completing	24.12.2016

Results of Water Analysis

WHO Drinking Water Guideline (Geneva - 1993)

pH			
Colour (True)	6.8		6.5 - 8.5
Turbidiby	110	TCU	15 TCU
Conduction	186	NTU	5 NTU
Conductivity		micro S/cm	
Total Hardness		mg/l as CaCO ₃	500 moll as Cacco
Calcium Hardness	34	mg/Las CaCO ₂	ooo ingn as cacog
Magnesium Hardness	16	mg/Las CaCO	
Total Alkalinity		mail as Cacco	
Phenolphthalein Alkalinity		mg/r as CaCO3	
Carbonate (CaCO ₃)		mg/r as CaCO3	
Bicarbonate (HCO ₃)		mg/i as CaCO3	
Iron	2.20	mg/l as CaCO ₃	
Chloride (as CL)	3.25	mg/l	0.3 mg/l
Sadium eblade (mg/l	250 mg/l
Sodium chloride (as NaCL)		mg/l	
Sulphate (as SO ₄)		mg/l	200 ma/l
Total Solids		mg/l	1500 mail
Suspended Solids		ma/l	1000 mg/t
Dissolved Solids	109	may	water they
Manganese	Nil	mg/l	1000 mg/l
Phosphate		mga	0.05 mg/l
Phenolohthalein Acidity		mg/i	
Vethyl Orange Acidity		mg/l	
Solicity		mg/l	
saminy		ppt	

Remark: This certificate is issued only for the receipt of the test sample.

Tested by Signature:		Approved by	Spest-1
Name:	Zaw Hein Oo B.Sc (Cuemistry)	Signature: Name:	See Thir B # (Civil) 1980
(a division of WEG Co.,LI	St. Chemist LISO TECH Laboratory		Technical Officer ISO TECH Laboratory

Np. nsein Township, Yangon, Myanmar.

Ph: 01-840955, 09-73225175, 09-73242182, Fax: 01-844506, E-mail: isotechlaboratory@gmail.com, Website: weg-myanmar.com



O saw Christophin maturg B Sc Engl, Collis, Dp SE (Delth Ledorer of YIT (Reta), Consultant (Y C D C), LWSE 001 Former Member (UNICES: Write coality manifering & Surveillance Myaninar)

W1216 526

WTL-RE-001 Issue Date = 01-12-2012 Effective Date = 01-12-2012 Issue No = 1 0/Page 2 of 2

WATER QUALITY TEST RESULTS FORM

Client	E-Guard		
Nature of Water	Row Water		
Location	Myaung Ta Kar Industrial Zone, Hmawbi Township,		
Date and Time of collection	20 12:2016 (11:24 AM)		
Date and Time of arrival at Laboratory 21 12:2016			
Date and Time of commencing examination	22.12.2015		
Date and Time of completing	24,12,2016		

Results of Water Analysis

WHO Drinking Water Guideline (Geneva - 1993)

Temperature (°C)	'C	
Fluoride (F)	mg/l	1.5 mg/l
Lead (as Pb)	mg/l	0.01 mg/l
Arsenic (As)	Nil mg/l	0.01 mg/l
Nitrate (N.NO ₃)	Nil mgA	50 mg/l
Chlorine (Residual)	ng/l	
Ammonia (NH ₃)	mgA	
Ammonium (NH ₄)	mg/l	1
Dissolved Oxygen (DO)	5.4 mg/l	
Chemical Oxygen Demand (COD)	mg/l	
Biochemical Oxygen Demand (BOD)	mg/l	
(5 days at 20 °C)		
Cyanide (CN)	ing/i	0.07 mg/l
Žinc (Zn)	mg/t	3 mg/l
Copper (Cu)	mg/l	2 ma/l
Silica (SI)	mg/l	

Remark: This certificate is issued only for the receipt of the test sample.

1.	-157	coppieren et	a start and
Signature:	14200	Signature.	SOUTH
Name:	Zaw Hern Oo B.Sc (Chemistry)	Name:	Spe Thir h E (Civil) 1980,
	190 TECH Laboratory		Tomical Officer 150 TECH Laboratory

No. 18, Lanthit Road, Nanthargona Quarter, Inseln Township, Yangon, Myanmar. Ph: 01-640965, 09-73225175, 09-73242162, Fax: 01-644506, E-mail: isotechiabonetory@ginail.com. Website: weg-myanmar.com
guard	Operation Depa WQ Baseli Sampling/Surv Notes	artment ine ey Field	E Guard-OD-EQ-F- 010 Version :00	Approved by MD On Date: 02/24/2016 Page 2 of 3
Project: De Heus Myon	mar 46d.	Date:	20.12.2015	
Client:		Survey	or: U Si Thu Luin	
Location: Mgoung To Ka	Industry Zone .	Time:	11:54 am	
Lat: 17'09'24.32" N		Long:	95'58'07.07"E	
Evaluation:		Barom	eter Pressure:	
Weather:		Sample GPS W Tempe Time:	e/Location ID: Row V /aypoint no: rature: 29.0 °C	uoter
Turbidity by Sechi Dept	th (cm):			
NTU converted from ch	art:			

Surface/Ground/Effluent Water

	100	Elect	rical Condu	ctivity	Sec. 20	And Annual and Annual	-1411	
Sr. No.	pH	EC (µS/cm)	TDS (ppm)	Salinity (ppt)	DO (Pp+a)	Flow Rate (m/sec)	Depth (m)	Rem ark
	6.782	172-3 148/0m	173mg/L	0.0	6.05 mg/L			Beca 1000mil

cm	NTU	cm	NTU
< 6	> 240	31 10 34	21
6 to 7	240	34 to 36	19
7 to 8	185	36 to 39	17
8 to 9	150	39 to 41	15
9 to 10	120	41 to 44	14
10 to 12	100	44 to 46	13
12 to 14	84	46 to 49	12
14 to 16	60	49 to 51	11
16 to 19	48	51 to 54	10
19 to 21	40	54 to 57	9
21 to 24	35	57 to 60	B
24 to 26	30	60 to 70	7
26 to 29	27	70 10 85	6
29 to 31	24	> 85	< 5



Ryce Ryc Mg EQ Team Leater HAND MA DATE: 01/03/2016 EFFECTIVE DATE: 20.12.2016

Appendix 7 Wastewater Lab Analysis Result





Issue Date 01-12-2012 Effective Data 01-12-2012 Incise No -10Page 10f2

WATER QUALITY TEST RESULTS FORM

Client	E-Guard
Nature of Water	Waste Water
Location	Myaung Ta kar Industrial Zone, renawoi Township
Date and Time of collection	6.01.2017
Date and Time of arrival at Laboratory	6.01.2017
Date and Time of commencing examination	16.01.2017
Date and Time of completing	16.01.2012

W1216 559

Results of Water Analysis

WHO Drinking Water Guideline (Geneva - 1993)

pH	8.8		6.5 - 8.5
Colour (True)	15	TÇU	15 TCU
Turbidity	91	NTU	5 NTU
Conductivity		micro S/cm	
Total Hardness		mpli as CaCO3	500 mg/l as CaCO3
Calcium (Ca)		mgll as CaCO ₃	200 mg/l
Magnesium Hardness		mp/l as CaCO ₃	
Total Alkalinity	-	mg/l as CaCO3	
Phenoiphthalein Alkalinity		mg/) as CaCO3	
Carbonate (CaCO3)		mg/i as CaCO ₃	
Bicarbonete (HCO ₂)		mgil as CaCO3	
tron	No.	mgñ	0,3 mg/l
Chloride (as CL)	1	mgñ	250 mg/l
Sodium chloride (as NaCL)		ngữ	
Sulphate (as SO ₄)		mgA	200 mg/l
Total Solids		mg/l	1500 mg/l
Suspended Solids		mg1	
Dissolved Solids	412	ing/l	1000 mgil
Manganese		ing/l	0.05 mg/t
Phosphate		mg/l	
Phenolphthalein Acidity	-	ing/l	
Methyl Orange Acidity		mg/i	
Chlorine (CL)		mg/l	0.2 mgil

Remark: This certificate is issued only for the receipt of the test sample.

Tested by Sinnshure	15th	Approved by Signature	specahit
Name:	Zam Hein Oo B.Sc (Chemistry)	Name:	Dot Thi B.E (Civil) 1980.
a division of WEG Co. Lti	ISC Chemist		Tochnical Officer ISO TECH Laboratory

No.18, Lantitet Road, Hammangaba susanan, insen rownersp. rangon, myarmar Ph: 01-640966, 09-73225176, 09-73242182, Pao: 01-644506, E-mail: isotechiaboretory@gmail.com. Websile: weg-invannar.com



W1216 559

WATER QUALITY TEST RESULTS FORM

Client.	E-Guard
Nature of Water	Waste Water
Location	Myaung Ta kar Industrial Zone, Himawbi Township
Date and Time of collection	6.01.2017
Date and Time of annual at Laboratory	6.01.2017
Date and Time of commencing examination	16,01.2017
Date and Time of completing	16,01,2017

Results of Water Analysis

WHO Drinking Water Guideline (Geneva - 1993)

lasue No -1 0/Page 2 of 2

Temperature (°C)	25.1	°C	
Fluoride (F)		mg/l	1.5 mg/l
Lead (as Pb)	1	mg/l	0.01 mg/l
Arsenic (As)		mg/l	0.01 mg/l
Nitrate (NO ₃)		mg/l	.50 mg/t
Chlorine (Residual)		mg/l	
Ammonia (NH ₃)	D.1	mg/l	
Ammonium (NH ₄)		mg/l	
Dissolved Oxygen (DO)		mig/l	
Chemical Oxygen Demand (COD)	252	mg/l	
Biochemical Oxygen Demand (BOD)	160	mgA	
(5 days at 20 °C)			
Cyanide (CN)		mg/l	0.07 mg/l
Zina (Zn)		mg/l	3 mg/l
Copper (Cu)		mg/l	2 mg/
Total Phosphorus	0.2	mg/l	2 mg/l

Remark: This certificate is issued only for the receipt of the test sample.

Tested by

Signature Zaw Hein Oo Name: Sc (Chemistry) Sr. Chemist

Approved by

south Signature See This B.E. (Civil) 1980 Name: Technical Officer 150 TECH Laboratory

La division of WEG Co. Ltd /

ISO TECH Laboratory

No.18, Lanthit Road, Nanthstoone Quarter, Insein Township, Yangon, Myanmar. Ph. 01-840955, 09-73225175, 09-73242162, Fax: 01-644506, E-mail: isotechlaboratory@gmail.csim, Website: wag-myanmar.com





Appendix 8 Boiler Discharge Water Results



U Saw Christopher Maung B Sc Engg (Christ, Dip S.E. (Delth) Lecturer of VIT (Reich, Gemaitani (Y.E.E.G), LWSE 001. Former Member (UNICEF, Water quality monitoring & Sianwildance Myenman)

W0117 025

WTL-RE-001 Issue Date - 01-12-2012 Effective Date - 01-12-2012 Issue No - 1.0/Page 1 of 1

WATER QUALITY TEST RESULTS FORM

Client	De Heus Myanmar		
Nature of Water	Boiler Water		
Location	Myaung Takar		
Date and Time of collection	3.1.2017 (9:45 AM)		
Date and Time of arrival at Laboratory	3.1.2017		
Date and Time of commencing examination	4:1.2017		
Date and Time of completing	6.1.2017 -		

Results of Water Analysis

WHO Drinking Water Guideline (Geneva - 1993)

6.5 - 8.5 15 TCU
15 TCU
5 NTU
500 mg/l as CaCO3
0.3 mg/l
250 mg/i
200 mg/i
1500 mg/l
1000 mg/l
0.05 mg/l

Remark: This certificate is issued only for the receipt of the test sample.



308 Zaw Hein On Se IChemistr 5c Chemist

Signature: Name:

Approved by

seath Sor Thir (Civil) 1080 Technical Officer

2019

MW Aqua Solutions Company Limited No.86, Yeik Thar Lane No.5, Wai Zan Yan Tar Garden Housing Esta Thingangyun Township, Yangon, Myanmar MW MW AQUA SOLUTIONS Tel: +95 1 8564543 Email: analysis@mwas.jp ANALYTICAL TEST REPORT 12/Jun/2018 Issue Date : Customer name : De Heus Myanmar Co., Ltd Adress : Myaung Ta Gar Industrial Zone Tel: 09799337786 2018-0084D Report No. R2018-0092 Sample No. Sample Name Boiler Water (Stream) Sampling Date 09/May/2018 Sample Type **Drinking Water** Sampling Time 10:00 09/May/2018 Sample Taken By Sample Received . ate Analyzed 09/May/2018 ~ 12/Jun/2018 Project Code P0022 Parameters Unit Result JRA GL-02-1994 MDL 0.01 µS/cm Conductivity 75 800 µS/cm uS/cm 6.5 - 8.2 0.0-14.0 6.4 pH . Iron : Fe mg/L 0.77 1.0 mg/L 0.02 mg/L 43 0.010 mg/L : SiO₂ 50 mg/L Silica mg/L 0.099 1.5 mg/L as NH4 0.016 mg/L Ammonia Nitrogen : NH4-N mg/L Chloride : Cľ mg/L 2.2 200 mg/L 0.2 mg/L < 2 200 mg/L 2 mg/L : SO42. Sulfate mg/L Total Hardness mg/L 25 200 mg/L 1 mg/L Calcium Hardness 16 150 mg/L 1 mg/L mg/L M-Alkalinity 34 100 mg/L 0.5 mg/L mg/L Sample and customer information is designated by the request of customers. JRA GL-02-1994: Guideline of Water Quality for Refrigeration and Air Condition Equipment (Japan Refrigeration and Air Conditioning Industry Association) Remarks Approved by: 白 Takako UEDA 12 06 Laboratory Head

Prepared by E Guard Environmental Services Co., Ltd.

MW Aqua Solutions Company Limited No.86, Yeik Thar Lane No.5, Wai Zan Yan Tar Garden Housing Esta Thingangyun Township, Yangon, Myanmar MW MW AQUA SOLUTIONS Tel: +95 1 8564543 Email: analysis@mwas.jp ANALYTICAL TEST REPORT Issue Date : 12/Jun/2018 De Heus Myanmar Co., Ltd Customer name : Adress : Myaung Ta Gar Industrial Zone 09799337786 Tel: 2018-0083D R2018-0091 Sample No. Report No. 09/May/2018 Sample Name Treated Water Sampling Date Drinking Water Sampling Time 10:00 Sample Type Sample Taken By Sample Received 09/May/2018 P0022 09/May/2018 ~ 12/Jun/2018 Project Code Date Analyzed WHO Guideline MDL Parameters Unit Result Color TCU 30 15 TCU 0.5 TCU Turbidity NTU 5.9 5 NTU 0.2 NTU 5.8 - 8.6 0.0-14.0 6.0 . pH Total Phosphorus T-P mg/L <1 5 mg/L -1 mg/L 50 mg/L as NO3 0.1 mg/L Nitrate Nitrogen : NO3-N mg/L 0.2 Nitrite Nitrogen : NO2-N mg/L < 0.002 3 mg/L as NO2 0.002 mg/L mg/L 0.89 0.3 mg/L 0.02 mg/L Iron : Fe 0.013 0.5 mg/L 0.006 mg/L : Mn mg/L Manganese Ammonia Nitrogen : NH4-N mg/L 0.049 1.5 mg/L as NH4 0.016 mg/L 4.0 250 mg/L 0.2 mg/L Chloride : Cľ mg/L Sulfate : SO,2. mg/L < 2 250 mg/L 2 mg/L Potassium K mg/L 4 2.3 12 mg/L 0.1 mg/L 44 300 mg/L 1 mg/L Total Hardness mg/L **Total Dissolved Solids** : TDS mg/L 65 1000 mg/L 0 mg/L Sample and customer information is designated by the request of customers. * : Japanses Standard Limits (established by Ministry of Health and Welfare in Japan) Remarks **: European Standard Limits (set by European Committee for Environmental Legislation) Approved by: 上田 Takako UEDA Laboratory Head



13/Mar/2018

Issue Date :

MW AQUA SOLUTIONS

MW Aqua Solutions Company Limited No.86, Yeik Thar Lane No.5, Wai Zan Yan Tar Garden Housing Estate Thingangyun Township, Yangon, Myanmar Tel: +95 1 8564543 Email: analysis@mwas.jp

ANALYTICAL TEST REPORT

Customer name : De Heus Myanmar Co., Ltd

Myaung Ta Gar Industrial Zone Adress : 09799337786 Tel:

MV

R2018-0044 Sample No. 2018-0044D Report No. Sample Name Raw Water From Tube Well Sampling Date 07/Mar/2018 8:30 Drinking Water Sampling Time Sample Type Sample Taken By Sample Received 07/Mar/2018 07/Mar/2018 ~ 09/Mar/2018 P0022 Project Code Date Analyzed

Parameters		Unit	Result	WHO Guideline	MDL
Color		TCU	140	15 TCU	0.5 TCU
Turbidity		NTU	45	5 NTU	0.2 NTU
рН			6.1	5.8 - 8.6 *	0.0-14.0
Total Phosphorus	: T-P	mg/L	<1	5 mg/L **	1 mg/L
Nitrate Nitrogen	: NO ₃ -N	mg/L	< 0.1	50 mg/L as NO3	0.1 mg/L
Nitrite Nitrogen	: NO ₂ -N	mg/L	< 0.002	3 mg/L as NO2	0.002 mg/L
Iron	:Fe	mg/L	5.3	0.3 mg/L	0.02 mg/L
Manganese	: Mn	mg/L	0.42	0.5 mg/L	0.006 mg/L
Ammonia Nitrogen	: NH4-N	mg/L	< 0.01	1.5 mg/L as NH4	0.01 mg/L
Chloride	Cr	mg/L	4.3	250 mg/L	0.2 mg/L
Sulfate	: SO4	mg/L	< 2	250 mg/L	2 mg/L
Potassium	: K	mg/L	1.8	12 mg/L **	0.1 mg/L
Total Hardness		mg/L	61	300 mg/L *	1 mg/L
Total Dissolved Solids	: TDS	mg/L	68	1000 mg/L	0 mg/L

* : Japanses Standard Limits (established by Ministry of Health and Welfare in Japan)

**: European Standard Limits (set by European Committee for Environmental Legislation)

Approved by:

Remarks

上田 Takako UEDA Laboratory Head

MW AQUA SOL	UTIONS	T	al: +95 1 8564543 Email: analy	ysis@mwas.jp	
	-	ANALYTIC	CAL TEST REI	PORT Issue Date	: 23/Apr/2019
Customer name : Adress : Myaung T Tel : 09799337	De Heus N la Gar Industrial Z 1786	Iyanmar Co.,	Ltd	-	
Sample No.	201	9-0117D	Report No.	R2019	9-0096
Sample Name	Boiler V	Vaste Water	Sampling Date	08/Ap	r/2019
Sample Type	Drink	ing Water	Sampling Time	09:0	0AM
Sample Taken By			Sample Received	08/Ap	r/2019
Date Analyzed	08/Apr/2019	~ 23/Apr/2019	Project Code	PO	022
Paramet	ers	Unit	Result	JRA GL-02-1994	MDL
Conductivity		µS/cm	320	800 µS/cm	0.01 µS/cm
рH			10	6.5 - 8.2	0.0-14.0
Iron	: Fe	mg/L	1.1	1.0 mg/L	0.02 mg/L
Silica	: SiO ₂	mg/L	230	50 mg/L	0.010 mg/L
Ammonia Nitrogen	: NH ₄ -N	mg/L	0.17	1.5 mg/L as NH4	0.016 mg/L
Chioride	: CI	mg/L	25	200 mg/L	0.2 mg/L
Sulfate	: SO4	mg/L	< 2	200 mg/L	2 mg/L
Total Hardness		mg/L	5.9	200 mg/L	1.0 mg/L
Calcium Hardness		mg/L	<1.0	150 mg/L	1.0 mg/L
M-Alkalinity		mg/L	140	100 mg/L	0.5 mg/L
Remarks	Sample and cu JRA GL-02-199 (Japan Refrige	stomer information i 94: Guideline of Wat ration and Air Condi	s designated by the request er Quality for Refrigeration tioning Industry Association	st of customers. and Air Condition Equipment n)	
	Approved by:	Le f	₹ 3 €	MWA	S

MW AQUA SOL	UTIONS	Т	al: +95 1 8564543 Email: analysis	@mwas.jp	
Customer name : Adress : Myaung T Tel : 09799337	De Heus M a Gar Industrial Zi 786	ANALYTIC	CAL TEST REP	Issue Date :	23/Apr/2019
Sample No.	2019	-0115D	Report No.	R2019-	0094
Sample Name	Raw Water	From Tube Well	Sampling Date	08/Apr/2	1019
Sample Type	Drink	ing Water	Sampling Time	09:30/	M
Sample Taken By		-	Sample Received	08/Apr/2	2019
Date Analyzed	08/Apr/2019	~ 23/Apr/2019	Project Code	P002	2
		11-24	Denville	WHO Culdeline	HDI
Calar	ers	TCU	31	15 TCU	0.5 TCU
Turbidiby		NTU	46	5 NTU	0.2 NTU
all		in o	7.4	58-86 *	0.0-14.0
Total Phosphonis	T.P	ma/L	<0.3	5 mg/L **	0.3 ma/L
Nitrate Nitrogen	: NO+-N	ma/L	0.1	50 mg/L as NO3	0.1 mg/L
Nitrite Nitrogen	:NO-N	mg/L	< 0.002	3 mg/L as NO2	0.002 mg/L
Iron	Fe	mg/L	1.1	0.3 mg/L	0.02 mg/L
Manganese	: Mn	mg/L	0.037	0.5 mg/L	0.006 mg/L
Ammonia Nitrogen	: NH4-N	mg/L	< 0.01	1.5 mg/L as NH4	0.01 mg/L
Chloride	: CI	mg/L	3.7	250 mg/L	0.2 mg/L
Sulfate	: SO4	mg/L	<2	250 mg/L	2 mg/L
Potassium	:К	mg/L	2.9	12 mg/L **	0.1 mg/L
Total Hardness		mg/L	46	300 mg/L *	1.0 mg/L
Total Dissolved Solid	s : TDS	mg/L	71	1000 mg/L	0 mg/L
Remarks	Sample and cu * : Japanses S **: European Si	stomer information i tandard Limits (esta tandard Limits (set t	s designated by the request oblished by Ministry of Health by European Committee for E	of customers. and Welfare in Japan) nvironmental Legislation)	
Ĩ	akako UEDA	上面学	書 36	MWAS	S



MW Aqua Solutions Company Limited No. 65, Yek Thar Lare (so 5, Yek Zan Yan Tar Garden Housing Estaie Thingslepich Toenship Yangon, Myanmar Tel +05 1 8056543 Errak asalyssighmessip

ANALYTICAL TEST REPORT

Customer name : De Heus Myanmar Co., Ltd

Issue Date

05/Jul/2019

Adress :	Myaung Ta	Gar Industrial	Zone	-

Tel 09799337786

Sample No.	201	-0280D	Report No.	R2019	9-0216
Sample Name	Boiler Water	(Stream Water)	Sampling Date	29/Ju	2019
Sample Type	Donk	ing Water	Sampling Time	9.0	DAM
Sample Taken By	Ma Th	ae Su Mon	Sample Received	29/Ju	n/2019
Date Analyzed	29/Jun/201	9-05/Jul/2019	Project Code	PO	022
Paramet	lers	Unit	Result	JRA GL-02-1994	MDL
Color		TCU	4.6	15 TCU	0.5 TCU
Turbidity		NTU	2.7	5 NTU	0.2 NTU
Conductivity		µS/cm	300	300 µS/cm	0.01 uS/cm
pH		+	11	6.5-82	0.0-14.0
Total Organic Carbon	n TOC	mg/L			
Biochemical Oxygen De	emand : BOD	mg/L	-		
Chemical Oxygen De	mand : COD	mgL		2	
Total Nitrogen	T-N	mgl			
P-Acidity		mg/L	<0.5		0.5 mg/L
M-Acidity		mg/L	<0.5		0.5 mg/L
Carbonate		mg/L	57		0.6 mg/L
non	Fe	mg/L	0.14	0.3 mgl	0.02 mg/L
Manganese	Mn	mg/L	0.060	0.5 mg/L	0.006 mg/L
Total Solid	: TS	mg/L	150		5 mg/L
Suspended Solids	SS	mg/L	6		5 mg/L
Sodium Chloride	: NaCl	mg/L	18		0.2 mg/L
Chlorida	: CI	mg/L	11	50 mg/L	0.2 mg/L
Sulfate	: SO, 2	mgiL	<2	50 mg/L	2 mg/L
P-Alkalinity		mg/L	89	-	0.5 mg/L
Total Hardness (mg/L	as CaCO ₃)	mg/L	3.9	70 mg/L	1.0 mg/L
Calcium Hardness (m	g/L as CaCO3)	mgL	3.9	50 mg/L	1.0 mg/L
Magnesium Hardness	S(mgiL as CaCO,)	mg/L	<1.0	-	1.0 mg/L
M-Alkalinity		mg/L	120	50 mg/L	0.5 mg/L
Bicarbonate	HCO,	mgiL	<0.6		0.6 mg/L
Total Dissolved Solid	s TDS	mgiL	140	1000 mg/L	0 mg/L
Salinity		960	0.14	4	0 %
Phosphate	2	mg/L	<0.25		0.25 mg/L
Dissolved Oxygen	DO	mg/L			
Others (1			-	1

Approved by:

Takako UEDA Laboratory Head

EB



MW Aqua Solutions Company Limited No 66: Yea Thar Lare No 5: Wa Zan Yan Tar Garden Housing Estine Thingungsin Toenship, Yangon, Myanmar Tel. +95:1:8564543 Email, anaysaigh was.jo

ANALYTICAL TEST REPORT

Issue Date

mar Co Itd

05/Jul/2019

Customer	name :	De Heus	Myanmar	Co., Ltd
Adress	Myaung Ta	Gar Industria	d Zone	

Tel 09799337786

Sample No.	2019	-0279D	Report No.	R2019	-0215
Sample Name	Treat	ed Water	Sampling Date	29/Jun	/2019
Sample Type	Drink	ng Water	Sampling Time	9.00	AM
Date Analyzed	29/Jun/201	9-05/Jul/2019	Project Code	P00	22
Paramete	ers	Unit	Result	WHO Guideline	MDL
Color		TCU	< 0.5	15 TCU	0.5 TCU
Turbidity		NTU	< 0.2	5 NTU	02NTU
Conductivity		µS/cm	140		0.01 µS/cm
pH			11	58-86 *	CO 14 0
Total Organic Carbon	TOC	mgL	7.		
Biochemical Oxygen Der	mand ; BOD	mgiL	-		
Chemical Oxygen Der	mand . COD	mgL			-
Total Nitrogen	T-N	mg1			
P Acidity		mg/L	<0.5		0.5 mg/L
M-Acidity		mgiL	<0.5	-	0.5 mg/L
Carbonate		mgL	10	· ·	0.6 mg/L
Iron	Fe	mg/L	0.03	0.3 mg/L	1.00 mg/L
Manganese	Mn	mg/L	0.012	0.5 mgl	0.006 mg/L
Total Solid	TS	mg/L	68	-	5 mg/L
Suspended Solids	\$\$	mg/L	< 5		5 mg/L
Sodium Chloride	NaCl	mg/L	0.94		0.2 mg/L
Chloride	Cľ	mg/L	0.57	250 mg/L	0.2 mg/L
Sulfate	SO,2	mg/L	< 2	250 mg/L	2 mg/L
P-Alkalinity		mg/L	13		0.5 mg/L
Total Hardness (mg/L	as CaCO ₂)	mgiL	2.3	300 mg/L *	10 mg/L
Calcium Hardness (mg	A as CaCOJ)	mgiL	2.3		1.0 mg/L
Magnesium Hardness	(mg/Las CaCO.)	mgt	<1.0	-	10 mg/L
M-Alkalinity	_	mg/L	22		0.5 mg/L
Bicarbonate	HCO,	mg/L	< 0.6	4	0.6 mg/L
Total Dissolved Solids	TDS	mg1_	68	1000 mg/L	0 mg/L
Salinity		%o	0.07		0 %
Phosphate		mgL	<0.25		0.25 mg/L
Dissolved Oxygen	DO	mg/L			
Others ()				

Japanses Standard Limits (established by Ministry of Health and Welfare in .

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上田

Approved by:

Remarks

Takako UEDA Laboratory Head

Appendix 9Fire Fighting Training Activities at DH factory



Appendix 10 Pubic Consultation Meeting

a) Invitation Card



b) Attended Lists

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De Haus Myamua Limitedမှတ်ရိတ္တန်တစားအတာထုတ်လုပ်ခြင်းနှင့်ခြန့်ခြစ်ရောင်းရသည့် ကော်ရုံတည်ဆောက်လည်ဟင်ခြင်းအတွက် ကာနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း (IEE) လုပ်ငန်းဆိုင်ရာ ရှင်းလင်းတင်ပြခြင်း နှင့် အများပြည်သူသဘောထားရေးမှုခြင်း (Public Heating) အခေါ်နားသို့တက် ရောက်လာသူများစာရင်း

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De Him Mymme Liminsမှတ်ရိတ္ဆန်အစာအတတ္တတ်လုပ်ခြင်းနှင့်ခြန်ခြာချောင်ရသည့် စက်ရုံးလည်ဆောက်လည်းကံခြင်းအတွက် ကနှင့်မက်စန်းကျင်ဆန်ဆန်ခြင်း (IEE) လုပ်စန်းဆိုင်ရာ ရှင်လင်းတင်ဖြစ်ပြီး နှင့် အမှုကပြည်သူသဘောတာရေးမြင်း (NeNic Namme) အခေါ်မှာလို့လက် ရောက်လာသူများစာရင်း

ugedinongerlique (Private Company)

ရက်ခွဲ - ၂၀၁၇ ခုနှစ် ၊ မတ်လ (၇) ရက်

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c) Presentation by De Heus Myanmar Limited





Agenda

- 1. Mission, vision, company culture and 5 pillars
- 2. De Heus Global organization structure
- 3. Investment in Myanmar
- Introduction to Factory : Location and Layout, Operational Infrastructure, Plant Capacity, Production Process and Product Specifications
- Production Plant Construction Project and Design related to Environmental Facts
- 6. Q&A





Mission

Our mission is to secure the continuity of De Heus as a family-owned business and to realize worldwide growth in the animal feed industry, in accordance with our vision, values and culture and in doing so, creating agricultural development and progress wherever we are active.

ကျွန်ုပ် တို့ ၏ရပ်တည်ရက်မှာ De Heus ကုမ္မကိအားမိသားစုပိုင် ကုမ္မကိအဖြစ် အစဉ်အမြံ ဆက်လက်ရပ်တည်စေပြီး ကျွန်ုပ် တို့ကုမ္ပကိဏ်ရပ်တည်ရက်၊ ရည်မှန်းရက်၊ တန်ဖိုးနှင့် အစဉ်အလာများနှင့် အညီ တိရစ္ဆာန်အတထုတ်လုပ်ရေးလုပ်ငန်းအား ကမ္ဘာနှင့်အဝမ်း လုပ်ကိုင်ရာတွင် ကျွန်ုပ် တို့လုပ်ငန်းလည်မတ်ရာ နေရာဒေသ အသီးသီး၏ မွေးမြူရေးကက္က ဖွံ့ဖြီးတိုးတက်မှုတွင် အဝှိန်အဟုန်ဖြင့် ပါဝင်ဆောင်ရွက်နိုင်ရမည် ဖြစ်သည်။

Vision



 With a growing world population and a growing standard of living, agricultural activity and food production w need to increase rapidly. It is our belief that an improved availability of cost price efficiently, sustainably produced food products is essential for the increase of prosperity worldwide.

 ကျွန်ုပ် တို့ ကမ္ဘာကြီး၏ တစ်နေ့ တရြား များပြားလာသော လူဦးရေနှင့် ရွံဖြီးတိုးတက်လာသော လူနေမှု အဆင့်အတန်းနှင့် အညီ ရေမှုန်းသင့်တွင် မူတ၍ ရေရည်စိုရီ အားထားရနိုင်သော နွေမြေရောက်ကွဲနှင့် စားသောက်ကုန် လုပ်ငန်းများသည်လည်း လျှင်မြန်စွာ စွံဖြီးတိုးတက်လာရန် လိုအပ်ပေသည်။

- It is our vision to be a global leading supplier of nutritional products for animals in order to support the performance of our clients, the producers of meat, milk, eggs and fish. It is our objective to supply our clients with efficiency and technological progress by providing them with in-depth knowledge about animal nutrition and animal science.
- ကျွန်ုပ် တို့ ၏ ရည်မှန်းရက်မှာ အသားငါးနှံ့နှင့် ဥ ထုတ်လုပ်သော မွေမြူးရေ သမားများ၏ လိုအပ်ရက်များကို ထောက်ပံပေးခြင်း အားဖြင့် တိရစ္ဆာန် အာဟာရ ဆိုင်ရာ ထုတ်ကုန်များ ထုတ်လုပ်သူအဖြစ် ကမ္ဘာနှင့် အပုမ်း ဦးဆောင်ရပ်တည် နိုင်ရည် ဖြစ်သည်၊ မွေမြေရောက်ကွဲတွင် လုပ်ကိုင်သူရားအား ကျွန်ုပ် တို့ ၏ တိရစ္ဆာန် မွေမြေရေးနှင့် အာဟာရ ဆိုင်ရာ အသီးသွာ ပောသုတ်များ ရည်းပညာ တိုးတက်မှ ဖြစ်ရာများနှင့် အမိန့်တို့တို အတွင်း အက်ဖြံ့သက်ရောက်မှု များ ကို ကူးသိမြန် နက်စိုင်ရာ ထောက်ပိုခြန် ဖြစ်ပေးများခြင် အမိန့်တို့တို အတွင်း အက်ဖြံ့သက်ရောက်မှု များ ကို ကူးသိမြန် နက်စိုင်ရာ ထောက်ပိုခြန် ဖြစ်ပေးများချင် ဖြစ်သည်။

Vision







Why De Heus in Myanmar?

- · Exports to explore investment opportunities
- Good fit between the market and our strategy
- Myanmar small market (1.2 MMT/y), but great potential
- First mover advantages
- Economic development = higher consumption of animal proteins

2019

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28	Jacobus Johannes de Heus	CEO
p	Marcus Leonardus van der Kwaak	CFO
	John Christian van den Ban	Managing Director (De Heus Myanmar)

Investment and Construction Project Data

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ာ တိရိစ္တာန်အားထုတ်လုပ်မေ့ ကေပစ္စည်များ ၂,၆၆၀သန်း ၂။ အဆောက်အဦးကုန်ကျစရိတ် စ,၉၀၀သန်း ၃။ စက်ရုံတည်ဆောက်နောကုန်ကျစရိတ် စ,၉၀၀သန်း ၄။ တပ်ဆင်ရေး ကုန်ကျစရိတ် စ,၉၇၀သန်း ၆။ အတြာ၊ စ,၇၇၀သန်း ၇။ အစိကကုန်ကျစရိတ် စ,၀၇၇သန်း	еğ	adilian	ကုန်ကူစရိုက်လန်ခုံး (အမေရိကန်ပေါ် (တ)
၂။ အဆောက်ဆဦးကုန်ကုနစိုက် စ. ခုသုသန်း ၃။ ကေရိခဲ့သည်ဆောက်ဆောက်နားကုန်ကုနစိုက် စ. ဖြစ်သန်း ၄။ တစ်ဆင်ရေး ကုန်ကုနစိုက် စ. ရေ စွာသန်း ၅။ အတွစ်နိုင်အဆောက်ဆဆုံးနား စ. ၄. စွာသန်း ၆။ အခြား စ. ၀. ၀. စွာန်း ၇။ အစိကကုန်ကုနစိုက် စ. ရပ္ပာသန်း	ai -	လိရိစ္ဆာန်အတထုတ်လုပ်ခေ့၊ က်ေပရွည်ရား	1060aafu
ခု၊ စကိရိတည်ထောက်ရောက္နန်ကျစရိတ် စစ်လသန်း eှ၊ တစ်ထင်ရေးကုန်ကျစရိတ် စစ္ဆကသန်း g၊ အတွင်းနိုင်အထောက်ဆက်မှား စ.၄.၉သန်း ၆။ အဆြာ စ	3	အဆောက်အဦးကုန်ကျစရိတ်	a.ponoala
င္း တစ်ဆစ်ရေးကုန်ကူရော် စစ္သာသန်း ၅။ အတွစ်ရိုင်အစောက်ဆရာနား စ.၄.၉သန်း ၆။ အကြာ ဝ.၀ဟာန် ^{၄။} အစိကကုန်ကူရော် ဂု.၀၇က္ကသန်း အတွောတ္ ကုန်ကူရော် ပ.ရဟသန်း	15	ကော်ရဲ့တည်ဆောက်ရောက္ခန်ကျစစိုက်	ារទី០៣១៦ឆ្នាំ
g အတွင်နိုင်အဆောက်ဆဆုံများ ပင္ကျက္ကသန်း ၆။ အခြား ပင္လာတာနိ ^{လု} အစိုကကုန်ကူစရိတ် ဂု.မက္ကသန်း အတွောတ္ ကုန်ကူစရိတ် ပင္လာတာနို	çi.	တပ်ဆင်ရေး ကုန်ကျာရီတိ	စ ၉၅၀၁၃န်း
၆။ အကြား စာတာသန်း ရက်ကကုန်ကူစရိတ် စုတက္ကသန်း အတွောက္ ကုန်ကူစရိတ် ဖာတ္ဘာသန်း	9	အတွင်းပိုင်းအစဆာက်အခွံများ	0.9.0004
၅º အဓိကကုန်ကူးရောက် ဂုဟုစ္စသန်း အထွောက္ ကုန်ကျားရောက် ပန်မာသန်း	6i	solita	a.500564
အတွေးတူ ကုန်ကျစရိတ် ပာရှမာသန်း	de	အဓိကကုန်ကူရေလ်	dicebborb
		အတွေတွေ ကုန်ကျစရိတ်	ນ.ສູບແຕ່ວຣັສ









Production Plant in MyangDaGar Industrial Zone



- Design capacity 220-240,000 MT/year (20% of feed market share in Myanmar)
- Operation Phase 1: 9-10,000 MT/month
- Operation Phase 2 : 10- 20,000MT/month
- Productivity capacity for operational phase 2 will be implemented on mid of 2017



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70 JC

Factory Construction Project:



Building Area Breakdown

- Height of Production Tower 39.4meters, 7 stories.
- Production Tower area- 405m²
- Finished Product Warehouse 1567m²
- Raw Material Warehouse 2969m⁷
- Utilities Rooms area (Transformer +Boiler + Empty bag room) -450.5 m²
- Welfare block area- 724.5 m²
- Garbage Room (5 compartments for different kinds of waste) 138 m²
- Water Pump Room 72 m²

Building Area (41%)-	9311m ²
Internal Circulation (33%) -	5772m ²
Green Area (26%) -	7377m ²
*Total Factory Area (100%) -	22,461m ²

Factory Design













E Guard Environmental Services





E Guard Environmental Services





guan ၃။စီမံကိန်းပတ်ဝန်းကျင်လက်ရှိအနေအထား မြောက်လတ္တီတွခ် ၁၇ ဒီဂရီ ၉ မိနစ်၂၁.၅၂ စက္ကန့် ကိုသြန်နိတ်အမှတ် အရှေ့ လောင်ဂျီကျူ ၉၅ ဒီဂရီ ၅၈ မိနစ် ၆.၃၀ စက္ကန့် နှစ်စဉ်ပျမ်းမှုအမြင့်ဆုံးအပူရှိန် : ၃၂.၅၃ ဒီဂရီဆိုယ်ထိုးယ်ဝိစ် ရာသီဥတုအခြေအနေများ နစ်စဉ်ပွင်းဖူးအနိမ့်ဆုံးအပူရှိန်း ၂၁.၇၂ ဒီဂရီဆဲလ်ဆီးယဝ်စ် 4 (မိုးရလပ်သန့်စလဗေဒညွှန်ကြားမှု နှစ်စဉ်မိုးရေရှိန်: ၃၄၀၉.၉ စင်တီမီတာ စိမ်ကိန်းတည်နေရာတွင်လက်ရှိမြေအသုံးရမှု – စက်မှုလုပ်ငန်းနှင့်ဆိုင်သောမြေအသုံးရမှုပုံစံ ę. ရန်ကုန်-ပြည်လမ်း (စီမံကိန်းတည်နေရာမှ ၂.၈၈ ကီလိုမီတာ) အနီးဆုံးလမ်း 8 အနီးဆုံးခရာအရင်းအဖြစ် လိုင်မြစ် (စီမံကိန်းတည်နေရာမှ ပ.၂၉ ကီလိုမီတာ) \$ ၇ သစ်တောစရိယာ - 680 ရောဂ်ခံရေဝပ်ခရီယာ - 480 in i ၉ ကန့်သတ်ကာကွယ်ထားသောစမီယာ - 680

Pubic Consultation Meeting Presented Documents (continued)

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ရည်အသွေးတိုင် ဘးပတ်ဂန်းကျင် ဂည်။	းတာမှု _ တို ဆိုင်ရာ(ထုတ်	င်းတာမူရလဒ်မ လွှတ်မူ)အရည်	pးအရ PM သွေးလမ်းညွှ	I 10, PM 2.5 နမှု၏သတ်မှတ်ချ	, NO2 တို့သ က်ထက် ကျော်ဂ
Parameters	Observed Value	Guidelines Value	Unit	Organization	Averaging Period
PM 10	183.53	-54)	µg/m ³	NEQ	24hrs
PM 2.5	84.20	25	µg/m ³	NEQ	24hts
NO,	179.97	200	µg/m ³	NEQ	lbr
801	12.06	20	µg/m ³	NEQ	24hrs
Ozone	0.01	100	µg/m)	NEQ	8hrs
co	0.41	35	ppm	NAAQS	Shrs
				1	
C02	293.3	5000	ppm	ACGIH	Shrs

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and the second	ှာ စီပံကိန်းပတ်	ဝန်းကျင်ဆိုင်	ရာအရည်ရော	හරිදිංගාමූහි
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mon mon	mbanapara (WHO)) adeata	S S S S S S S S S S S S S S S S S S S	(ကက်လက်မ) အလေ်လေ
ສົາງຕົບຕໍ	amonhamonia	E Contraction	autor la de de	(chow Bord) and Dark
	A	To sole i	-	The second second second second
~	Parameters	Case.	Water (jaam)	STREET DETAILING STATES
				a contract of the second se
	ar	-11	11	15.11
-	pill Turbullu	pH .	4.5	45-83
	pill Turbiday Colora (Tana)	ell NTU ICN	4.4	kr-ki Lixtu
- 4	pH Turbolity Colour (True) Colours (True)	pH NTU TCN metacOCO.	4.8 -146 -100	AS-AS DATU DITUT
	pH Turboley Colour (True) Colours Hardens Manecian Unitary	ell NTU TCN egitar CaCO, metar CaCO,	4.8 .166 .109 .24	61-61 1 KTU 11117
	pil Turtsukty Culsur (Tran) Calvinn Hanbess Magnesian Hanbass Disadiod Oragen (DO)	ell NTU TCN mpTarCACO, mpTarCACO, mpTarCACO,	43 160 34 18	k5-K5 PATU UTIPT
	pH Turtsolity Culsor (True) Calvinn Hardness Magnetian Hardness Dissolved Origin (DO) Dissolved Scients	pH NTU TCN mpLacCaCO, mpLacCaCO, mpLacCaCO, mpLacCaCO,	43 140 34 18 54 199	6.5 - 8.5 PATU - 117171
	pif Turtokty Colum (True) Colum Hanters Magnetian Hanters Disologi Solab Disologi Solab ban	pH NTU TCN mpTaxCaCD, mpTaxCaCD, mpTaxCaCD, mpT mpT	48 388 39 34 18 44 199	4.5-45 PATU 1777
	plf Turtiskiy Cultur (True) Culston Hardness Magnetian Hardness Discolved Orgen (DO) Discolved Sciulo June Arrenic (As)	pH StrU TCN mpLacGaCO, mp1 mp1 mp1 mp1 mp1	4.8 .160 .100 .34 .18 .54 .100 .564	5-55 FATU 1777 000 01 001
	plf Turbolity Culture (Trave) Cultures (Trave) Magnessian Harniana. Discolived Oxygen (DO) Discolived Socials Item Arrepsic (Are) Nitrave (N.NO.)	pH Stru TCN mpTacCaCO, mpTacCaCO, mpT mpT mpT mpT mpT mpT	4.8 .160 .24 .16 .54 .109 .501 .561 .561	6.5 - 6.5 1 ATU 17717.

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iubeast-	တိုင်းတာမလော်များအတ	a casaoo	Some (turbidity)	1 -5-63(BOD) 8-63
ໃຫ້ໝໍດ	နင်(စစ္စေပါင်း) စသည် ဖ	ອອອດວິດວ	ວະບຸກະວາວຽອເຊື້ອງ	ນາະບວ້າດສະດາເຮັດອິຣິຄາ
ာတ်မှ)အရ	သိသွေးလမ်းသွန်၏သတ်မ	မတ်ရက်ထ	က်ကျော်လွန်နေပါ	apps
			V 01 1	-
	Parameters		Warrs quality fronds	Names of Factor Streams and
		C Deserved of	11.00	Conditi (reasons) (Laid-ter
100	Torrest of the second se	Cashington	101	15
	conformation partners.	-	p.1	
100		-	**	
	Turbiday	No.	11	P NTU
	Commit Classes	ico	10	11
4	Destivul South	-mp1	412	-
	Arminia (NH)	-1997	0.1	
	Chemical Organi Demaid (COD)	-463	197	256
	Businessod Danam Danami	and a		142
1.61	(HOD)			
	Total Pleasthere	- mail	62	12
1000	a second or and the second second			-
1000	Total Mirrows	. Town	100 100	
	Total Name	1ge	10	10

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	oc			
ထုတ်ရေအရည်အသွေး_ ကိုမှုတို့သည်အမျိုးသားပဝ ကြထက်ကျော်လွန်နေပါ၁	ဘုင်းတာမှုရလင် ဂ်ဂန်းကျင်ဆိုင်ရေ သည်။	များအရသဓာတ p(ထုတ်လွှတ်မှု)	ပ၊၀င်မှု၊pH၊ရေအ အရည်သွေးလမ်း	
Perameter	1.00	Water Quality Receilts	NEQ Condeline Value	
iner .	ing1	1.44	. I.	
pfs	\$.17.*	111.0	6-9	
Suspended Solids	High?	428	50	
Colour (True)	TCU	130	15	
Turbidity	NTU	730		
Conductivity	Micro S/cm	214		
Total Handness	High an CaCO ₁	14	500	
Calcium Hardness	ing tas CaCO ₃	10	-	
Magnesium Hurdness	night as CaCO,	dia.	*	
Total Alkabriny	mgri as CaCO,	164		
Phenotphinatein Atkalinity	ing the CaCO ₁	740		
Carlsmate (CaCO ₃)	ing/larCaCO,	Nil		
Biearbonate (HCD ₁)	mg/For CaCE)	104	1.21	
Chloride (as CL)	right.	13	290	
Sodium chloride (as NaCL)	mgil	23	-	
	and the second		200	
Sulplinic (as SO ₄)	TTTLE			
Sulplinte (as SO ₄) Total Solida	mgri	530	1500	

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	၆၊ ထိရိက်သက်ရေ	ာက်မှု အဆင့်ဖ	ilo:	gua
-	ත්දින්හු	ပတ်ဝန်းကျင်အာ	မေါ်သက်ရောက်မှုများ	
အဆင့်	ကော်ပြချက်	စက်ရုံလည်ပတ် သည့်ကာလ	စက်ရုံပိတ်သိမ်း ကာလ (ရြီဖျက်နေးကာလ)	စုစုခေါ်
အလွန်နည်း (very low)	သက်ရောက်မှုလုံးပမရှိ	o	9	9
(low)	သက်ရောက်မှုနည်း	oc	33	JE
အလယ်အလ တိ (moderate)	သက်ရောက်မှုအနည်းငယ် ရှိ၍ပိုမိုကောင်းမွန်စေရေး ဆောင်ရွက်ရန်လိုအပ်	е	p	90
ups (high)	သိသာထင်ရှားသောသက် ရောက်မှုရှိ၍ကောင်းမွန်စေ ရေအမှန်တကယ် ဆောင်ရွက်ရန်လိုအပ်	o	ø	a
အလွန်များ (very high)	ရေရည်ဆောင်ရွက်ရန်မ သင့်တော်သောအနေအထား	o	0	ø
	စုစုပေါင်း	л	pe	99

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0		guard
	ဂု။ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီဒ	දිං
• စက်ရုံလည်ပတ်ခြင်း (စက်ရုံလည်ပတ်သည့် ကာလ) • စက်ရုံပိတ်သိမ်းကာလ (ရြိုဖျက်ရေးကာလ)	ဆိုးကျိုးသက်ရောက်ခြင်းမှ ≺ကာကွယ်ရန် ≺ရှောင်ကွှဲရန် ≺လျော့နည်းစေရန်	နည်းလမ်းနှင့် အစီအစဉ်များ ဖော်ပြသည့်စီမံချက်



-So	သတ်ရောက်မှု	နိုင်ကိန်းထောင်ရွက်ရတ်	လျော့နည်းစရန်အရေးမှ ဆောင်ရွက်မှု
3	လေအရည်အသွေး	 ကောက်ပဲသီးနံများကုန်ကြမ်းပစ္စည်း များသိုလှောင်မှုဖြည့်စွက်အတများ၊ ဝိတာပင်းပရမင်များ၊ထာရှည်ခံစာတု ပစ္စည်းများသိုလှောင်ခြင်း ကောက်ပဲသီးနံကုန်ကြမ်းများ ကြိတ်ခွဲခြင်းပြင်ဆင်ရောနောခြင်း ရေနွေးစင်ကိုင်လာလည်ပတ်ခြင်း ရေနွေးစင်ကိုင်များအသုံးပြုခြင်း၊ အရေပေါ် ဒီငယ်ဂျင်နရေတာအသုံး မြခြင်း နှင့် ယာဉ်များရွေ့လျားမှု 	 အမှန်ဝပ်သည့်စနစ်တပ်ဆင်ခြင်း ဘွိုဝ်လာ၏အမှန်ဝပ်စနစ်ကိုပုံမှန်ဝစ် ဆေးခြင်း တပ်ဆင်ထားသောအမှန်ဝပ်တိရိယာ များကိုပုံမှန်ဝစ်ဆေးပြုပြင်ခြင်း သန့်ရှင်းရေးပုံမှန်လုပ်ပေးခြင်း ဆန့်ရှင်းရေးပုံမှန်လုပ်ပေးခြင်း စတ်ရုံတွင်းလမ်းအား ရေချန်းခြင်း ကုန်ကြမ်းများဆေးပါးများဆားသတ် မှတ်ထားသည့်အပူချိန်တွင်သတ်မှတ် ထားသောသို့လောင်သမီးဆည်းမှုစနစ် ဖြင့်စနစ်တကျထားခြင်း လုပ်ငန်းသုံးလည်များ၏အရှိန် နှင့် လောင်စုံတွင်းသစ်ပင်မြက်စင်းများစိုက် ပျိုးခြင်း
3	ဆူညံသံ၏သက် ရောက်နိုင်မှု	 တိရိတ္ဆန်အဗာထုတ်လုပ်သည့် စရိယာမှစက်ပစ္စည်းကိရိယာများ လည်ပတ်ခြင်း ဒီစယ်ဂျင်နေရေတာ အသုံးပြုခြင်း၊ ရေနွေးခွေဘွိုင်လာလည်ပတ်ခြင်း၊ ကုန်ပစ္စည်းများကိုသယ်ယူပို့ ဆောင် သည့်လော်ရီကားများ မော်တော် ယာဉ်သွားလာမောင်းနှင်ခြင်း၊ 	 စက်ရံတွင်းသစ်ပင်များစိုက်ပိုးခြင်း။ ကောင်းမွန်သောယာဉ်ယွန်ရားများ အသုံးပြုခြင်းနှင့်ဝုံမှန်စစ်ဆေးခြင်း။ ပတ်ဂန်းကျင်အားအသံဆူသံမှုနည်း စေရန်စက်ရဲ့အဆောက်အဦဒီဇိုင်းကို စနစ်တကျပြင်ဆင်ခြင်း။

€°	သက်ရောက်မှု	စီမံကိန်းဆောင်ရွက်ရက်	လျော့နည်အခြေအခေရမှာ ဆောင်ရွက်မှ
<u>Sa</u>	မြေအောက်ရေသုံးစွဲမှုနှင့် စက်ရုံအိမ္မန်ပစ်ရေဆိုး ကြောင့်ပတ်စန်းကျင် အပေါ် သက်ရောက်နိုင်မှု	 ဘွိုင်လာရေနေးငွေ အတွက် ရေအသုံးပြုခြင်း ဘွင်လာမှုရေစွန့်ထုတ်ခြင်း ခွင်လာမှုရေစွန့်ထုတ်ခြင်း ခူံးစားစိုဆောင်နှင့်ရောမီမိ အတွက်ရေအသုံးပြုမှုနှင့် ရေထိုးစွန့်ပစ်မှု 	 ရေကိုဖနစ်တကျခောတာအသုံးပြုခြင်းi ရေအသုံးပြုမှုလျော့ချနှင်သောနည်းမည်ာ နှင့်ကိုရသာများအသုံးပြုခြင်းi စကိုရုံစွန့်ပစ်ချောစနစ်တကျင်ပြင်ခြီးမှ သာအများပြည်သူရေနတ်မြောင်းသို့ စွန့်ပစ်ခြင်း အမျိုးသားပတ်ပန်းကျင်ဆိုင်ရာ (ထုတ်လွှတ်မှု)လမ်းညွှန်ရွက်နှင့်အညီ စကိုရုံစွန့်၏ရေဆိုးများကိုစွန့်ပစ်ခြင်းi စကိုရှိစရေနတ်မြောင်းကိုစနစ်တကျ ပြုံခြင်ထားရှိခြင်းi စက်ရှိ၏နေတံမြောင်းကိုစနစ်တကျ ပြုံခြင်ထားရခြင်းi စက်ရှိ၏နေတံမြောင်းကိုစနစ်တကျ ပြုံခြင်ထားရခြင်းi စားရထောင်ရန်ပစ်ရောင်ပြီးမှသာစွန့်ပစ်ရောင် ကိုခြုံငြမှုလုပ်ဆောင်ခြီးမှသာစွန့်ပစ်ရောင် ကိုခြုံငြမှုလုပ်ဆောင်ခြီးမှသာစွန့်ပစ်ရောင် သာရသန့်စစ်နည်းမညာအသုံးပြုံခြင်းi
9	ရေနေသတ္တဝါများအဖေါ် သက်ရောက်နိုင်မှု	 ရေနွေးဝင္လသိုင်လာမှရေအပူ ထုတ်လွှတ်ခြင်း၊ ရုံးကန်တင်းစားဖိုဆောင် နှင့်ရေအစ်အတွက်ရေအသုံး မြမူနှင့် ရေဆိုးစွန့်ဝစ်မှု 	 ဘွိုင်လာမှထွက်လာသောရေ၏အမူမျိန် ကိုစစ်ဆေးခြင်းနှင့်အအေးရံပြီးမှသာရေ နတ်မြောင်းအတွင်းသို့ဝွန့်ပစ်ခြင်း၊ အမျိုးသားမတ်လန်းကျင်ဆိုင်ရာ (ထုတ်လွှတ်မူ) လမ်းညွှန့်ချက်နှင့်အညီ စက်ရုံစွန့်ရေဆုံးများကိုစွန့်ပစ်ခြင်း၊ စက်ရုံစွန့်ရေဆုံးများကိုစွန့်ပစ်ခြင်း၊ များမရှိစေရန်သန့်ရှင်းရေးလုပ်ခြင်း၊
		EG	inard Environmental Services

သက်ရောက်မှု	စီမံကိန်းဆောင်ရွက်ချက်	လျော့နည်းဖေရန်အရေးယူ ဆောင်ရွက်မှု
စွန့်ပစ်ပစ္စည်းအစိုင်အခဲ များကြောင့်သက်ရောက် နိုင်မှု	 ဘိုင်လာမှုခွဲပြာမှုနံ့ထွက်ခြင်း၊ ကောက်ပဲသီးကြတ်ခွဲခြင်းမှ ထွက်လာသောအမွံးအမှုန်မှားထွ ကိုခြင်း ဆေးဂါးဖြည့်စွက်တသို့လှောင်ကိ များထည့်သောတိုင်ကိုပုံများနှင့် ဝုံးခွဲများနှင့်ပလပ်စတစ်အတိများ ရူံးသုံးဝတ္ထု ပလပ်စတစ် အစားအစာအကြင်းကျွန်များ အခြားသောအညစ်အကြေးများ 	 စက်ရံတွင်းနှင့်စက်ရံပတ်ပန်းတျှင် သန့်ရှင်းရေးအလေးပေးစောင်ကြည့် စစ်ဆေးခြင်းi အမိုတ်များကိုအမျိုးစားခွဲခြားခြင်းi ယာယီအမိုတ်သိမ်းဆည်းရာနေရာကို အနံ့အသက်ကင်းစေရန်စစ်ဆေး ဆောင်ရွက်ခြင်းi ကုန်ကြမ်းပရူည်းများကိုအလေလွင့် နည်းစေရန် ဆောင်ရွက်ခြင်းi ရန်ကုန်မြို့တော်စည်ပင်သာရေး ကော်မတီ၏လမ်းညွှန်ချက်နှင့်အညီ စက်မှုရှိအမိုက်များကိုစွန့်ပစ်ခြင်းi
စွန်းဆင်သုံးစွဲမှ	ကုန်ထုတ်လုပ်ခြင်းလုပ်ငန်းစဉ်၏	 သင့်တင့်ကောင်းမွန်သောက်ေပစ္စည်း
လျှပ်စစ်စွမ်းအင်သုံးစွဲမှု	ရာလျှပ်စစ်သုံးစွဲမှု၊	များရှေးမျယ်အသုံးပြုမျင်း။ • လျှပ်စစ်ဓာတ်အားကိုချွေတာအသုံး
လောင်စာသုံးစွဲမှု	မောတောယာဉ်နှင့်ဒီဖယ်ဂျနေတာတို ၏လောင်စာသုံးစွဲမှု၊	မြူခုင္း • လျှပ်စစ်ပွမ်းအင်ရွှေတာသောကိရိ
		ယာများအသူးမြူခင်း • မလိုလားအပ်သောလျပ်စစ်ဓာတ်အား ပိုမိသုံးစွဲခြင်းကိုတားမြစ်ခြင်း၊
		 ယာဉ်သွားလာမှုအား စိမ်ခန့်ခွဲခြင်းi ပတ်ပန်းကျင်ထိခိုက်မှုအနည်းဆုံး
		သောနည်းပညာများကိုအသုံးပြုခြင်း၊ • လောင်စာအသုံးပြမှုကိုချွေတာခြင်း၊
	သက်ရောက်မှ စွန့်မစ်ပစ္စည်းအစိုင်အခံ များကြောင့်သက်ရောက် နိုင်မှ စွမ်းအင်သုံးစွဲမှ လျှပ်စစ်စွမ်းအင်သုံးစွဲမှ လောင်စာသုံးစွဲမှ	သက်ရောက်မှု ပိမံကိန်ဆောင်ရွက်ခွက် မှာကြောင့်သက်ရောက် မိုင်မှု မိုင်မှု မိုင်မှု မိုင်မှု မိုင်မှု မိုင်မှု မိုင်မှု မိုင်မှု မိုင်မှု မိုင်မှု မိုင်မှုမှားနှင့်ပလပ်တောင်ကို များထည့်သောတိုင်ကိုပုံများနှင့် ကုန်ငြီး ဆေးပါးဖြည့်စွက်တသို့လှောင်ကိ များထည့်သောတိုင်ကိုပုံများနှင့် ကုန်ငံမှု သောတိုင်ကိုပုံများနှင့် ကုန်သုတ်လုပ်ခြင်းလုပ်ငန်းစဉ်၏ လျှင်စစ်စွမ်းအင်သုံးစွဲမှု လျှင်စစ်စွမ်းအင်သုံးစွဲမှု လျှင်စစ်စွမ်းအင်သုံးစွဲမှု လောင်စာသုံးစွဲမှု

ŝ	သက်ရောက်မှု	စိမံကိန်ဆောင်ရွက်ချက်	လျောနည်းစေရန်အရောယူ ဆောင်ရွက်မှု
đ	လုဝ်ငန်းရှင်ကျန်းမာရေးနှင့် သေးအန္တရာသီကင်းရှင်းရေး များအပေါ် သက်ရောက်နိုင်မှု - အသက်ရှလမ်းကြောင်း ဆိုင်ရာကျန်းမာရေးထိမိုက်မှ - ဆကြားအာရုံဆိုင်ရာ ထိခိုက်နိုင်မှု - မတော်တဆထိနိုက်မှု	 တိရက္ကန်အစားအစာ ကုန်ထုတ်လုပ်သည့်စရံယာ ကုန်ကြမ်းပစ္စည်းများသို့ လှောင်ရာစရိယာ ကုန်ကြမ်းပစ္စည်းများ၊ (ရြည့်စွက်စာများဆေးပါးများ၊ ကောက်ပဲသီးနံများစီတာမင်နှင့် ကြာရည်စံဆာတုပစ္စည်းများ) ကုန်ပစ္စည်းများကို သယ်ယုံပို့ဆောင်ခြင်းနှင့် မောင်းနှင့်ခြင်း 	 လုပ်ငန်းရွင်သုံးကာကွယ်ရေးပစ္စည်း အသုံးပြုစေခြင်းi အသုံးပြုစေခြင်းi အသုံးပြုစေခြင်းi အလုပ်ရှိန်အလှည့်ကျစနစ်ဖြင့်ဆောင် ရွက်စေခြင်း စက်ပစ္စည်းများအသုံးပြုပုံကိုဂန်ထမ်း များအားစနစ်တကျသင်ကြားပေးခြင်းi စက်ရုံတွင်းဆေးပေးခန်းထားပေးခြင်းi တစ်နှစ်တစ်ကြခ်ကျန်းမာနေးစစ်ဆေးမှု များ ပြလုပ်ပေးခြင်းi တစ်နှစ်တစ်ကြခ်ကျန်းမာနေးစစ်ဆေးမှု များ ပြလုပ်ပေးခြင်းi တစ်ပစ္စည်းများကိုနေစ်ထကျအသုံးပြု စြင်း၊ ပြုံပြင်ထိန်းသိမ်းခြင်းi စက်ပစ္စည်းများကိုနေစ်ထကျအသုံးပြု ခြင်း၊ ပြုံပြင်ထိန်းသိမ်းခြင်းi စက်ပစ္စည်းအသုံးပြုပုံတောင်ရန် ကုန်ပစ္စည်းအသုံးပြုပုံတောင်ရန် ၊ ရှောင်ရန်မှတ်တမ်းများ(MSDS) ထားရှိပေးခြင်း စက်ရုံတွင်းချမှတ်ထားသောလုပ်ငန်းခွင် ဘေးအွန္ဒရာယ်ကင်းပေးရေးစီမံချက်များ နှင့်အညီလိုက်နာဆောင်ရွက်ခြင်းi
			infu Environmental services



-é	angeber	రంగనిఘణాంక్యగాప్తాగ	ကျော့နည်းရေနီအရောင် ဆောင်ရွက်မှု
91	භූහුවන	 အဆောက်အဦများ ဖြံ့ခြင်းမှ ထွတ်ပေါ် လာသော ဆုံးပံသံများ လုပ်ငန်းခွက်သိမ်းရာတွင် အသုံးဖြည့်ညို သာဉ်လန်ရက်များ မောင်းနှင်ခြင်းနှင့် စက်များ လည်ပတ်ခြင်း 	 လုပ်ငန်းချက်သိမ်းဓာတွင် အသုံးပြာသည့် သာဉ်လျှန်ရားများနှင့်စက်များအားမှမနစ်စ လေခြင်းi ညာအဖြန်တွင် ဆူညံသံထွက်နိုင်သည့် ဖျက်သိမ်းသည့်လုပ်ငန်းများလုပ်ဆောင်ခြင်း အား တာဖြစ်ခြင်းi လုပ်ငန်းခွင်ကာကွယ်ခေ ပစ္စည်းများ အသုံးမြာစေခြင်းi
9	စွန့်ပစ်ပစ္စည်းများ	 ဖွက်သိမ်းရာမှ ထွက်ပေါ် လာသော စွန့်ပစ်ပစ္စည်းများ အလုပ်ထဲမားများမှ ထွက်ရှိလာသော မိလွာအညှစ်အကြေးများနှင့်ရေဆိုးများ ကျွန်ထုတ်လုပ်ငန်းမှကျွန်ရှိနေသော စွန့်ပစ်အဖိုက်များ 	 ဖျက်သိမ်းရာမှ ထွက်ပေါ်လာသော အမိုက်များကိုအမိုးအစားခဲ့ကာ ရန်ကုန်မြို့ တော်လုပ်ပင်သာယာရောကာ်မတ်နှင့်ဆက် သွယ်စွန့်ပစ်ခြင်း စီမံကန်းဆိုဒ်တွင်ယာယီယင်လုံသန့်စင်ခန်း အသုံးမြာစခြင်း စီမံကန်းဆိုဒ်တွင်သာသီယင်လုံသန့်စင်ခန်း အသုံးမြာစခြင်း အမိုက်များကိုနေငံထဲကာစွန့်ပစ်စေခြင်း ဖြီးများကိုနေငံထဲကာစွန့်ပစ်စေခြင်း ဖြီးများကိုနေငံထဲကာစွန့်ပစ်စေခြင်း၊ ပစ္စည်းရားကိုပြန်ဆင့်သူမျှနိုင်သောနေရာတွင် မြန်လည်အသုံးမြစေခြင်း၊
6	လုပ်ငန်းခွင် ကျွန်းမာရေးနှင့် ဘေးအျွန်းရာသံ ကင်းရှင်းရေး	 အဆောက်အဦးနာမြို့ရရာတွင် မတော်တဆားဖြစ်ပွားခြင်း လုင်ငန်းချက်သိမ်းရာတွင် အသုံးပြသည့် ယာဉ်လျှန်ရာများ သွားလာခြင်း ချက်သိမ်းထားသည့် ပရည်းများအား သယ်ရှိခြင်း 	 လုပ်ငန်းနှင်ကာတွယ်ရေး ပစ္စည်းများ အသုံးပြမာမြင်း လုပ်ငန်းဖျက်သိမ်းရာတွင် အသုံးပြသည့်ယာဉ်ပည်ရေးများသွား လာမှုကိုပ်မှန်စစ်ဆေးဖြင်း သတ်ပေးဆိုင်းဘုတ်များတစ်ဆင်ဖြင်း ကျွမ်းကျင်သော ဖျက်သိမ်းရေး စွင့်ထမ်းများခန်းဆုပ်မြင်း

ę	contempoly	စီမံကိန်ဆောင်ရွက်ရက်	လျော့နည်းကျေန်အရေးယူ ဆောင်ရွက်မှ
6	ကျွန်းမာရေးနှင့် ကျွန်းမာရေးနှင့် သေးဆွေရောယ် ကင်းရှင်းရေး	 အဆောက်အဦးနားမြီးခုနာတွင် မတော်တဆားမြစ်ပွားများ လုပ်ငန်းဖွက်သိမ်းရာတွင် အသုံးပြသည့် ယာဉ်သူ့နောများ သွားလာခြင်း ဖွက်သိမ်းထားသည့် ပစ္စည်းများအား သယ်ပြင်ခြင်း 	 ကျွမ်းကျွင်းလုပ်သားမှားကိုအသုံးပြုခြင်း။ ဆိုဒ်ထားနေမှစြဖွှောင်ရေးလုပ်ငန်းဆိုင်တော် တဆုံမှုနည်းစစ်ခန်စောင်ကြည်စစ်ခဆ်မြင်း။ ခရားမဖွှေသိုးအတံများလုပ်ငန်းခွင်တွင်ထား ဖတ်ခြင်း။
7*	မီးတေးအျွန်ရာယ်	+ ဖျက်သိမ်းထားသော ပစ္စည်းများစုပုံခြင်း	 မီးသတ်ဆေးဘူးများ ထားရှိခြင်။ မီးသေးအနုရာယ် ကာကွယ်ရေး အစီအစဉ်များခေုဆွဲခြင်း။

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-5	က္ရာကိုးကိုးလုပ်ရာ	- The Ard and the	dorente direntego
3C	လေထုအရည်အသွေး	တစ်နှစ် နှစ်ကြိမ်	စက်ရုံဝင်းအတွင်း
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91	မြေအောက်ရေ အရည်အသွေး	တစ်နှစ် တစ်ကြိမ်	စက်ရုံရှိ (အဂီစိတွင်း)
9 #	ရေဆိုးစွန့်ပစ်မှု	တစ်နှစ်သုံးကြိမ်	စက်ရုံရှိ ရေနတ်မြောင်း၊ ဘွိုင်လာမှထွက်လာသောရေ
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ခြောင်းဘေးအန္တရာယ် - စီးဘေး လုံဖြစ်ရောစ်ခဲ့ရ	က် (ကြိုတင်/ဖြစ်ပွားရှိန်/ပြန်လည်ထူထောင်ခြ	င်းကာလ)ရေးဆွဲခြင်း
ကြိုတင် ကာကွ မှာ ရေးနည်းလမ်း	ဖြစ်မွှားချိန်အဆည်ပြုပြီ) ခဖြရှင်းမည့်နည်းလမ်း	န္လြန္းက်ထူးထားနို႕ ကားက
 မီးဘေးလုံခြံရေးစီမံရက်ရေးဆွဲခြင်း၊ အရေးခပ် မီးဘေးအန္တရာယ်သရုပ်ပြ လေ့ကျွန်ပေးခြင်း၊ ခြင်လွယ်ကြားလွယ်သောအချက်ပေးစ နှစ်များတစ်ဆင်ခြင်းနှင့်မီးသတ်ကိရီယာ များကိုပုံမှန်စစ်စေခြင်း စီးဘေးအန္တရာယ်သင်တန်းပေးခြင်း စက်ရုံအတွင်းမီးသေးအန္တရာယ်ခြစ်နိုင် သောဓရီယာများသတ်မှတ်ကာကြီတင် ခြင်ဆင်မှုများပြလုပ်ဆောင်ရွက်ထားခြင်း ကိုအလေးထားဆောင်ရွက်ထြင်း 	 အရေးပေါ် အခြေအနေတား အခြားနေရာများသို့ မပြန့်ပွားစေရန် ဆောင်ရွက်ခြင်း၊ လူနှင့်ပစ္စည်းများစီးဆုံးရှုံးမှုအနည်းဆုံး ခြစ်စေခြင်း အရေးပေါ် ထွက်ပေါက်များသတ်မှတ် ပေးထားခြင်း၊ ထိရောက်သောကယ်ဆယ်မှု နှင့် ဆေးဝါးကုသမှုပေးခြင်း၊ ဘောကင်းရာသို့ ဂို့ ထောင်ပေးခြင်း၊ 	သက်ဆိုင်ရာတာဝန်ရှိသူများ သက်ဆိုင်ရာအခွဲ အစည်းမှာ နှင့် ပူးပေါင်းဆောင်ရွက်ခြင်း၊

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	01	စက်မှုစုန်ပတ်ဂန်းကျင်ရှိ ဒေသခံများအိ ပါဂင်ဆောင်ရွက်မှုနှင့် ဒေသဖွံ့ဖြိုးတိုးတက်မှုများ အတွက်လုုဒါန်းငွေ	0.00
	J	လူ့အခွင့်အရေး အသိပညာဗဟုသုတတိုးတက် လာစေရန်အတွက် ထောက်ပံ့ငွေ	0.9
	Şĸ	နည်းဥပဒေ စည်းမျဉ်းစည်းကမ်းများကိုနာခံ လိုက်နာစေရန်အတွက် ထောက်ပံ့ငွေ	0.9
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မှတ်ရက် - အသားတင်အမြတ်ဝွေ၏ ၂% ကို ရန်ပုံဝွေအဖြစ် ထားရှိပြီး အောက်ပါလုပ်ငန်းများတွင် အသုံးပြရန်ရည်ရွယ်ထားသည်။



E Guard Environmental Services



d) Public Hearing Ceremony Activities Photos



Record of Attendees



Presented by UThu Hla Zaw, Plant Manager, DH Myanmar Limited



Daw Myat Thiri Tun, Staff Officer, Directorate of Industrial Supervision and inspection



Daw Aye Win Khine, Staff Officer, ECD, Yangon Region



Record of Attendees



Presentation by Daw Yu Wai Yan Thein Tan, Consultant, E guard Environmental Services Co., Ltd.



U Zaw Min Oo, Staff Officer, Myanmar Fire Service Department, Hmawbi Township



U Maung Zaw, Administrator, Kan Kalay Village

Appendix 11 Materials Safety Data Sheet used in the Proposed Project

Lead (ii) acetate Tri hydrate



Prepared by E Guard Environmental Services Co., Ltd.

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention.

Skin Contact:

In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:

Wash with a disinfectant scap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. Seek medical attention.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: These products are carbon oxides (CO, CO2). Some metallic oxides.

Fire Hazards in Presence of Various Substances:

Slightly flammable to flammable in presence of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:

Use a shovel to put the material into a convenient waste disposal container. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

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Precautions:

Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as acids.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:

Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

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

Exposure Limits:

TWA: 0.05 (mg (Pb)/m) from OSHA (PEL) [United States] TWA: 0.15 (mg/m3) from ACGIH (TLV) [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Crystalline solid.)

Odor: Acetic (Slight.)

Taste: Not available.

Molecular Weight: 379.32 g/mole

Color: White.

pH (1% soln/water): Not available.

Boiling Point: Decomposition temperature: 100°C (212°F)

Melting Point: 75°C (167°F)

Critical Temperature: Not available.

Specific Gravity: 2.55 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility: Soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Excess heat, and incompatible materials

Incompatibility with various substances: Reactive with acids.

Corrosivity: Not available.

Special Remarks on Reactivity: Incompatible with Bromates, Phenol Chloral Hydrate, sulfides, and acids.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 4665 mg/kg [Rat].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. MUTAGENIC EFFECTS: Classified POSSIBLE for human. TERATOGENIC EFFECTS: Classified POSSIBLE for human. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female, Reproductive system/toxin/male [POSSIBLE]. May cause damage to the following organs: blood, kidneys, the nervous system, the reproductive system, central nervous system (CNS).

Other Toxic Effects on Humans:

Hazardous in case of skin contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:

May affect genetic material based on animal data May cause cancer (tumorigenic) based on animal data. May cause adverse reproductive effects (female/male fertility and other female/male effects) and birth defects based on animal data. Passes through the placental barrier in animal. Excreted in maternal milk in animal.

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: May cause severe local irritation. Eyes: May cause local irritation or abrasion. Lead acetate can produce encrustation of the comea with direct eye exposure. Inhalation: Can be absorbed through the respiratory system. May cause respiratory tract irritation (local irritation of the bronchia, and lungs). Symptoms such as metallic taste, chest and abdominal pain, and increased lead blood levels may follow. Also see symptoms of ingestion. Ingestion: May cause gastrointestinal tract irritation. May affect behavior/brain, metabolism, liver, cardiovascular system, urinary system, and blood. Ingestion can result in lead colic, headache, abdominal cramps, nausea, muscle weakness, depression, "lead line" on the gums, metallic taste, loss of appetite, insomnia, dizziness, high lead levels in the blood and urine, with shock, coma and death in extreme cases. Chronic Potential Health Effects: Skin: May be absorbed through the skin on prolonged exposure. See symptoms of ingestion. Ingestion/Inhalation: The hallmarks of chronic lead poisoning are peripheral motor polyneuropathy, ANEMIA, KIDNEY DAMAGE, HYPERTENSION. Also see symptoms of acute poisoning.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Phenolphthalein

-			ACROS			
			ORGANICS			
		MA	TERIAL SAFETY DA	ATA S	HEET	
			Phenolphthal	ein		
	Sec	llon 1 - Chei	mical Product and	Comp	any Identifi	cation
MSDS Nam	e: Phenolp	onthalein				1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1
Catalog Numbers:	14771-0 5000	0000, 14771	-1000, 14771-5000,	4171	8-0000, 417	18-0025, 41718-1000, 41718
Synonyms:						
Company Identification:			Acros Janss 2440	Organics BV en Pharmace Geel, Belgiu	BA suticalaan 3a m	
Company Identification: (USA)			Acros Organics One Reagent Lane Fair Lawn, NJ 07410			
For information in the US, call:			800-ACROS-01			
For information in Europe, call:			+32 14 57 52 11			
Emergency	Number, Euro	pe:		+32 14 57 52 99		
Emergency	Number US:			201-7	96-7100	
CHEMTREC	Phone Numbe	er, US:		800-4	24-9300	
CHEMTREC	Phone Numbe	er, Europe:		703-5	27-3887	
	s	ection 2 - Co	emposition, Inform	ation	on Ingredi	ents
		CAS#	Chemical Name:	%	EINECS#	1
		77-09-8	Phenolphthalein		201-004-7	
Ha	zard Symbols:	22.40				
Ris		Sec	tion 3 - Hazards Id	entiti	cation	
Ki			EMERGENCY OVE	RVIE	w	
Ki			ad Limitad auiduae	e of a	i carcinogen	ic effect.
Ki	Harmf	ul if swallow	eu. Linneu evident			
Potential H	Harmfo ealth Effects	ul if swallow	eu. Linnteu evident			
Potential H Eye:	Harmfo ealth Effects May cause eye	ul if swallow	eu. Liniteu evident			
Potential H Eye: Skin:	Harmfo ealth Effects May cause eye May cause skir	ul if swallow Irritation.	lay be harmful if ab	sorbe	d through th	e skin.
Potential H Eye: Skin: Ingestion:	Harmfo ealth Effects May cause eye May cause skir Harmful if swa blood pressure	Irritation. Irritation. M Irritation. M Nowed. May	lay be harmful if ab cause irritation of t	sorbe he dig vasci	d through th gestive tract ular effects.	e skin. . Ingestion may cause fever,
Potential H Eye: Skin: Ingestion: Inhalation:	Harmfo ealth Effects May cause eye May cause skin Harmful if swa blood pressure May cause res	Irritation. Irritation. M Nowed. May Increase an piratory trac	lay be harmful if ab cause irritation of t d other unspecified t irritation. May be l	sorbe he dig vascu	d through th gestive tract ular effects, ul if inhaled,	e skin. . Ingestion may cause fever,

	Sacilun 4 - First Ald Measures				
Eyes:	Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.				
Skin:	Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.				
Ingestion: Get medical aid. Wash mouth out with water.					
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.					
Notes to Physician:	Treat symptomatically and supportively,				
	Section 5 - Fire Fighting Measures				
General Information:	As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. This material in sufficient quantity and reduced particle size is capable of creating a dust explosion.				
Extinguishing Media:	Use water spray, dry chemical, carbon dioxide, or chemical foam.				
-	Section 0 - Accidental Release Measures				
General Information:	Use proper personal protective equipment as indicated in Section 8.				
Spills/Leaks:	Vacuum or sweep up material and place into a suitable disposal container. Avoid generating dusty conditions. Do not let this chemical enter the environment.				
	Section 7 - Handling and Storage				
Handling: Av	old breathing dust, vapor, mist, or gas. Avoid contact with skin and eyes. Avoid ingestion I inhalation. Use only in a chemical fume hood.				
Storage: Sto	re in a cool, dry place. Store in a tightly closed container.				
	Section 8 - Exposure Controls, Personal Protection				
Engineering	Controls:				
	Use adequate ventilation to keep airborne concentrations low.				
Exposure Lim	its				
Exposure Lin	its CAS# 77-09-8:				
Exposure Lin Personal Pro	CAS# 77-09-8:				
Exposure Lin Personal Pro Eyes:	its CAS# 77-09-8: cective Equipment Wear chemical splash goggles.				
Exposure Lin Personal Pro Eyes: Skin:	its CAS# 77-09-8: tective Equipment Wear chemical splash goggles. Wear appropriate protective gloves to prevent skin exposure.				
Exposure Lin Personal Pro Eyes: Skin: Clothing:	CAS# 77-09-8: Exective Equipment Wear chemical splash goggles. Wear appropriate protective gloves to prevent skin exposure. Wear appropriate protective clothing to prevent skin exposure.				
Exposure Lin Personal Pro Eyes: Skin: Clothing: Respirators:	CAS# 77-09-8: Exective Equipment Wear chemical splash goggles. Wear appropriate protective gloves to prevent skin exposure. Wear appropriate protective clothing to prevent skin exposure. Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.				
Exposure Lin Personal Pro Eyes: Skin: Clothing: Respirators:	CAS# 77-09-8: Tective Equipment Wear chemical splash goggles. Wear appropriate protective gloves to prevent skin exposure. Wear appropriate protective clothing to prevent skin exposure. Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced. Section 9 – Physical and Chemical Properties				
Exposure Lin Personal Pro Eyes: Skin: Clothing: Respirators:	its CAS# 77-09-8: tective Equipment Wear chemical splash goggles. Wear appropriate protective gloves to prevent skin exposure. Wear appropriate protective clothing to prevent skin exposure. Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced. Section 9 - Physical and Chemical Properties Physical State: Crystalline powder				
Exposure Lin Personal Pro Eyes: Skin: Clothing: Respirators:	its CAS# 77-09-8: tective Equipment Wear chemical splash goggles. Wear appropriate protective gloves to prevent skin exposure. Wear appropriate protective clothing to prevent skin exposure. Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced. Section 9 - Physical and Chemical Properties Physical State: Crystalline powder Color: almost white				
Exposure Lin Personal Pro Eyes: Skin: Clothing: Respirators:	its CAS# 77-09-8: tective Equipment Wear chemical splash goggles. Wear appropriate protective gloves to prevent skin exposure. Wear appropriate protective clothing to prevent skin exposure. Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced. Section 9 - Physical and Chemical Properties Physical State: Crystalline powder Color: almost white Odor: odorless				
Exposure Lin Personal Pro Eyes: Skin: Clothing: Respirators:	its CAS# 77-09-8: tective Equipment Wear chemical splash goggles. Wear appropriate protective gloves to prevent skin exposure. Wear appropriate protective clothing to prevent skin exposure. Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced. Section 9 - Physical and Chemical Properties Physical State: Crystalline powder Color: almost white Odor: odorless pH: Not available				

		Section 15 -	Regulatory Information		
Shipping Na Hazard Clas UN Number Packing Gro	ame: ss: r: oup:	IATA Not regulated.	IMO Not regulated.	RID/ADR Not regulated.	
		Section 14 -	Transport Information		
Dispose of in a r	manner consis	stent with federal	, state, and local regulation	S.	
		Section 13 -	Olsposal Considerations		
Other:	Do no	t empty into drai	ns.		
		Section 12 -	Ecological Information		
Other: See actual entry in RTECS for complete information. To not been fully investigated.			r complete information. The	toxicological properties have	
carcinogenicity	IARC: Group	2B carcinogen	corcinogen, initial date 5/15	y so wire: suspect carcinoger	
LD50/LC50:	RTECS: Not	available.		IND NED. Comment and and	
RTECS#:	CAS# 77-09	-8: SM8380000			
		Section 11-1	nottemnoint lealgoloaixo		
Hazardous Poly	merization		Will not occur.		
Hazardous Deco	omposition P	roducts	Carbon monoxide, carbon dioxide.		
Incompatibilitie	s with Other	Materials	Strong oxidizing agents.		
Conditions to Av	void:		Incompatible materials, exc	cess heat.	
Chemical Stabili	ity:		Stable under normal tempe	ratures and pressures.	
		Section 10 -	Stability and Reactivity		
		Molecular We	eight: 318.32		
		Molecular For	mula: C20H14O4		
	Spe	cific Gravity/Der	nsity: 1.299		
	becomp	Solubility in w	vater: <0.1%		
	Decomp	osition Tempera	ture: Not available		
	Exp	plosion Limits: Lo	ower: Not available		
	20	Flash F	Point: Not available		
	Autoi	gnition Tempera	ture: Not available		
	Fre	eezing/Melting P	Point: 258 - 263 deg C		
		Boiling I	Point: Not available		
		Visc	osity: Not available		

European Labeling in Accordance with EC Directives

Hazard Symbols: XN

Risk Phrases:

- R 22 Harmful if swallowed.
- R 40 Limited evidence of a carcinogenic effect.

Safety Phrases:

S 36/37 Wear suitable protective clothing and gloves.

5 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

WGK (Water Danger/Protection)

CAS# 77-09-8; 1

Canada

CAS# 77-09-8 is listed on Canada's DSL List

US Federal

TSCA

CAS# 77-09-8 is listed on the TSCA Inventory.

Section 15 - Other Information

MSDS Creation Date: 7/16/1996 Revision #4 Date 1/29/2007

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

Phenol Red







Material Safety Data Sheet Phenol red MSDS

Product Name: Phenol red	Contact Information:
Catalog Codes: SLP1927, SLP3736	Sciencelab.com, Inc.
CAS# 143-74-8	Houston, Texas 77396
RTECS: SJ7490000	US Sales: 1-800-901-7247
TSCA: TSCA 8(b) inventory: Phenol red	International Sales: 1-281-441-4400
Ci#: Not available.	Order Online: ScienceLab.com
Synonym: Phenoisulfonphthalein	CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300
Chemical Name: Not available.	International CHEMTREC, call: 1-703-527-3887
Chemical Formula: C19H14O5S	For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients			
Composition:			
Name	CAS #	% by Weight	
Phenol red	143-74-8	100	

Toxicological Data on Ingredients: Phenol red LD50! Not available. LC50! Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:

Hazardous in case of eye contact (irritant), of ingestion. Slightly hazardous in case of skin contact (irritant, permisator), of inhalation.

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to lungs, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

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

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Skin Contact:

After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact: Not available.

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

Serious Inhalation: Not available.

Ingestion:

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

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:

Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:

Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

Section 7: Handling and Storage

Precautions:

Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not breathe dust. Avoid contact with eyes Wear suitable protective clothing If you feel unwell, seek medical attention and show the label when possible.

Storage:

Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Combustible materials should be stored away from extreme heat and away from strong oxidizing agents.

Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, tume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:

Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

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

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties		
Physical state and appearance: Solid.		
Odor: Not available.		
Taste: Not available.		
Molecular Weight: 354.38 g/mole		
Color: Not available.		
pH (1% soln/water): Not available.		
Boiling Point: Not available.		
Melting Point: Decomposes.		
Critical Temperature: Not available.		
Specific Gravity: Not available.		
Vapor Pressure: Not applicable.		
Vapor Density: Not available.		
Volatility: Not available.		
Odor Threshold: Not available.		
Water/Oil Dist. Coeff.: Not available.		
Ionicity (in Water): Not available.		
Dispersion Properties: Not available.		
Solubility: Very slightly soluble in cold water.		

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available. Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Eye contact. Ingestion.

Toxicity to Animals:

LD50: Not available. LC50: Not available.

Chronic Effects on Humans: The substance is toxic to lungs, mucous membranes.

Other Toxic Effects on Humans:

Hazardous in case of ingestion. Slightly hazardous in case of skin contact (irritant, permeator), of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations: TSCA 8(b) inventory: Phenol red

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

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DSCL (EEC): R36- Irritating to eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 11:18 AM

Last Updated: 05/21/2013 12:00 PM

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

Methyl Red





Material Safety Data Sheet Methyl red MSDS

Product Name: Methyl red	Contact Information:	
Catalog Codes: SLM2305	Sciencelab.com, Inc.	
CAS#: 493-52-7	Houston, Texas 77396	
RTECS: DG8960000	US Sales: 1-800-901-7247	
TSCA: TSCA 8(b) inventory: Methyl red	International Sales: 1-281-441-4400	
CI#: Not available.	Orber Online: ScienceLab.com	
Synonym: C.I. Acid Red 2; Benzoic Acid, 2-((4-dimethylamino)phenyl)azo) ; 2- Carboxy-4-(dimethylamino)azobenzene: 4-	CHEMTREC (24HR Emergency Telephone), call: 1 800-424-9300	
	International CHEMTREC, call: 1-703-527-3887	
Dimethylaminoazobenzene-2-carboxylic acid: C.1 13020; C.I. Red 2; o-((p-(Dimethylamino)phenyl)azo)benzoic acid; p-(Dimethylamino)phenyl)azo)benzoic acid; Methyl Red, Neutral	For non-emergency assistance, call: 1-281-441-4400	
Chemical Name: 2-((4- (Dimethylamino)phenyl)azo)benzoic acid		
Chemical Formula: C15-H15-N3-O2		

Section 2: Composition and Information on Ingredients Composition:					
Methyl red	493-52-7	100			

Section 3: Hazards Identification

Potential Acute Health Effects:

Hazardous in case of ingestion. Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of inhalation,

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to liver. Repeated or prolonged exposure to the substance can produce larget organs damage.

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Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: These products are carbon oxides (CO, CO2), nitrogen oxides (NO, NO2...).

Fire Hazards in Presence of Various Substances:

Slightly flammable to flammable in presence of open flames and sparks, of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: As with most organic solids, fire is possible at elevated temperatures or by contact with an ignition source.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:

Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:

Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

Section 7: Handling and Storage

Precautions:

Keep locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not breathe dust. Wear suitable protective clothing. If you feel unwell, seek medical attention and show the label when possible. Keep away from incompatibles such as oxidizing agents, reducing agents.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

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

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Pł	nysical	state an	d appearance:	Solid.	(Crystals solid	or	Powdered s	olid.)	
----	---------	----------	---------------	--------	-----------------	----	------------	--------	--

Odor: Odorless.

Taste: Not available.

Molecular Weight: 269.3 g/mole

Color: Violet or Red. Bluish-purple.

pH (1% soln/water): Not applicable.

Boiling Point: Not available.

Melting Point: 179°C (354.2°F) - 182 C

Critical Temperature: Not available.

Specific Gravity: Not available.

Vapor Pressure: Not applicable.

Vapor Density: 9.3(Air = 1)

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:

Insoluble in cold water, hot water. Soluble in very hot acetone, benzene, chloroform, acetic acid, alcohol, lipids. Slightly soluble in petroleum ether.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Excess heat, incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents, reducing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals:

LD50: Not available. LC50: Not available.

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. May cause damage to the following organs: liver.

Other Toxic Effects on Humans:

Hazardous in case of ingestion. Slightly hazardous in case of skin contact (irritant), of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:

May affect genetic material (mutagenic). May cause cancer based on animal test data. No adequate data found for humans.

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: May cause skin irritation. Eyes: May cause eye irritation. This product contains an anionic dye. Similar dyes have not cause injury to cornea or conjunctivia in documented exposure cases with human or rabbit eyes. Inhalation: May cause respiratory tract and mucous membrane irritation. Ingestion: May cause gastrointestinal (digestive) tract disturbances. Chronic Potential Health Effects: Prolonged or repeated exposure may cause liver damage The toxicological properties of this substance have not been fully investigated.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations: TSCA 8(b) inventory: Methyl red

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): Not controlled under WHMIS (Canada).

DSCL (EEC):

R40- Possible risks of irreversible effects. S24/25- Avoid contact with skin and eyes. S36/37/39- Wear suitable protective clothing, gloves and eye/face protection.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Sodium Hydroxide





Material Safety Data Sheet Sodium hydroxide MSDS

Section 1: Chemical Proc	luct and Company Identification
Product Name: Sodium hydroxide	Contact Information:
Catalog Codes: SLS3298: SLS1081, SLS2503, SLS392 SLS1705	5. Sciencelab.com, Inc. 14025 Smith Rd.
CAS#: 1310-73-2 RTECS: WB4900000 TSCA: TSCA 8(b) inventory: Sodium hydroxide	US Sales 1-800-901-7247
	International Sales: 1-281-441-4400
	Order Online: ScienceLab.com
CI#: Not available.	CHEMTREC (24HR Emergency Telephone), call: 1.800.424.9300
Synonym: Caustic Soda	International CHEMTREC, call: 1-703-527-3887
Chemical Name: Sodium Hydroxide	For non-emergency assistance, call: 1-281-441-4400
Chemical Formula: NaOH	
Section 2: Composition	and Information on Ingredients
Composition:	
Name CAS	# % by Weight
Sodium hydroxide (310-	-73-2 100
Foxicological Data on Ingredients: Sodium hydroxide LD	050; Not available, LC50: Not available,
Section 3: Ha	azards Identification
Potential Acute Health Effects: Very hazardous in case of skin contact (corrosive, irritant, p of inhalation. The amount of tissue damage depends on ler olindness. Skin contact can produce inflammation and blist respiratory tract, characterized by burning, sneezing and co unconsciousness or death. Inflammation of the eye is chara- characterized by ltching, scaling, reddening, or, occasional	permeator), of eye contact (irritant, corrosive), of ingestion, ngth of contact. Eye contact can result in corneal damage or lering. Inhalation of dust will produce irritation to gastro-intestinal o oughing. Severe over-exposure can produce lung damage, chokin acterized by redness, watering, and itching. Skin inflammation is lly, blistering.
Potential Chronic Health Effects: CARCINOGENIC EFFECTS: Not available, MUTAGENIC I TERATOGENIC EFFECTS: Not available, DEVELOPMEN	EFFECTS: Mutagenic for mammalian somatic cells. TAL TOXICITY Not available. The substance may be toxic to

Tenarode independences in the substance may be toxic to mucous membranes, upper respiratory tract, skin, eyes. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure of the eyes to a low level of dust can produce eye irritation. Repeated skin exposure can produce local skin destruction, or dermatilitis. Repeated inhalation of dust can produce varying degree of respiratory irritation or lung damage.

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Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

Skin Contact:

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:

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

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: metals

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. Slightly explosive in presence of heat.

Fire Fighting Media and Instructions: Not available

Special Remarks on Fire Hazards:

sodium hydroxide + zinc metal dust causes ignition of the latter. Under proper conditions of temperature, pressure and state of division, it can ignite or react violently with acetaldehyde, ally alcohol, allyl chloride, benzene-1,4-diol, chlorine trifluoride, 1,2 dichlorethylene, nitroethane, nitromethane, nitroparaffins, nitropropane, cinnamaldehyde, 2,2-dichloro-3,3-dimethylbutane. Sodium hydroxide in contact with water may generate enough heat to ignite adjacent combustible materials. Phosphorous boiled with NaOH yields mixed phosphines which may ignite spontanously in air. sodium hydroxide and cinnamaldehyde + heat may cause ignition. Reaction with certain metals releases flammable and explosive hydrogen gas.

Special Remarks on Explosion Hazards:

Sodium hydroxide reacts to form explosive products with ammonia + silver nitrate. Benzene extract of allyl benzenesulfonate prepared from allyl alcohol, and benzene sulfonyl chloride in presence of aquesous sodium hydroxide, under vacuum distillation, residue darkened and exploded. Sodium Hydroxde + impure tetrahydrofuran, which can contain peroxides, can cause serious explosions. Dry mixtures of sodium hydroxide and sodium tetrahydroborate liberate hydrogen explosively at 230-270 deg. C. Sodium Hydroxide reacts with sodium salt of trichlorophenol + methyl alcohol + trichlorobenzene + heat to cause an explosion.

Section 6: Accidental Release Measures

Small Spill:

Use appropriate tools to put the spilled solid in a convenient waste disposal container. If necessary: Neutralize the residue with a dilute solution of acetic acid.

Large Spill:

Corrosive solid. Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of acetic acid. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep container dry. Do not breathe dust. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If you feel unwell, seek medical attention and show the label when possible. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, reducing agents, metals, acids, alkalis, moisture.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area. Hygroscopic. Deliquescent.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:

Splash goggles. Synthetic apron. Vapor and dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

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

Exposure Limits:

STEL: 2 (mg/m3) from ACGIH (TLV) [United States] TWA: 2 CEIL: 2 (mg/m3) from OSHA (PEL) [United States] CEIL: 2 (mg/ m3) from NIOSHConsult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Deliquescent solid.)

Odor: Odoriess.

Taste: Not available.

Molecular Weight: 40 g/mole

Color: White.

pH (1% soln/water): 13.5 [Basic.] Boiling Point: 1388°C (2530.4°F) Melting Point: 323°C (613.4°F) Critical Temperature: Not available.

Specific Gravity: 2.13 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff .: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility: Easily soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials, moisture, moist air

Incompatibility with various substances:

Highly reactive with metals. Reactive with oxidizing agents, reducing agents, acids, alkalis, moisture.

Corrosivity: Not available.

Special Remarks on Reactivity:

Hygroscopic. Much heat is evolved when solid material is dissolved in water. Therefore cold water and caution must be used for this process. Sodium hydroxide solution and octanol + diborane during a work-up of a reaction mixture of oxime and diborane in tetrahyrofuran is very exothermic, a mild explosion being noted on one occassion. Reactive with water, acids (mineral, non-oxidizing, e.g. hydrochloric, hydrofluoric acid, muratic acid, phosphoric), acids (mineral, oxidizing e.g. chromic acid, hypochlorous acid, nitric acid, sulfuric acid), acids (organic e.g. acetic acid, benzoic acid, formic acid, methanoic acid, oxalic acid), aldehydes (e.g. acetaldehyde, acrolein, chloral hydrate, foraldehyde), carbamates (e.g. carbanolate, carbofuran), esters (e.g. butyl acetate, ethyl acetate, propyl formate), halogenated organics (dibromoethane, hexachlorobenzene, methyl chloride, trichloroethylene), isocyanates (e.g. methyl isocyanate), ketones (acetone, acetophenone, MEK, MIBK), acid chlorides, strong bases, strong oxidizing agents, strong reducing agents, flammable liquids, powdered metals and metals (i.e aluminum, tin, zinc, hafnium, raney nickel), metals (alkali and alkaline e.g. cesium, potassium, sodium), metal compounds (toxic e.g. berylium, lead acetate, nickel carbonyl, tetraethyl lead), mitrides (e.g. potassium nitride, sodium nitride), nitriles (e.g. acetonitrile, methyl cyanide), nitro compounds (organic e.g. nitrobenzene, nitromethane), acetic anhydride, chlorohydrin, chlorosulfonic acid, ethylene cyanohydrin, glyoxal, hydrosulfuric acid, oleum, propiolactone, acylonitrile, phorosous pentoxide, chlorobenzene, cinnamaldehyde. Reacts with formaldehyde hydroxide to yield formic acid, and hydrogen.

Special Remarks on Corrosivity: Very caustic to aluminum and other metals in presence of moisture.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:

LD50: Not available. LC50: Not available.

Chronic Effects on Humans:

MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. May cause damage to the following organs: mucous membranes, upper respiratory tract, skin, eyes.

Other Toxic Effects on Humans:

Extremely hazardous in case of inhalation (lung corrosive). Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (corrosive), of ingestion, .

Special Remarks on Toxicity to Animals:

Lowest Published Lethal Dose: LDL [Rabbit] - Route: Oral; Dose: 500 mg/kg

Special Remarks on Chronic Effects on Humans: May affect genetic material. Investigation as a mutagen (cytogenetic analysis)

Special Remarks on other Toxic Effects on Humans:

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Class 8: Corrosive material

Identification: : Sodium hydroxide, solid UNNA: 1823 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

Illinois toxic substances disclosure to employee act: Sodium hydroxide Illinois chemical safety act: Sodium hydroxide New York release reporting list: Sodium hydroxide Rhode Island RTK hazardous substances: Sodium hydroxide Pennsylvania RTK: Sodium hydroxide Minnesota: Sodium hydroxide Massachusetts RTK: Sodium hydroxide New Jersey: Sodium hydroxide Louisiana spill reporting: Sodium hydroxide California Director's List of Hazardous Substances: Sodium hydroxide TSCA 8(b) inventory: Sodium hydroxide CERCLA: Hazardous substances.: Sodium hydroxide: 1000 lbs. (453.6 kg)

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

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WHMIS (Canada): CLASS E: Corrosive solid.

DSCL (EEC):

R35- Causes severe burns. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S37/39- Wear suitable gloves and eye/face protection. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 0

Reactivity: 2

Personal Protection: j

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 0

Reactivity: 1

Specific hazard:

Protective Equipment:

Gloves. Synthetic apron. Vapor and dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Hydrochloric Acid







Material Safety Data Sheet Hydrochloric acid MSDS

Section 1: Chemical Product and Company Identification			
Product Name: Hydrochloric acid	Contact Information:		
Catalog Codes: SLH1462, SLH3154	Sciencelab.com, Inc.		
CAS#: Mixture.	Houston, Texas 77396		
RTECS: MW4025000	US Sales: 1-800-901-7247		
TSCA: TSCA 8(b) inventory: Hydrochloric add	International Sales: 1-281-441-4400		

CI#: Not applicable:

Synonym: Hydrochloric Acid; Muriatic Acid

Chemical Name: Not applicable.

Chemical Formula: Not applicable.

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients Composition:					
Hydrogen chiande	7647-01-0	20-38			
Water	7732-18-5	62-80			

Toxicological Data on Ingredients: Hydrogen chloride: GAS (LC50): Acute: 4701 ppm 0.5 hours [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:

Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (irritant, corrosive), of ingestion, . Slightly hazardous in case of inhalation (lung sensitizer). Non-corrosive for lungs. Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Severe over-exposure can result in death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering

Potential Chronic Health Effects:

Slightly hazardous in case of skin contact (sensitizer) CARCINOGENIC EFFECTS: Classified 3 (Not classifiable for human.) by IARC [Hydrochloric acid]. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to kidneys, liver, mucous membranes, upper respiratory tract, skin, eyes, Circulatory System, teeth. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

Skin Contact:

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:

Wash with a disinfectant scap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:

If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: of metals

Explosion Hazards in Presence of Various Substances: Non-explosive in presence of open flames and sparks, of shocks.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards:

Non combustible. Calcium carbide reacts with hydrogen chloride gas with incandescence. Uranium phosphide reacts with hydrochloric acid to release spontaneously flammable phosphine. Rubidium acetylene carbides burns with slightly warm hydrochloric acid. Lithium silicide in contact with hydrogen chloride becomes incandescent. When dilute hydrochloric acid is used, gas spontaneously flammable in air is evolved. Magnesium boride treated with concentrated hydrochloric acid produces spontaneously flammble gas. Cesium acetylene carbide burns hydrogen chloride gas. Cesium carbide ignites in contact with hydrochloric acid unless acid is dilute. Reacts with most metals to produce flammable Hydrodgen gas.

Special Remarks on Explosion Hazards:
Hydrogen chloride in contact with the following can cause an explosion, ignition on contact, or other violent/vigorous reaction: Acetic anhydride AgCIO + CCI4 Alcohols + hydrogen cyanide, Aluminum Aluminum-titanium alloys (with HCI vapor), 2-Amino ethanol, Ammonium hydroxide, Calcium carbide Ca3P2 Chlorine + dinitroanilines (evolves gas), Chlorosulfonic acid Cesium carbide Cesium acetylene carbide, 1.1-Difluoroethylene Ethylene diamine Ethylene imine, Fluorine, HCIO4 Hexalithium disilicide H2SO4 Metal acetylides or carbides, Magnesium boride, Mercuric sulfate, Oleum, Potassium permanganate, beta-Propiolactone Propylene oxide Rubidium carbide, Rubidium, acetylene carbide Sodium (with aqueous HCI), Sodium hydroxide Sodium tetraselenium, Sulfonic acid, Tetraselenium tetranitride, U3P4 , Vinyl acetate. Silver perchlorate with carbon tetrachloride in the presence of hydrochloric acid produces trichloromethyl perchlorate which detonates at 40 deg. C.

Section 6: Accidental Release Measures

Small Spill:

Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: Neutralize the residue with a dilute solution of sodium carbonate.

Large Spill:

Corrosive liquid. Poisonous liquid. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of sodium carbonate. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep locked up.. Keep container dry. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, organic materials, metals, alkalis, moisture. May corrode metallic surfaces. Store in a metallic or coated fiberboard drum using a strong polyethylene inner package.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:

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

Personal Protection in Case of a Large Spill:

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

Exposure Limits:

CEIL: 5 (ppm) from OSHA (PEL) [United States] CEIL: 7 (mg/m3) from OSHA (PEL) [United States] CEIL: 5 from NIOSH CEIL: 7 (mg/m3) from NIOSH TWA: 1 STEL: 5 (ppm) [United Kingdom (UK)] TWA: 2 STEL: 8 (mg/m3) [United Kingdom (UK)]Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Pungent. Irritating (Strong.)

Taste: Not available.

Molecular Weight: Not applicable.

Color: Colorless to light yellow.

pH (1% soln/water): Acidic.

Boiling Point:

108.58 C @ 760 mm Hg (for 20.22% HCl in water) 83 C @ 760 mm Hg (for 31% HCl in water) 50.5 C (for 37% HCl in water)

Melting Point:

-62.25°C (-80°F) (20.69% HCl in water) -46.2 C (31.24% HCl in water) -25.4 C (39.17% HCl in water)

Critical Temperature: Not available.

Specific Gravity:

1.1- 1.19 (Water = 1) 1.10 (20%and 22% HCl solutions) 1.12 (24% HCl solution) 1.15 (29.57% HCl solution) 1.16 (32% HCl solution) 1.19 (37% and 38% HCl solutions)

Vapor Pressure: 16 kPa (@ 20°C) average

Vapor Density: 1.267 (Air = 1)

Volatility: Not available.

Odor Threshold: 0.25 to 10 ppm

Water/Oil Dist. Coeff .: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether.

Solubility: Soluble in cold water, hot water, diethyl ether.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials, water

Incompatibility with various substances:

Highly reactive with metals. Reactive with oxidizing agents, organic materials, alkalis, water.

Corrosivity:

Extremely corrosive in presence of aluminum, of copper, of stainless steel(304), of stainless steel(316). Non-corrosive in presence of glass.

Special Remarks on Reactivity:

Reacts with water especially when water is added to the product. Absorption of gaseous hydrogen chloride on mercuric sulfate becomes violent @ 125 deg. C. Sodium reacts very violently with gaseous hydrogen chloride. Calcium phosphide and hydrochloric acid undergo very energetic reaction. It reacts with oxidizers releasing chlorine gas. Incompatible with, alkali metals, carbides, borides, metal oxides, vinyl acetate, acetylides, sulphides, phosphides, cyanides, carbonates. Reacts with most metals to produce flammable Hydrogen gas. Reacts violently (moderate reaction with heat of evolution) with water especially when water is added to the product. Isolate hydrogen chloride from heat, direct sunlight, alkalies (reacts vigorously), organic materials, and oxidizers (especially nitric acid and chlorates), amines, metals, copper and alloys (e.g. brass), hydroxides, zinc (galvanized materials), lithium silicide (incandescence), sulfuric acid (increase in temperature and pressure) Hydrogen chloride gas is emitted when this product is in contact with sulfuric acid. Adsorption of Hydrochloric Acid onto silicon dioxide results in exothmeric reaction. Hydrogen chloride causes aldehydes and epoxides to violently polymerize. Hydrogen chloride or Hydrochloric Acid in contact with the folloiwng can cause explosion or ignition on contact or

Special Remarks on Corrosivity:

Highly corrosive. Incompatible with copper and copper alloys. It attacks nearly all metals (mercury, gold, platinium, tantalum, silver, and certain alloys are exceptions). It is one of the most corrosive of the nonoxidizing acids in contact with copper alloys. No corrosivity data on zinc, steel. Severe Corrosive effect on brass and bronze

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation.

Toxicity to Animals:

Acute oral toxicity (LD50): 900 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 1108 ppm, 1 hours [Mouse]. Acute toxicity of the vapor (LC50): 3124 ppm, 1 hours [Rat].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: Classified 3 (Not classifiable for human.) by IARC [Hydrochloric acid]. May cause damage to the following organs: kidneys, liver, mucous membranes, upper respiratory tract, skin, eyes, Circulatory System, teeth.

Other Toxic Effects on Humans:

Very hazardous in case of skin contact (corrosive, irritant, permeator), of ingestion, - Hazardous in case of eye contact (corrosive), of inhalation (lung corrosive).

Special Remarks on Toxicity to Animals:

Lowest Published Lethal Doses (LDL/LCL) LDL [Man] -Route: Oral; 2857 ug/kg LCL [Human] - Route: Inhalation; Dose: 1300 ppm/30M LCL [Rabbit] - Route: Inhalation; Dose: 4413 ppm/30M

Special Remarks on Chronic Effects on Humans:

May cause adverse reproductive effects (fetoxicity). May affect genetic material.

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: Corrosive. Causes severe skin irritation and burns. Eyes: Corrosive. Causes severe eye irritation/conjuntivitis, burns, corneal necrosis. Inhalation: May be fatal if inhaled. Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract. Inhalation of hydrochloric acid fumes produces nose, throat, and larryngeal burning, and irritation, pain and inflammation, coughing, sneezing, choking sensation, hoarseness, laryngeal spasms, upper respiratory tract edema, chest pains, as well has headache, and palpitations. Inhalation of high concentrations can result in corrosive burns, necrosis of bronchial epithelium, constriction of the larynx and bronchi, nasospetal perforation, glottal closure, occur, particularly if exposure is prolonged. May affect the liver. Ingestion: May be fatal if swallowed. Causes irritation and burning, ulceration, or perforation of the gastrointestinal tract and resultant peritonitis, gastric hemorrhage and infection. Can also cause nausea, vomitting (with "coffee ground" emesis), diarrhea, thirst, difficulty swallowing, salivation, chills, fever, uneasiness, shock, strictures and stenosis (esophogeal, gastric, pyloric). May affect behavior (excitement), the cardiovascular system (weak rapid pulse, tachycardia), respiration (shallow respiration), and urinary system (kidneys- renal failure, nephritis). Acute exposure via inhalation or ingestion can also cause erosion of tooth enamel. Chronic Potential Health Effects: dyspnea, bronchilis. Chemical pneumonitis and pulmonary edema can also

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Class 8: Corrosive material

Identification: : Hydrochloric acid, solution UNNA: 1789 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

Connecticut hazardous material survey.: Hydrochloric acid Illinois toxic substances disclosure to employee act: Hydrochloric acid Illinois chemical safety act: Hydrochloric acid New York release reporting list: Hydrochloric acid Rhode Island RTK hazardous substances: Hydrochloric acid Pennsylvania RTK: Hydrochloric acid Minnesota: Hydrochloric acid Massachusetts RTK: Hydrochloric acid Massachusetts spill list: Hydrochloric acid New Jersey: Hydrochloric acid New Jersey spill list: Hydrochloric acid Louisiana SPK reporting list: Hydrochloric acid Louisiana spill reporting: Hydrochloric acid California Director's List of Hazardous Substances: Hydrochloric acid TSCA 8(b) inventory: Hydrochloric acid SARA 302/304/311/312 extremely hazardous substances: Hydrochloric acid SARA 313 toxic chemical notification and release reporting: Hydrochloric acid CERCLA: Hazardous substances: Hydrochloric acid: 5000 lbs. (2268 kg)

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):

CLASS D-2A: Material causing other toxic effects (VERY TOXIC). CLASS E: Corrosive liquid.

DSCL (EEC):

R34- Causes burns. R37- Irritating to respiratory system. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 0

Reactivity: 1

Personal Protection:

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 0

Reactivity: 1

Specific hazard:

Protective Equipment:

Gloves. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Face shield.

Section 16: Other Information

References:

-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -SAX, N.I. Dangerous Properties of Indutrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II. -Guide de la loi et du règlement sur le transport des marchandises dangeureuses au canada. Centre de conformité internatinal Ltée. 1986.

Other Special Considerations: Not available.

Created: 10/09/2005 05:45 PM

Last Updated: 05/21/2013 12:00 PM

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Petroleum Ether





Material Safety Data Sheet Petroleum ether MSDS

Product Name: Petroleum ether	Contact Information:
Catalog Codes: SLP3409, SLP1381, SLP5005	Sciencelab.com, Inc.
CAS#: 8032-32-4	Houston, Texas 77396
RTECS: 016180000	US Sales: 1-800-901-7247
TSCA: TSCA 8(b) inventory: Petroleum ether Cl#: Not applicable. Synonym: Ligroine:	International Sales: 1-251-441-4400
	Order Online: ScienceLab.com
	CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300
Chemical Name: Not available.	International CHEMTREC, call: 1-703-527-3887
Chemical Formula: Not available.	For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Comp	osi	lion:
	Nar	ne

CAS #

8032-32-4

% by Weight

Toxicological Data on Ingredients: Petroleum ether LD50 Not available. LC50 Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:

Petroleum ether

Hazardous in case of eye contact (irritant), of ingestion, of inhalation, Slightly hazardous in case of skin contact (irritant, permeator).

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Classified Development toxin [POSSIBLE]. The substance may be toxic to skin, eyes, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Get medical attention.

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Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 288°C (550.4°F)

Flash Points: CLOSED CUP: Lower than -18°C (0°F).

Flammable Limits: LOWER: 1.1% UPPER: 5.9%

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Extremely flammable in presence of open flames and sparks.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

Flammable liquid, insoluble in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:

Flammable liquid, insoluble in water. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep locked up.. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not breathe gas/fumes/ vapor/spray. Avoid contact with eyes. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If you feel unwell, seek medical attention and show the label when possible.

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Storage:

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves (impervious).

Personal Protection in Case of a Large Spill:

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

Exposure Limits:

TWA: 300 from ACGIH (TLV) [United States] [1995] TWA: 1370 from ACGIH (TLV) [United States] [1995] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Ph	vsical	state	and	ap	pear	rance:	Liquid.	
				_				

Odor: Slight.

Taste: Not available.

Molecular Weight: Not available.

Color: Clear Colorless.

pH (1% soln/water): Not applicable.

Boiling Point: 60°C (140°F)

Melting Point: Not available.

Critical Temperature: Not available.

Specific Gravity: 0.7 (Water = 1)

Vapor Pressure: Not available.

Vapor Density: 3.9 (Air = 1)

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Not considered to be corrosive for metals and glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute toxicity of the vapor (LC50): 3400 4 hours [Rat].

Chronic Effects on Humans:

DEVELOPMENTAL TOXICITY: Classified Development toxin [POSSIBLE]. May cause damage to the following organs: skin, eyes, central nervous system (CNS).

Other Toxic Effects on Humans:

Hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Petroleum distillate, n.o.s. (Ligroin) UNNA: UN1268 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

Pennsylvania RTK: Petroleum ether TSCA 8(b) inventory: Petroleum ether

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada): CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).

DSCL (EEC):

R11- Highly flammable. R36- Irritating to eyes. R40- Possible risks of irreversible effects. R63- Possible risk of harm to the unborn child.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: j

National Fire Protection Association (U.S.A.):

Health: 1

Flammability: 4

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves (impervious). Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Ethanol





111-77-3

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Material Safety Data Sheet 2-(2-Methoxyethoxy)ethanol MSDS

Product Name: 2-(2-Methoxyethoxy)ethanol	Contact Information:		
Catalog Codes: SLM1393	Sciencelab.com, Inc.		
CAS#: 111-77-3	Houston, Texas 77396		
RTECS: KL6125000 TSCA: TSCA B(b) inventory: 2-(2-Methoxyethoxy)ethanol Cl#: Not available. Synonym:	US Sales: 1-800-901-7247		
	International Sales: 1-281-441-4400		
	CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300		
			Chemical Formula: C5H12O3
	For non-emergency assistance, call: 1-281-441-4400		
Section 2: Composition a	nd Information on Ingredients		
omposition:			

(2-(2-)Methoxyethoxy())ethanol

Toxicological Data on Ingredients: 2-(2-Methoxyethoxy)ethanol: ORAL (LD50): Acute: 5500 mg/kg [Rat]. 8222 mg/kg [Mouse]. DERMAL (LD50): Acute: 6540 mg/kg [Rabbit].

Section 3: Hazards Identification

Potential Acute Health Effects:

Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS' Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to kidneys, bladder. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

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

Skin Contact:

After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cold water may be used. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:

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

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

Serious Inhalation: Not available.

Ingestion:

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

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Combustible.

Auto-Ignition Temperature: 250°C (482°F)

Flash Points: CLOSED CUP: 86.7°C (188.1°F). OPEN CUP: 93.33°C (200°F).

Flammable Limits: LOWER: 1.5% UPPER: 22.7%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Flammable in presence of open flames and sparks, of heat, of oxidizing materials.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:

Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:

Combustible material. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

Section 7: Handling and Storage

Precautions:

Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/spray. Wear suitable protective clothing in case of insufficient ventilation, wear suitable respiratory equipment if ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes

Storage:

Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. Keep container dry. Keep in a cool place.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:

Splash goggles. Lab coat, Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

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

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid. Odor: Not available. Taste: Not available. Molecular Weight: 120.15 g/mole

molecular weight. 120.10 g/mol

Color: Not available.

pH (1% soln/water): Not available.

Boiling Point: 193°C (379.4°F)

Melting Point: -84°C (-119.2°F)

Critical Temperature: Not available.

Specific Gravity: 1.019 (Water = 1)

Vapor Pressure: 0.2 mm of Hg (@ 20°C)

Vapor Density: 4.14 (Air = 1)

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff .: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility: Easily soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Eye contact. Inhalation. Ingestion.

Toxicity to Animals:

Acute oral toxicity (LD50): 5500 mg/kg [Rat]. Acute dermal toxicity (LD50): 6540 mg/kg [Rabbit].

Chronic Effects on Humans: The substance is toxic to kidneys, bladder.

Other Toxic Effects on Humans:

Hazardous in case of skin contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

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Federal and State Regulations:

Pennsylvania RTK: 2-(2-Methoxyethoxy)ethanol Florida: 2-(2-Methoxyethoxy)ethanol Massachusetts RTK: 2-(2-Methoxyethoxy)ethanol TSCA 8(b) inventory: 2-(2-Methoxyethoxy)ethanol

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):

CLASS B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F).

DSCL (EEC): R36/38- Irritating to eyes and skin.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 2

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 2

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Sulphuric Acid

Science Lab com Chemicals & Laboratory Equipment Mater	ial Safety D Sulfuric acid N	ata Sheet MSDS	
Section 1: Chemi	cal Product and C	Company Identification	
Product Name: Sulfuric acid	Conta	act Information: clencelab.com, Inc.	
SLS3793	14	025 Smith Rd.	
CAS#: 7664-93-9	US	5 Sales: 1-800-901-7247	
RTECS: WS5600000	Int	ernational Sales: 1-281-441-4400	
TSCA: TSCA 8(b) inventory: Sulfuric acid	Or	Order Online: ScienceLab.com CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300	
CI#: Not applicable.	1-800		
Synonym: Oll of Vitriol: Sulfuric Acid	Interr	ational CHEMTREC, call: 1-703-527-3887	
Chemical Name: Hydrogen sulfate	For n	on-emergency assistance, call: 1-281-441-4400	
Section 2: Comp	osition and Infor	mation on Ingredients	
Composition:			
Name	CAS #	% by Weight	
Sulfuric acid	7664-93-9	95 - 98	
Toxicological Data on Ingredients: Sulfuric act 2 hours (Rat), 320 mg/m 2 hours (Mouse).	d: ORAL (LD50): Acul	e; 2140 mg/kg [Rat.]. VAPOR (LC50): Acute: 510 mg/m	
Secti	ion 3: Hazards Ide	Intification	
Potential Acute Health Effects: Very hazardous in case of skin contact (corrosive of Inhalation. Liquid or spray mist may produce to respiratory tract. Skin contact may produce burns tract, characterized by coughing, choking, or sho the eye is characterized by redness, watering, ar or, occasionally, blistering. Potential Chronic Health Effects: CARCINOGENIC EFFECTS: Classified 1 (Prove human.) by ACGIH. MUTAGENIC EFFECTS: No	a, initiant, permeator), issue damage particula s Inhalation of the spratness of breath. Sevend itching, Skin Inflamm in tor human.) by IARC it available. TERATOC	of eye contact (imitant, corrosive), of ingestion, inly on mucous membranes of eyes, mouth and ay mist may produce severe irritation of respiratory re over-exposure can result in death. Inflammation of nation is characterized by Itching, scaling, reddening, C, + (Proven.) by OSHA. Classified A2 (Suspected for SENIC EFFECTS: Not available. DEVELOPMENTAL	
Potential Chronic Health Effects: CARCINOGENIC EFFECTS: Classified 1 (Prove	n for human.) by IARC it available. TERATOC	. + (Proven.) by OSHA. Classified A2 (Suspected I SENIC EFFECTS: Not available. DEVELOPMENTA	

contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

Skin Contact:

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion:

Products of combustion are not available since material is non-flammable. However, products of decomposition include fumes of oxides of sulfur. Will react with water or steam to produce toxic and corrosive fumes. Reacts with carbonates to generate carbon dioxide gas. Reacts with cyanides and sulfides to form poisonous hydrogen cyanide and hydrogen sulfide respectively.

Fire Hazards in Presence of Various Substances: Combustible materials

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. Slightly explosive in presence of oxidizing materials.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards:

Metal acetylides (Monocesium and Monorubidium), and carbides ignite with concentrated sulfuric acid. White Phosphorous + boiling Sulfuric acid or its vapor ignites on contact. May ignite other combustible materials. May cause fire when sulfuric acid is mixed with Cyclopentadiene, cyclopentanone oxime, nitroaryl amines, hexalithium disilicide, phorphorous (III) oxide, and oxidizing agents such as chlorates, halogens, permanganates.

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Special Remarks on Explosion Hazards:

Mixtures of sulfuric acid and any of the following can explode: p-nitrotoluene, pentasi lver trihydroxydiaminophosphate, perchlorates, alcohols with strong hydrogen peroxide, ammonium tetraperoxychromate, mercuric nitrite, potassium chlorate, potassium permanganate with potassium chloride, carbides, nitro compounds, nitrates, carbides, phosphorous, iodides, picratres, fulminats, dienes, alcohols (when heated) Nitramide decomposes explosively on contact with concentrated sulfuric acid. 1,3,5-Trinitrosohexahydro-1,3,5-triazine + sulfuric acid causes explosive decompositon.

Section 6: Accidental Release Measures

Small Spill:

Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: Neutralize the residue with a dilute solution of sodium carbonate.

Large Spill:

Corrosive liquid. Poisonous liquid. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of sodium carbonate. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep locked up.. Keep container dry. Do not ingest. Do not breathe gas/lumes/ vapor/spray. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, reducing agents, combustible materials, organic materials, metals, acids, alkalis, moisture. May corrode metallic surfaces. Store in a metallic or coated fiberboard drum using a strong polyethylene inner package.

Storage:

Hygroscopic. Reacts. violently with water. Keep container tightly closed. Keep container in a cool, well-ventilated area. Do not store above 23°C (73.4°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:

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

Personal Protection in Case of a Large Spill:

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

Exposure Limits:

TWA: 1 STEL: 3 (mg/m3) [Australia] Inhalation TWA: 1 (mg/m3) from OSHA (PEL) [United States] Inhalation TWA: 1 STEL: 3 (mg/m3) from ACGIH (TLV) [United States] [1999] Inhalation TWA: 1 (mg/m3) from NIOSH [United States] Inhalation TWA: 1 (mg/m3) [United Kingdom (UK)]Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Odor: Odorless, but has a choking odor when hot.

Taste: Marked acid taste. (Strong.)

Molecular Weight: 98.08 g/mole

Color: Colorless.

pH (1% soln/water): Acidic.

Boiling Point:

270°C (518°F) - 340 deg. C Decomposes at 340 deg. C

Melting Point: -35°C (-31°F) to 10.36 deg. C (93% to 100% purity)

Critical Temperature: Not available.

Specific Gravity: 1.84 (Water = 1)

Vapor Pressure: Not available.

Vapor Density: 3.4 (Air = 1)

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility:

Easily soluble in cold water. Sulfuric is soluble in water with liberation of much heat. Soluble in ethyl alcohol.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability:

Conditions to Avoid: Incompatible materials, excess heat, combustible material materials, organic materials, exposure to moist air or water, oxidizers, amines, bases. Always add the acid to water, never the reverse.

Incompatibility with various substances:

Reactive with oxidizing agents, reducing agents, combustible materials, organic materials, metals, acids, alkalis, moisture.

Corrosivity:

Extremely corrosive in presence of aluminum, of copper, of stainless steel(316). Highly corrosive in presence of stainless steel(304). Non-corrosive in presence of glass.

Special Remarks on Reactivity:

Hygroscopic. Strong oxidizer. Reacts violently with water and alcohol especially when water is added to the product. Incompatible (can react explosively or dangerously) with the following: ACETIC ACID, ACRYLIC ACID, AMMONIUM HYDROXIDE, CRESOL, CUMENE, DICHLOROETHYL ETHER, ETHYLENE CYANOHYDRIN, ETHYLENEIMINE, NITRIC ACID, 2-NITROPROPANE, PROPYLENE OXIDE, SULFOLANE, VINYLIDENE CHLORIDE, DIETHYLENE GLYCOL MONOMETHYL ETHER, ETHYL ACETATE, ETHYLENE CYANOHYDRIN, ETHYLENE GLYCOL MONOMETHYL ETHER, ETHYL ACETATE, ETHYLENE CYANOHYDRIN, ETHYLENE GLYCOL MONOMETHYL ETHER, ACETATE, GLYOXAL, METHYL ACETATE, dehydrating agents, organic materials, moisture (water), Acetic anhydride, Acetone, cyanohydrin, Acetone+nitric acid, Acetone + potassium dichromate, Acetonitrile, Acrolein, Acrylonitrile, Acrylonitrile +water, Alcohols + hydrogen peroxide, ally compounds such as Allyl alcohol, and Allyl Chloride, 2-Aminoethanol, Ammonium hydroxide, Ammonium triperchromate, Aniline, Bromate + metals, Bromine pentafluoride, n-Butyraldehyde, Carbides, Cesium acetylene carbide, Chlorates, Cyclopentanone oxime, chlorinates, Chlorates + metals, Chlorine trifluoride, Chlorosulfonic acid, 2-cyano-4-nitrobenzenediazonium hydrogen sulfate, Cuprous nitride, p-chloronitrobenzene, 1,5-Dinitronaphthlene + sulfur, Disobutylene, p-dimethylaminobenzaldehyde, 1,3-Diazidobenzene, Dimethylbenzylcarbinol + hydrogen peroxide, Epichlorohydrin, Ethyl alcohol + hydrogen peroxide, Ethylene diamine, Ethylene glycol and other glycols, , Ethylenimine, Fulminates, hydrogen peroxide, Hydrochloric acid, Hydrofluoric acid, Iodine heptafluoride, Indane + nitric acid, Iron, Isoprene, Lithium silicide, Mercuric nitride, Mesityl oxide, Mercury nitride, Metals (powdered), Nitromethane, Nitric acid, Iglycerides, p-Nitrotoluene, Pentasilver trihydroxydiaminophosphate, Perchlorates, Perchloric acid, Permanganates + benzene, 1-Phenyl-2-methylpropyl alcohol + hydrogen peroxide, Phosphorus, Phosphorus isocyanate, Picrates, Potassium terl-butoxide, Potassium chlorate, Potassium Permanganate and other permanganates, halogens, amines, Potassium Permanganate + Potassium chloride, Potassium Permanganate + water, Propiolactone (beta)-, Pyridine, Rubidium aceteylene carbide, Silver permanganate, Sodium, Sodium carbonate, sodium hydroxide, Steel, styrene monormer, toluene + nitric acid, Vinyi acetate, Thalium (I) azidodithiocarbonate, Irine Joncate, Zinc Iodide, azides, carbonates, cyanides, sulfides, sulfites, alkali hydrides, carboxylic acid anhydrides, nitriles, olefinic organics, aqueous acids, cyclopentadiene, cyano-alcohols, metal acetylides, Hydrogen gas is generated by the action of the acid on most metals (i.e. lead, copper, tin, zinc, aluminum, etc.). Concentrated sulfuric acid oxidizes, dehydrates, or sulfonates most organic compounds.

Special Remarks on Corrosivity:

Non-corrosive to lead and mild steel, but dillute acid attacks most metals. Attacks many metals releasing hydrogen. Minor corrosive effect on bronze. No corrosion data on brass or zinc.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 2140 mg/kg [Rat.]. Acute toxicity of the vapor (LC50): 320 mg/m3 2 hours [Mouse].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: Classified 1 (Proven for human.) by IARC, + (Proven.) by OSHA. Classified A2 (Suspected for human.) by ACGIH. May cause damage to the following organs: kidneys, lungs, heart, cardiovascular system, upper respiratory tract, eyes, teeth.

Other Toxic Effects on Humans:

Extremely hazardous in case of inhalation (lung corrosive). Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (corrosive), of ingestion, .

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:

Mutagenicity: Cytogenetic Analysis: Hamster, ovary = 4mmol/L Reproductive effects: May cause adverse reproductive effects based on animal data. Developmental abnormalities (musculoskeletal) in rabbits at a dose of 20 mg/m3 for 7 hrs.(RTECS) Teratogenecity: neither embryotoxic, fetoxic, nor teratogenetic in mice or rabbits at inhaled doses producing some maternal toxicity

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: Causes severe skin irritation and burns. Continued contact can cause tissue necrosis. Eye: Causes severe eye irritation and burns. May cause irreversible eye injury. Ingestion: Harmful if swallowed. May cause permanent damage to the digestive tract. Causes gastrointestial tract burns. May cause perforation of the stomach, GI bleeding, edema of the glottis, necrosis and scarring, and sudden circulatory collapse(similar to acute inhalation). It may also cause systemic toxicity with acidosis. Inhalation: May cause severe irritation of the respiratory tract and mucous membranes with sore throat, coughing, shortness of breath, and delayed lung edema. Causes chemical burns to the repiratory tract. Inhalation may be fatal as a result of spasm, inflammation, edema of the larynx and bronchi, chemical pneumonitis, and pulmonary edema. Cause corrosive action on mucous membranes. May affect cardiovascular system (hypotension, depressed cardiac output, bradycardia). Circulatory collapse with clammy skin, weak and rapid pulse, shallow respiration, and scanty urine may follow. Circulatory shock is often the immediate cause of death. May also affect teeth(changes in teeth and supporting structures - erosion, discoloration). Chronic Potential Health Effects: Inhalation: Prolonged or repeated inhalation may affect behavior (muscle contraction or spasticity), urinary system (kidney damage), and cardiovascular system, heart (ischemic heart leisons), and respiratory system/lungs(pulmonary edema, lung damage), teeth (dental discoloration, erosion). Skin: Prolonged or repeated skin contact may cause dermatitis, an allergic skin reaction.

Section 12: Ecological Information

Ecotoxicity: Ecotoxicity in water (LC50): 49 mg/l 48 hours [bluegill/sunfish].

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Sulfuric acid may be placed in sealed container or absorbed in vermiculite, dry sand, earth, or a similar material. It may also be diluted and neutralized. Be sure to consult with local or regional authorities (waste regulators) prior to any disposal. Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Class 8: Corrosive material

Identification: : Sulfuric acid UNNA: 1830 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

Illinois toxic substances disclosure to employee act: Sulfuric acid New York release reporting list: Sulfuric acid Rhode Island RTK hazardous substances: Sulfuric acid Pennsylvania RTK: Sulfuric acid Minnesota: Sulfuric acid Massachusetts RTK: Sulfuric acid New Jersey: Sulfuric acid California Director's List of Hazardous Substances (8 CCR 339): Sulfuric acid Tennessee RTK: Sulfuric acid TSCA 8(b) inventory: Sulfuric acid SARA 302/304/311/312 extremely hazardous substances: Sulfuric acid SARA 313 toxic chemical notification and release reporting: Sulfuric acid CERCLA: Hazardous substances.: Sulfuric acid: 1000 lbs. (453.6 kg)

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):

CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS E: Corrosive liquid.

DSCL (EEC):

R35- Causes severe burns. S2- Keep out of the reach of children. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S30- Never add water to this product. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 0

Reactivity: 2

Personal Protection:

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 0

Reactivity: 2

Specific hazard:

Protective Equipment:

Gloves. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Face shield.

Section 16: Other Information

References:

-Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II. -Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987.

Other Special Considerations: Not available.

Created: 10/09/2005 11:58 PM

Last Updated: 05/21/2013 12:00 PM

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Appendix 12Commitments Letter of Project Proponent



Date: March 20,2017

Commitment to follow Environmental Conservation Law, Rules and Regulation, Environmental Standards and Mitigation Measures Stated in the Environmental Management Plan (EMP) of IEE Report

Regarding the above matter, we, De Heus Myanmar Limited has established for production and distribution of animal feeds such as poultry,cattle, and swine feeds. Our company strongly commits that all our operations will be performed in an environmental friendly manner by following *Environmental Conservation Law 2012, Environmental Conservation Rules 2014, Environmental Impact Assessment Procedure* and *National Environmental Quality (emission) Guidelines (2015)*, and relevant environmental standards through successful implementation of mitigation measures stated in the Environmental Management Plan (EMP) of IEE Report.

The Proponent

De Heus Myanmar Limited

Johan Christiaan Van Den Ban Director De Heus Myanmar Ltd.

De Heus Myanmar Ltd. Plot No (S), 308, 307 And 308. Myaung Dakar Industrial Zone Mhawbi Township, Yangon, Myanmar

D a company of Reyal Do Heur.

Appendix 13Commitments Letter of Third Party Consulting Firm



No. (11), Airport Avenue Road, (@coe05885accco&t) Aangon Airport Road, Saw Bwar Gyi Gone Quarter, Insein Twnship, Yangon 11011, Myanmar. Tel: (95) 1 666512 Fax: (95) 19667757 H.P (95) 9 44801676



Commitment to follow and compliance with Environmental Conservation Law, Rules and, Environmental Impact Assessment Procedure, National Environmental Quality (emission) Guideline, Standards and Mitigation Measures Stated in the Environmental Management Plan (EMP) of IEE Report

With regard to the above matter, we, E Guard Environmental Services Co.,Ltd. has prepared Initial Environmental Examination (IEE) report for Production and distribution of Animal feed such as poultry feed, cattle feed, pig feed for De Heus Myanmar Co.,Ltd.. Our company strongly commits that this IEE report has been prepared by following Environmental Conservation Law 2012, Environmental Conservation Rules 2014, Environmental Impact Assessment Procedure 2015, National Environmental Quality (emission) Guidelines 2015, and relevant environmental standards through successful implementation of mitigation measures stated in the Environmental Management Plan (EMP) of IEE Report.

April Thiles

URL: www.eguardservices.com



Email: info@impiaerchervices.com

Appendix 14Emergency Preparedness Plan

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EMPLOYEE EMERGENCY RESPONSE PLAN

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Emergency Response procedure M

EMERGENCY PHONE NUMBERS

Police (Myaung Dagar)

U Khin Maung Lovin	093072442
(chief officer)	09 450 400 789
U Nyi Nyi Min (Sheriff II)	09 784 554 397
(Zane police)	
Fire Department (Mhaw	bil
U Zaw Min Do	89 799 772 910
(Chief Officer)	09 254 540 128
D Tom Them	09 798 387 310
(Assistant firefighting offi	cer]
Fire Department (Main)	141
Ambulance (Charity/pri	vate)
D. Aung Zaya	0973132358
Saw Armone Din	09 421 038 395
U Utan Htun De	09 505 1885
Office	01 620676



EMPLOYEE EMERGENCY RESPONSE PLAN

Section: DH 20- 01 Revision: 00 Date: 01/10/2016 Page: 3 of 5

Emergency Response procedure M

EMERGENCY PERSONNEL NAMES AND PHONE NUMBERS

Name	Position	Department	Contact Number
Thu Hla Zaw(Leo)	Production Manager	Production	09798757142
Khin Hnaung (Emma)	QC Manager	Quality Control	09797023470
Thein Tan (David)	Production supervisor	Production	09977003535
Htet Htet Lwin (Jessica)	HR	HR	09799535919
Yin Myat Thu (Alice)	Production assistant	Production	09781154254

ASSIGNED PERSONNEL TO CONTACT

Name	Shift	Department	Contact Number
Pyae Phyo Aung (Owen)	Shift leader	Production	09 7977 37537
Soe Htun Khaing (Faddy)	Maintenance leader	Production	09 7983 71124
Saw MarKu (David)	Jr. Warehouse Supervisor	Warehouse	09 7984 46648
Ye Min Thu (Micheal)	FP warehouse keeper	Warehouse	09 4250 18872
Aung Ko Htet (Silva)	QC Leader	Quality Control	09 975 806930
Lin Lin Oo (Lin)	Shift A	Quality Control (Finished feed)	09 7932 76831
May Theon Lwin (Julie)	Admin	HR	09 79560 2239



- c. Fainting
- d. Reart attack
- 3. Severe Weather and natural disaster
 - a. Earthquake
 - b. Flood
 - c. Storms
- 4. Others(Specify)

[e.g. fighting among workers, threats using weapons, hostage taking]

1. Accidents happen

- a. Bleeding
 - Apply direct pressure on a bandage over the wound to prevent loss of blood from the body without disrupting normal circulation
 - If a pressure bandage or suitable substitute is not available, elevate the wound above the level of the victim's heart to reduce the blood pressure and decrease the loss of blood.
- b. Shock injury
 - Keep the victim lying down and cover the victim when needed to prevent loss of body heat
 - If a head injury is involved, the victim's head should be kept higher than the rest of the body
- c. Hurns
 - Treat by applying cold water to the affected area
 - Apply dry sterile gauze to protect wound
 - Do not break blisters and apply ointments or sprays on severe burns.



EMPLOYEE EMERGENCY RESPONSE PLAN

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Emergency Response procedure M

- d. Bone injuries
 - Call for the necessary medical assistance
 - In case of open fracture, remove or cut away clothing covering the wound area

2. Sudden illnesses and diseases

- If the injured person is not breathing
- Check and determine the person is still breathing.
 - Perform CPR, first aid by establishing an airway in the patient.
- Use your ears to check if the victim's breathing; also check the chest to see if it rises and falls
- If there are no signs of breathing, have a co-worker call for medical assistance immediately
- b. If the injured person has no heartbeat
 - Check the victim is still breathing
 - Check the pulse. If no pulse is present, begin CPR till professionals help arrives or the victim responds to CPR and breathing and a pulse returns
- c. Fainting

2

- Symptoms include extreme paleness, sweating, clamminess of the skin, dizziness, nausea, and numbress of the hands and feet
- · Contact emergency aid to provide proper treatment
- d. Heart Attack
 - symptoms of a heart attack include persistent chest pains, usually under the breast bone gasping or shortness of breath, the skin, lips and beds of the fingernails may take on a bluish hue or extreme paleness
 - Make the victim as comfortable as possible and keep the air go around
 - Contact emergency aid to provide proper treatment

When calling medical emergency, provide the following information:

- 1. Location of the emergency (address; building, room number)
- 2. Name, phone number, and location of the person who calls

NOTE:

Attempt first aid ONLY if trained and qualified

3. Severe weather and natural disasters

a. Earthquake

- Keep away from overhead fixtures, windows, filing cabinets, and electrical power
- Assist people with disabilities in finding a safe place
- · Evacuate as instructed by the Emergency personnel

IS	EMPLOYEE EMERGENCY RESPONSE PLAN	Section: DH 20- 01 Revision: 00 Date: 01/10/2016 Page: 6 of 5
	Emergency	Response procedu
b. Fla Irii •	od doors: Be ready to evacuate as directed by the Emergency personnel	
	atdoors: Climb to high ground and stay there Avoid walking or driving through flood water	
c. Sto	r ms Once a storm warning has been issued, be ready to evacuate as dir personnel Leave areas that might be affected by storm tide or stream floodin	ected by the Emerger
lt is ne happer situatio Name: Job titi	essary for assigned personnel to remain in the workplaces when s ed. The assigned personnel to report to the emergency personnel f is happened in the assigned areas and take the appropriate action	ome critical situation or the emergency n.
Depart Phone	nent:	
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Appendix 15 HSE Committee Announcement



Announcement De Heus Myanmar Animal Feed Factory-Yangon Plant HSE Operation Committee

HSE Operation Committee in Yangon Plant is founded as below to promote HSE practice and safe working environment.

No.	Name	Function	Position
1.	Leo Zaw	Management	HSE Committee Chairman
z.	David Tan	Management	HSE Vice Committee Chairman
3.	Roger Lin	HSE	HSE Committee Secretary
4.	David MarKu	Warehouse	HSE Committee Member
5.	Faddy	Maintenance	HSE Committee Member
6.	Owen	Production	HSE Committee Member
7.	Silva Aung	Quality Control	HSE Committee Member
8.	Julie	HR	HSE Committee Member
9.	Alice	Admin	HSE Committee Member

The Responsibilities of HSE Committee,

- 1. Attend regular HSE committee meeting.
- 2. Participate in monthly HSE committee work place inspection.
- 3. Encourage and support on improving HSE Activities.
- 4. Emphasize and involve HSE concerns in monthly plant ER and firefighting drill.
- Set up / upgrade HSE regulation, penalty and reward system for HSE practice implementation.
- 6. Conduct HSE promotion program.
- 7. Develop, review and practice Emergency response procedure.
- Make detailed plans for safety training for employee to get familiar with HSE practice, safe work procedure / instructions and fully aware of hazards in work place.

- The committee members to follow the HSE policy strictly as role model for inspiration to co-workers.
- Investigate, review and assess on accidents / incidents occasionally, monthly, quarterly and yearly to find out the root cause, actions and preventive actions.

This announcement is effective from Feb 23,2019.

Leo Zaw

Production Manager

Appendix 16 HSE Guidelines



De Heus Myanmar Co.,Ltd

Health, Safety & Environment Guide Line

ရည်ရွယ်ရတ်

လုပ်ငန်းခွင်အတွင်းတွင် အလုပ်လုပ်နေပြာသော အလုပ်သမားများ၊ ပန်ထမ်းများနှင့် လုပ်ငန်းခွင် သို့ ရောက်ရှိလာသော ဧည့်သည်များ၏ ဘေးအန္တရာယီကင်းရှင်းရေး၊ ကျန်စာရေး နှင့် သဘာပပတ်ဝန်းကျင် ထိနိက်မှုမရှိ စေရန် အတွက် ဤလမ်းညွှန်ချက်ကို ပြဋ္ဌာန်းခြင်ဖြစ်ပါသည်။

ဂိုက်လိုင်းဖွဲ့စည်းတည်ဆောက်ပုံ

က်ဂိုက်လိုင်းကို အခန်း(၅) ခန်းဖြင့် သတ်မှတ်ထားပါသည်။ ၎င်းတို မှာ-

အခန်း (၁) လုပ်ငန်းစွင် ဘေးအန္တရာယ်ကင်းရှင်းရေးကျန်းမာရေးနှင့် သဘာဝပတ်ပန်းကျင် ပေါ်လစီ နှင့် အတွေတွေ လုပ်ငန်းစဉ်များ

အခန်း (၂) လုပ်ငန်းခွင် ဘေးအန္တရာယ်ကင်းရှင်းရေး၊ ကျန်းမာရေးနှင့် သဘာပတ်ဝန်းကျင် ကျင့်ဝတ်စည်းမျင်း

အစန်း (၃) လုပ်ငန်းခွင် ဘေးအန္တရာယ်ကင်းရှင်းရေး၊ ကျန်းမာရေးနှင့် သဘာပတ်ဂန်းကျင် စဉ်ဆက်မပြတ် တိုးတက်မှု

အခန်း (၄) လုပ်ငန်းခွင် ဘေးအန္တရာယ်ကင်းရှင်းရေး၊ ကျန်းမာရေးနှင့် သဘာပတ်ဝန်းကျင် စောင့်ကြည့်ခြင်းနှင့် ထိန်းချပ်ခြင်း

အရန်း (၅) လုပ်ငန်းစွင် ဘေးအန္တရာယ်ကင်းရှင်းရေး၊ ကျန်းမာရေးနှင့် သဘာပတ်ပန်းကျင် အစီအရင်ခံစာများ

အစန်း (၀) လုပ်ငန်းစွင်ဘေးအန္တရာယ်ကင်းရှင်းရေးကျန်မာရေး နှင့် သဘာဝပတ်ဂန်ကျင်ပေါ်လစီနှင့် အတွေ စထွ လုပ်ငန်းစဉ်များ

လုပ်ငန်းစွင်ဘေးအန္တရာယ်ကင်းရှင်းရေး၊ ကျန်းမာရေးနှင့် သဘာဝပတ်ဝန်ကျင် မထိနိုက်ရေး စသည် လုပ်ငန်းစဉ်များကို ကျယ်ကျယ်မြန်မြန့် အကောင်ထည်ဖော် ဆောင်ရွက်နိုင်ရန်အတွက် လုပ်ငန်းစွင် ဘေးအန္တ ရယ်ကင်းရှင်းရေးမေါ် လစီအား ရေးဆွဲ မြွှငွာန်းထားရမည့်အပြင် လုပ်ငန်းစွင်ဘေးအန္တရာယ်ကင်းရှင်းရေး၊ ကျန်း မာရေးနှင့် သဘာဝပတ်ဝန်းကျင် ပေါ် လစီကိုလည်း၊ လူတိုင်း၊ သိရှိနားလည်ပြီး၊ လိုက်နာအောင် ဆောင်ရွက်ထားရမည်။ ထို့ပြင် လုပ်ငန်းစွင်ဘေးအန္တရာယ်ကင်းရှင်းရေး၊ ကျန်မာရေးနှင့် သဘာဝပတ် ဝန်းကျင် ကော်မတီကို ဖွဲ့စည်း၍ ကော်မတီအ၊ တာဝန်များကို လည်းရမှုတ်ထား၊ ရမည်းကော်မတီသည် လုပ်ငန်းစွင်အတွင်း၊ လှည့်လည်းစစ်စောခြင်း၊ အန္တရာယ်ရှိသော အနေထားများ၊ ရှာဖွေဖော်ထုတ်ခြင်း အန္တရာယ်ရှိ သောအဆင် ့များအား အကဲဖြတ်ခြင်းများကို တစ်လတွင် တစ်ကြိမ် လစဉ် စစ်ဆေးမှုများ ပြုလုပ်သွားရမည်။ ထို့ပြင် ကော်မတီသည် လုပ်ငန်းခွင်အတွင်း လှည့်လည်စစ်ဆေး မှ၊ သည် တစ်နှစ်လုံးတွင် အနည်းဆုံး (၉) ကြိမ်မှ အများဆုံး (၁၁)ကြိမ်ပြုလုပ်ရမည်ဖြစ်သည်။ ကော်မတီသည် လုပ်ငန်းခွင်ဘေးအန္တရာ ယ်ကင်းရှင်းရေး ၊ကျန်းမာရေး နှင့်သဘာဂပတ်ဂန်ကျင် ကော်မတီပုံမှန် အစည်ဂေးကို လည်း လစဉ်ပြုလုပ်သွား ရမည်ဖြစ်သည်။ အထက်ပါကော်မတီ အစည်းအဝေးနှင့် လုပ်ငန်းအတွင်းလှည့်လည်စစ်ဆေးခြင်းတွင် ကော်မတီ HSE Committee Chairman သို့မဟုတ် HSE Committee Vice Chairman တစ်ဦးအနည်းဆုံး တက်ရောက်ရမည်။ ကော်မတီ အစည်းအဝေးအထမြောက်ရန်အတွက် ကော်မတီပါပင်သော သူများသည် အနည်း ၈၀% ရာစိုင်နန်း တက်ရောက်ရမည်။ကော်မတီသည် လုပ်ငန်းခွင်အတွင်း လှည့်လည်စစ်ဆေး ရန်အတွက် ကော်မတီ အဖွဲပင်အား လုံး တက်ရောက်ပေးရမည်။

အထွေထွေလုပ်ငန်းစဉ်များ အနေဖြင့်လုပ်ငန်းခွင်အတွင်း ဘေးအန္တရာယ်ဖြစ်နိုင်မှု အများဆုံးနေရာ များ ကိုလည်း နေရာအလိုက်လုပ်ထုံး လုပ်နည်း (Regulation) များကိုသတ်မှတ် ၍ဘေးအန္တရာယ်ကင်းရှင်းစေရန် အတွက် ရျမှတ်ရေးဆွဲထားရမည်။ ထို့ပြင် ဘေးအန္တရာယ်ရှိမှု နေရာအလိုက် သက်ဆိုင်ရာဘေးအန္တရာယ် ကင်းရှင်းရေး လုပ်ထုံးလုပ်နည်းများ (Regulation)၊များကိုထုတ်ပြန်ပြဋ္ဌာန်းရမည် အပြင်၄င်းနေရာတွင် အလုပ်လုပ်နေသူများ သိရှိနားလည် လိုက်နာစေရန် ဆောင်ရွက်ထားရမည်။

ထို့အပြင်အထွေထွေလုပ်ငန်းစဉ်များ အနေဖြင့် အလုပ်ရုံနှင့်အလုပ်သမားဦးစီဌာနမှ ထုတ်ပြန်ထားသော ဥပဒေများကို လိုက်နာအောင်ဆောင်ရွက်ထားရမည်။

အခန်း(၂) လုပ်ငန်းခွင်ဘေးအန္တရာယ်ကင်းရှင်းရေး၊ ကျန်းမာရေး နှင့် သဘာဂပတ်ပန်းကျင် ကျင့်ပတ်စည်းမျဉ်း များ

ကျင့်ဂတ်စည်မျဉ်းများအနေဖြင့် ဘေးအန္တရာယ်ကင်းရှင်းရေး မူဂါဒများရေးဆွဲခြင်း (SWP)၊ လုပ်ငန်းခွင် တွင် ဘေးအန္တရာယ်ကင်းရှင်းမှုရှိစေရန် လုပ်ငန်းခွင်မစမှီ ဘေးအန္တရာယ်ကင်းရှင်းရေး အစည်းပေးများပြု လုပ်ခြင်း၊ မီးဘေးလုံခြုံရေးအတွက် အစီအမံများဆောင်ရွက်ထားရှိခြင်း၊ဘေးအန္တရယ်ရှိသော အရာများကို အကဲဖြတ်ဆန်းစစ်ခြင်းနှင့် ကြိုတင်ကာကွယ်ထိန်းချူပ်သော အစီမံများဆောင်ရွက်ခြင်း၊ ဘေးအန္တရာယ်ကင်း ရှင်းရေး၊ကျန်းမာရေးနှင့်သဘာပပတ်ဂန်းကျင်အတွက် အပတ်စဉ်၊ လစဉ် နှင့် နှစ်စဉ် အရှိန်ဖယားစီမံဆောင် ရွက်ချက်များရေးဆွဲ အကောင်ထည်ဖော်ခြင်း များပြုလုပ်ရမည်။

အခန်း (၃) ဘေးအန္တရာယ်ကင်းရှင်းရေး၊ ကျန်းမာရေးနှင့် သဘာပပတ်ပန်းကျင် စဉ်ဆက်မပြတ် တိုးတက်မှု

ဘေးအန္တရာယ်ကင်းရှင်းရေး၊ကျန်းမာရေးနှင့် သဘာဂပတ်ဂန်းကျင် စဉ်ဆက်မပြတ် တိုးတက်မှုများ ဖြစ်စေရန်အတွက် လုပ်ငန်းခွင်ဘေးအန္တရာယ်ကင်းရှင်းရေးဆိုင်ရာ သင်တန်းများ ဝို့ချရန်အတွက် လုပ်ငန်းခွင် ဘေးအန္တရာယ်ကင်းရှင်းရေးဆိုင်ရာ အပတ်စဉ်၊ လစဉ် သင်တန်းအချိန်ဇယားများရေးဆွဲခြင်း၊ လုပ်ငန်းခွင် ဘေးအန္တရာယ်ကင်းရှင်း သင်တန်းများ ဝို့ချခြင်း၊ လုပ်ငန်းခွင်ဘေးအန္တရာယ်ကင်းရှင်းရေးဆိုင်ရာ အသိပညာ ပေးဟောပြောပွဲများပြုလုပ်ခြင်း၊ သက်ဆိုင်ရာအစိုးရအဖွဲ့စည်းများနှင့် သင်တန်းပေးခြင်း၊အသိပညာပေး ဟော ပြောပွဲများပူးပေါင်းဆောင်ရွက်ခြင်းများပြုလုပ်ရမည်။ သင်တန်းမှ ဝို့ချချက်များသည် လုပ်ငန်းခွင်တွင် ထိရောက် မှု ရှိမရှိ တိုင်းတာ အကဲဖြတ်ရမည်။ ထို့အပြင် ဘေးအန္တရာယ်ကင်းရှင်းရေး၊ ကျန်းမာရေးနှင့် သဘာဂပတ်ဂန်း ကျင် လစဉ်၊ နှစ်စဉ်ဆောင်ရွက်ချက်များကို ဆန်းစစ် အကဲဖြတ်မှုများ ပြုလုပ်ရမည်။ ထို့အပြင် ဆောင်ရွက်ချက် အားလုံးသည် အကောင်ထည်ဖော်ဆောင် ရွက်ရာတွင် ထိရောက်မှု ရှိ၊ မရှိ ကို တိုင်းတာမှုများ ဆောင်ရွက်ထား ရမည်။

အခန်း (၄) လုဝ်ဝန်းခွင်ဘေးအန္တရာယ်ကင်းရှင်းရေး၊ ကျန်းမာရေးနှင့် သဘာပပတ်ပန်းကျင် စောင့်ဂြာည် ခြင်းနှင့် ထိန်းချုပ်မှုများ

လုပ်ငန်းခွင်ဘေးအန္တရာယ်ကင်းရှင်းရေး၊ ကျန်းမာရေးနှင့် သဘာပပတ်ပန်းကျင် စောင့်ဂြာည်ခြင်းနှင့် ထိန်းချုပ်ခြင်းကို အပိုင်း (၁ပ)ပိုင်းဖြင့်ဆောင်ရွက်ရမည်။ ၄င်းတို့မှာ အောက်ပါအတိုင်း ဖြစ်ပါသည်။

(၁) ကျန်းမာရေးဆိုင်ရာ ဘေးန္တရာယ်ကင်းရှင်းရေးအတွက် စောင့်ကြည့်ခြင်းနှင့် ထိန်းချပ်ခြင်း။

(၂) စက်ပိုင်းဆိုင်ရာ ဘေးအန္တရာယ်ကင်းရှင်းရေးအတွက် စောင့်ဂြာည့်ခြင်းနှင့် ထိန်းချုပ်ခြင်း။

(၃) လျှပ်စစ် ဘေးန္တရာယ်ကင်းရှင်းရေးအတွက် စောင့်ဂြာည့်ခြင်းနှင့် ထိန်းချူပ်ခြင်း။

(၄) ဓါတပစ္စည်းကိုင်တွယ် အသုံးပြုရာတွင် စောင့်ဂြာည့်ခြင်းနှင့် ထိန်းချပ်ခြင်း။

(၅) 5S အတွက် စောင့်ဂြာည်ခြင်းနှင့် ထိန်းချုပ်ခြင်း။

(၆) ရွှေလျားနေသော ယာဉ်များ၊ စက်များ ဘေးအန္တရာယ်ကင်းရှင်းရေးအတွက် စောင့်ဂြာည့်ခြင်းနှင့်ထိန်းချူပ် ခြင်း။

(၇) ဘေးအန္တရာယ် ကင်းရှင်းရေးအတွက် တကိုယ်ရေသုံးကာကွယ်ရေး ပစ္စည်းများကို စောင့်ဂြာည့်ခြင်းနှင့် ထိန်းချုပ်ခြင်း။

(၈) လုဝ်ငန်းခွင် အတွင်း တည်ဆောက်၊ ပြုပြင်းလုဝ်ငန်းများအတွက် အလုဝ်လုဝ်ခွင့် ပါမစ် အတိုင်း လိုက်နာ ဆောင်ရွက်မှု ရှိ၊မရှိ စောင့်ဂြာည့်ခြင်းနှင့် ထိန်းချုပ်ခြင်း။

(၉) သဘာဂပတ်ပန်းကျင် ထိခိုက်မှု မရှိစေရန်အတွက် စောင့်ဂြာည့်ခြင်းနှင့် ထိန်းချုပ်ခြင်း၊

(၁၀) မတော်တဆ ထိခိုက်မှု ဖြစ်ရပ်များကို အကဲဖြတ် ထိန်းချုပ်ခြင်း။

အဝိုင်း (၁) အရ ကျန်းမာရေးဆိုင်ရာ ဘေးန္တရာယ်ကင်းရှင်းရေးအတွက် စောင့်ဂြာည်ခြင်းနှင့် ထိန်းချပ်ခြင်း ကို ဆောင်ရွက်ရာတွင် အလုစ်ရုံနှင့် အလုစ်သမားစစ်ဆေးရေးဥပဒေအရ သတ်မှတ် လုစ်သားဦးရေထက် မနည်း သော စက်ရုံ အလုစ်ရုံများတွင် ဆေးပေးခန်းထားရှိခြင်း၊ အစိုးရ အသိမှတ်ပြု ဆရာဂန် (သို့မဟုတ်) သူနာပြုဆရာ၊ ဆရာမ ထားရှိခြင်း၊ လုစ်ငန်းခွင်အတွင်း အရေးပေါ်ရှေးဦးသူနာပြုလုစ်နိုင်ရန် အတွက် ဆေးသတ္တာ ပုံးများထားရှိခြင်း၊ အလုစ်သမားအတွက် လုံလောက်သော သောက်သုံးရေ ထားရှိခြင်း ၊အလုစ်သမားများအတွက် နားရှိန်တွင် သတ်မှတ်ထားသော နားနေဆောင်များထားရှိခြင်း၊ အလုစ်သမား ဦးရည် အရိူးအစားအတိုင်း အိမ်သာ အရေအတွက် သတ်မှတ်ထားရှိခြင်း၊ တစ်နှစ်တစ်ကြိမ်ဆေးစစ်ပေးခြင်းနှင့် ကျန်းမာရေးဆိုင်ရာ အသိပညာပေး ဟောပြောပွဲများ ပြုလုစ်ခြင်း များဆောင်ရွက်ရမည်။ အဝိုင်း(၂) အရ စက်ပိုင်းဆိုင်ရာ ဘေးအန္တရာယ်ကင်းရှင်းရေးအတွက် စောင့်ကြည့်ခြင်းနှင့် ထိန်းချုပ်ခြင်းကို ဆောင်ရွက်ရာတွင် စက်များတွင် အရေးအခြေအနေတွင် အသုံးပြုရန်အတွက် တတ်ဆင်ထားသော ခလုတ်များ နှင့် ပုံမှန်အရြေနေတွင် အသုံးပြုသော လေတ်များကို စစ်ဆေးခြင်း၊ လည်ပတ်နေသော စက်အစိတ်ပိုင်းများတွင် အကာအရံ များကို စစ်ဆေးခြင်း၊ ဆီ၊ရေ၊လေ၊ပိုင်၊ အမှုန် ယိုစိမ် ့မှု ရှိ၊ မရှိ ကို စစ်ဆေးခြင်း၊ လျပ်စစ်ယိုစိမ့်မှု ရှိ၊မရှိ စစ်ဆေးခြင်း၊ ချိန်းကြီးများ ဘတိကြီးများ ကို စစ်ဆေးခြင်း၊ စက်လည်ပတ်ရာတွင် ပုံမှန် အနေထားတွင် ရှိ၊မရှိ စစ်ဆေးခြင်း၊ စက်လည်ပတ်ရာတွင် သတ်မှတ်ထားသော အပူရိုန်ထက် ကျော်လွန်မှု ရှိ၊မရှိ စစ်ဆေးခြင်း၊ စက်များထားရှိရာနေရာတွင် အလုပ်ကောင်းမွန်စွာ လုပ်ဆောင်နိုင်ရန်အတွက် နေရာ လုံလုံလောက်ရှိခြင်း၊ အလင်းရောင် လုံလောက်စွာ ရှိ၊မရှိ စစ်ဆေးခြင်း၊ လေပင်လေထွက် ကောင်းမွန်မှု ရှိ၊မရှိ စစ်ဆေးခြင်း၊ အရေးပေါ် အခြေအနေတွက်ထွက်ပေါက်လမ်းများ၊ စက်လည်ပတ်ရာတွင် စက်မှထွက်ပေါ် လာသော ဘေးအန္တရာယ်ကင်းရှင်းရေးတွင် သတ်မှတ်ထားသော စံစနစ်ထက် ကျော်လွန်မှု ရှိ၊မရှိ အသံများသည် စစ်ဆေးခြင်း၊စက်များတွင် ဘေးအန္တရာယ်ကင်းရှင်းရေးအတွက် တပ်ဆင်ထားသော ဘေးအန္တကင်းရှင်းရေး သင်္ကေတများ ရှိ၊မရှိ စစ်ဆေးခြင်း၊ထွက်ပေါက်များပိတ်ဆို့နေခြင်းရှိ၊မရှိစစ်ဆေးခြင်း၊စသည်တို့ကို ဇယား ရေးဆွဲ၍ လုပ်ငန်းမစမှီအချိန်နှင့် လုပ်ငန်းပြီး ဆုံးချိန်များတွင် သက်ဆိုင်ရာ တာပန်ရှိသူမှ နေ့စဉ် စစ်ဆေး ရမည်။

အပိုင်း(၃) အရ လျပ်စစ် ဘေးန္တရာယ်ကင်းရှင်းရေးအတွက် စောင့်ကြည့်ခြင်းနှင့် ထိန်းချူပ်ခြင်းကို ဆောင်ရွက်ရာ တွင် လျှပ်စစ်ပုံးများတွင်ပါသော အချက်ပြမီးများ ပုံမှန်အနေထားရှိမရှိ စစ်ဆေးခြင်း၊ volt meter/ ampere meter များ ၊fault များ၊ circuit breaker များစစ်ဆေးခြင်း၊ ဂါယာကြီးများပေါက်ပြံမှု ရှိ၊မရှိ စစ်ဆေးခြင်း၊ အသုံး ပြုသော volt အားပေါ် မူတည်၍ earth ချထားမှု ရှိ၊ မရှိ စစ်ဆေးခြင်း၊ မိန်းဘုတ်များ၊ အိတ်စတန်းရှင်း ဘုတ်များ ကောင်းမွန်မှု ရှိုမရှိ စစ်ဆေးခြင်း၊ ပလပ်ခေါင်းများ ကောင်းမွန်မှု ရှိုမရှိစစ်ဆေးခြင်း၊ အသုံးပြုသော volt အား ပေါ်မူတည်၍ သတ်မှတ်ထားသော ပါယာကြီးများကို အသုံးပြုမှု ရှိုမရှိ စစ်ဆေးခြင်း၊ ပါယာငုတ်များ လျော့ရဲမှု ရှိ၊ မရှိ စစ်ဆေးခြင်း၊ လျပ်စစ်ပုံးများအတွင်း သန့်ရှင်းမှု၊ ခြောက်သွေမှု၊ ရှိ၊မရှိ စစ်ဆေးခြင်း၊ ပါယာကြီးများသည် စနစ် တကျ သတ်မှတ်ပေးထားသော cable tray များအတွင်း ရှိ၊မရှိစစ်ဆေးခြင်း၊ cable tray များကောင်းမွန်မျ ရို၊မရိ စစ်ဆေးခြင်း၊ တည်ဆောက်ပြုလုပ်ငန်းများတွင် welding work, grinding work, drilling work, စသည် တို့တွင် အသုံးပြုသော ပါယာများသည် စနစ်တကျ သွယ်တန်းမှု ရှိ၊မရှိ စစ်ဆေးခြင်း၊ လျပ်စစ်ပုံးများ ရုပ်ပိုင်းဆိုင်ရာ ကောင်းမွန်မှု ရှိ၊မရှိ စစ်ဆေးခြင်း၊ လျပ်စစ်ပုံးများတွင် ဘေးအန္တရာယ်ကင်းရှင်းရေး သင်္ကေတ များ၊ လျှပ်ပုံးတာဂန်ခံကို ဆက်သွယ်ရမည့် ဖုန်းနံပါတ်များ ရှိ၊ မရှိ စစ်ဆေးခြင်း၊ လျပ်စစ်ပုံးများ အတွက် နေရာသတ်မှတ်ထားရှိမျ କା မရှိ စစ်ဆေးခြင်း၊ လျှပ်စစ်ပုံးများအတွက် သတ်မှတ်ထားသော နေရာများအတွင်းတွင် ပစ္စည်းများ စုပုံထားရှိမှု ရှိ၊ မရှိစစ်ဆေးခြင်း၊ လှုပ်စစ်ပုံးများထားရှိရာနေရာသို့ သွားသော ပင်လမ်းထွက်လမ်းများ မိတ်ဆို့မှု ရှိ၊ မရှိစစ်ဆေး၊ စသည်တို့ကို သက်ဆိုင်ရာ နေမြေက တာပန်ခံမှ နေ့စဉ် စစ်ထေးရမည်။

အဝိုင်း(၄)အရ ဓါတုပစ္စည်းကိုင်တွယ် အသုံးပြုရာတွင် စောင့်ဂြာည့်ခြင်းနှင့် ထိန်းချပ်ခြင်း ကို ဆောင်ရွက်ရာတွင် ဓါတုပစ္စည်းများကို သတ်မှတ်ထားသော ဓါတုပစ္စည်းထားသိုရာ အခန်းအတွင်းတွင်သာ ထားရှိမှု ရှိုမရှိ စစ်ဆေးခြင်း၊ ဓါတုပစ္စည်းများကို အမျိုးအစားခွဲခြား၍ စနစ်တကျ ထားရှိခြင်းရှိုမရှိ စစ်ဆေးခြင်း ၊လေပင်လေထွက် ကောင်းမွန်ပြီး အေးမြခြောက်သွေ့မှု ရှိုမရှိ စစ်ဆေးခြင်း၊ ၄င်းအခန်းတွင် ပင်လမ်း
ထွက်လမ်းများ ကောင်းမွန်မှု ရှိုမရှိ စစ်ဆေးခြင်း၊ ဓါတု ပစ္စည်းများကို သစ်သားခုံများဖြင့် အမြင့် တင်ထပ်ထားရာ၌ အခန်း၏ ၃ပုံ ၂ပုံ ခန့်သာ ထားရှိမှု ရှိ၊ မရှိ စစ်ဆေးခြင်း၊ အခန်းအတွင်းနှင့် အခန်းအပြင်တွင် ထားရှိသော ဘေးအန္တရာယ်ကင်းရှင်းရေး သင်္ကေတများ ကောင်းမွန်မှု ရှိ၊ မရှိ စစ်ဆေးခြင်း၊ အခန်းတွင် MSDS ရှိ၊မရှိ စစ်ဆေးခြင်း၊ ဓါတုပစ္စည်းများကို သယ် ဆောင်အသုံးပြုရာတွင် အသုံးပြုသော ပစ္စည်းများ စနစ်တကျ အသုံးပြုခြင်းရှိ၊မရှိ စစ်ဆေးခြင်း၊ စသည် တို့ကို ဆောင်ရွက်ရမည်ဖြစ်သည်။

အပိုင်း(၅) အရ 5S အတွက် စောင့်ဂြာည့်ခြင်းနှင့် ထိန်းချုပ်ခြင်း ကို ကိုဆောင်ရွက်ရာတွင် လုပ်ငန်းခွင် ဧရိယာ အလိုက် အောက်ပါ သတ်မှတ်ချက်များအတိုင်းလုပ်ဆောင်ရမည်။ ၄င်းတို့မှာ-

(1) Sort Out- မလိုအပ်သော ပစ္စည်းများအား ရှင်းလင်း ဖယ်ရှားခြင်း

- (2) Set in order အစီအစဉ် တကျ ထားရှိခြင်း
- (3) Shine သန့်ရှင်းတောက်ပြောင်စွာရှိခြင်း
- (4) Standardize စံစနစ် ထားရှိခြင်း
- (5) Sutain စည်းမျဉ်းစည်းကမ်းများ လိုက်နာခြင်း

အဝိုင်း (၆) အရ ရွှေလျားနေသော ယာဉ်များ၊ စက်များ ဘေးအန္တရာယ်ကင်းရှင်းရေးအတွက် စောင့်ကြည့် ခြင်း နှင့်ထိန်းချူပ်ခြင်းကို ဆောင်ရွက်ရာတွင် သက်ဆိုင်ရာ ရွေ့လျားသော ယဉ်များအလိုက် လုပ်ငန်းခွင်အတွင်းတွင် သတ်မှတ်ထားသော စည်းမျဉ်းစည်းကမ်းအတိုင်း လိုက်နာမှု ရှိ၊မရှိ စစ်ဆေးခြင်းတို့ကို ပြုလုပ်ရမည်။

အဝိုင်း(၇) အရဘေးအန္တရာယ်ကင်းရှင်းရေးအတွက်တကိုယ်ရေသုံးကာကွယ်ရေး ပစ္စည်းများကို စောင့်ဂြာည် ခြင်းနှင့် ထိန်းချုပ်ခြင်းကို ဆောင်ရွက်ရာတွင် ပန်းထမ်းနှင့် အလုပ်သမားများသည် သက်ဆိုင်ရာလုပ်ငန်း ခွင်အတွင်း သတ်မှတ်ထားသော တစ်ကိုယ်ရည်သုံးပစ္စည်းများကို စနစ်တကျ အသုံးပြုမှု ရှိ၊ မရှိ စစ်ဆေးခြင်း၊ လုပ်ငန်းချိန်ပြီးတိုင်း တစ်ကိုယ်ရည်သုံးကာကွယ်ရေးပစ္စည်းများကို စနစ်တကျ သိမ်းဆည်းမှု ရှိ၊ မရှိ စစ်ဆေးခြင်း များကို ဆောင်ရွက်ရမည်။

အဝိုင်း(၈) အရ လုပ်ငန်းခွင် အတွင်း တည်ဆောက်၊ ပြုပြင်းလုပ်ငန်းများအတွက် အလုပ်လုပ်ခွင့် ပါမစ် အတိုင်း လိုက်နာ ဆောင်ရွက်မှု ရှိုမရှိ စောင့်ဂြာည့်ခြင်းနှင့် ထိန်းချုပ်ခြင်း ဆောင်ရွက်ရာတွင် တည်ဆောက်ပြုပြင် လုပ်ငန်းများသည် အလုပ်အမျိုးအစားအလိုက် အလုပ်မစမှီ သက်ဆိုင်ရာ အလုပ်လုပ်ခွင့်ပါမစ်ကို ကြိုတင် လျှောက်ထားခြင်း ရှိုမရှိ စစ်ဆေးခြင်း၊ သက်ဆိုင်ရာ ပါမစ်အလိုက် ခွင့်ပြုထားသော တည်ဆောက်ပြုပြင် လုပ်ငန်းခွင်တွင် ပါမစ်ပါ အချက်အလက်တိုင်း လိုက်နာခြင်းရှိ၊မရှိ စစ်ဆေးရမည်။

အပိုင်း(၉)အရ သဘာဂပတ်ပန်းကျင် ထိခိုက်မှု မရှိစေရန်အတွက် စောင့်ကြည် ခြင်းနှင့် ထိန်းချုပ်ခြင်းဆောင် ရွက်ရာတွင် ပထမဦးစွာ လုပ်ငန်းခွင်မှ စွန့်ပစ်ပစ္စည်းများကို စွန့်ပစ်ပစ္စည်းအမျိုးအစားခွဲ၍ သတ်မှတ်ထားသော စွန့်ပစ်ပစ္စည်းများထားရာနေတွင် စနစ်တကျ စွန့်ပစ်မှု ရှိ၊မရှိစစ်ဆေးခြင်း၊ ရေနတ်မြောင်းများသည် ရေစီးဆင်းမှု ကောင်းမွန်မှု ရှိ၊မရှိ စစ်ဆေးခြင်း၊ လုပ်ငန်းခွင်မှ ထွက်ရှိသော အမှုန်များ၊ အမှိုက်များသည် ပတ်ဂန်းကျင် လေထု၊ ရေထုကို ထိခိုက်မှု ရှိ၊မရှိ စစ်ဆေးခြင်း၊ ဆောင်ရွက်ရပါမည်။ အပိုင်း(၁ဂ) အရ မတော်တဆ ထိခိုက်မှု ဖြစ်ရပ်များကို အကဲဖြတ် ထိန်းချုပ်ခြင်း ကို ဆောင်ရွက်ရာတွင် ဖြစ်ခဲ့ပြီး မတော်တဆဖြစ်ရပ်များကို ပြန်လည်သုံးသပ်ခြင်း၊ လုပ်ငန်းခွင် ရေိယာအလိုက် Risk Assessment ရေးဆွဲ၍ မတော်တဆဖြစ်ရပ်များအားထိန်းချုပ်ခြင်း များ ဆောင်ရွက်ရမည်။

အစန်း (၅) လုပ်ငန်းစွင် ဘေးအန္တရာယ်ကင်းရှင်းရေး၊ ကျန်းမာရေးနှင့် သဘာပတ်ပန်းကျင် အစီအရင်ခံစာများ

လုပ်ငန်းခွင်ဘေးအန္တရာယ်ကင်းရှင်းရေး၊ကျန်းမာရေးနှင့် သဘာဂပတ်ဂန်းကျင်အစီအရင်ခံများကို အောက်ပါအတိုင်းဆောင်ရွက်ရမည်။

(က) လုပ်ငန်းခွင်တစ်ခုခြင်းစီအလိုက် ဘေးအန္တရာယ်ကင်းရှင်းရေး၊ကျန်းမာရေးနှင့် သဘာဂပတ်ဂန်းကျင် လုပ်ငန်း၏ ဆောင်ရွက်ပြီးစီးမှု အခြေအနေကို HSE Officer မှ Production Manager ကို လစဉ် အစီအရင်ခံ တင်ပြရမည်။

(ခ) HSE Officer မှ လုပ်ငန်းခွင် ဘေးအန္တရာယ်ကင်းရှင်းစေရန်အတွက် ထုတ်ပြန်ပေးထားသော ညွှန်ကြား ချက်များကို သက်ဆိုင်ရာ လုပ်ငန်းခွင်အလိုက် တာပန်ယူထားသော ခေါင်းဆောင်များမှ HSE လုပ်ငန်းများကို လုပ်ဆောင်၍ တိုးတက်ဆောင်ရွက်နေမှု အခြေအနေများကို HSE Officer ထံသို့ အစီအရင်ခံ တင်ပြရမည်။

(ဂ) မတော်တဆဖြစ်ရပ်များ ရှိလာပါက သက်ဆိုင်ရာ ခေါင်းဆောင်သည် HSE Officer နှင့် Production Manager ထံသို့ ချက်ခြင်း အစီအရင်ခံ တင်ပြရမည်။

(ဃ) လုပ်ငန်းစွင်အတွင်း တည်ဆောက်၊ပြုပြင်လုပ်ငန်းများရှိလျှင် သက်ဆိုင်ရာ ခေါင်းဆောင်မှ HSE Officer နှင့် Production Manager ထံသို့ လုပ်ငန်းမစမှီတင်ပြ အစီအရင်ခံရမည်။

(င) လုဝ်ငန်းခွင်အတွင်း အရေးအပေါ် အခြေများ ဖြစ်လာပါက သက်ဆိုင်ရာခေါင်းဆောင်များသည် HSE Officer နှင့် Production Manager ထံသို့ ချက်ခြင်းအဂြောင်းကြားရမည်။

Appendix 17 QR code of IEE report



http://www.mediafire.com/file/qkonosroavb0gdc/IEE_De_Heus_Myanmar_Limited_Second_Revise d_November_5_2019_Final.pdf/file