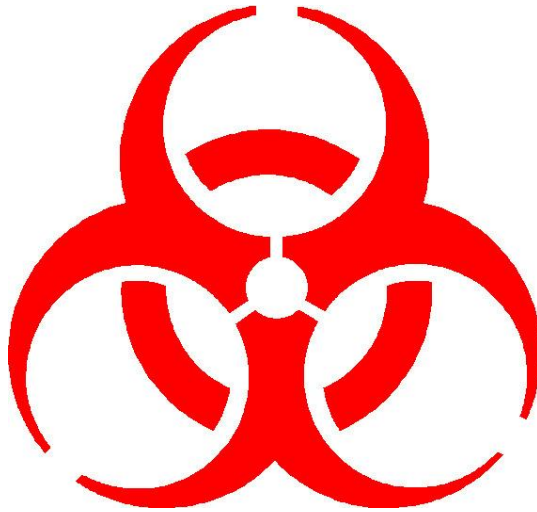


LRM-MAN002


SAFETY MANUAL

CENTER OF INFECTIOLOGY LAO-CHRISTOPH MERIEUX (CILM)

Version: 05
20/02/2020



Center of Infectiology Lao-Christophe Merieux (CILM)
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Forewords

The Center Infectiology Lao-Christophe Mérieux (CILM) has committed to quality and would like to ensure that all the staff, guests and the patients coming to the CILM is within a safe environment.

This handbook has been thought to serve as a reference and a guide for the staff to work in a safe place, to apply good laboratory practices and to mitigate the risks linked to a biomedical laboratory.

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HEALTH AND SAFETY POLICY

We are committed to the highest standard of health and safety and we will ensure the following:


1. All staffs are aware of Safety Manual;
2. Any identified unsafe act is immediately stopped and dealt with, recorded and either made safe or quarantined to prevent injury occurring;
3. All accidents are record.
4. Conduct regular safety inspections of work area and laboratory;
5. Ensure there are adequate safety, first aid training.
6. Ensure that there are adequate emergency procedure in place and everyone aware it.
7. Ensure that adequate fire extinguishers are available and regularly inspected.

Vientiane Capital, Date: 30 MAR 2020




Vice Director of CDC, MoH
Executive Director of CILM



ດຣ.ສີສະຫວາດ ສຸດທານີລະໄຊ
Dr.Sisavath SOUTTHANIRAXAY

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Activities	Name	Position	Date	Signature
Author	Mixivang XAYAOVONG	Quality/Biosafety Officer	30/03/20	
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Validator	Phimpha PABORIBOUNE	Lab Scientific Director	30.03.20	

History of modifications:

Version	Date	Comments
01	14/06/2016	<ul style="list-style-type: none"> Initial version
02	05/03/2018	<ul style="list-style-type: none"> Update the layout and contain of section VII
03	07/01/2020	<ul style="list-style-type: none"> Change manual's name Biosafety manual to be safety manual Update application date and contain of the manual Add safety policy in page 2 of 34. Add safety audit checklist as annex 14.


Copy needed and location

Amount	Location of copies				
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1	Lab 2.1	N/A	N/A	N/A	N/A


Next revision planned: 01/01/2022

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RESPONSIBILITIES

Laboratory Scientific Director:	<ul style="list-style-type: none"> • Validate and approve safety policy, safety action plan and procedure to ensure the complying with ISO15190 requirements; • Ensure that CILM personnel are protected from harms and infectious risk.
Laboratory Manager: Deputy Lab Manager:	<ul style="list-style-type: none"> • Ensure that the GBP is applied to all lab personnel; • Ensure that lab personnel have enough training on safety Validate the results of safety evaluation (LRM-MAN002-A14 - Safety checklist) and corrective action plan; • Validate risk assessment results and corrective action plan. • Provide consultant in case first aid is needed.
Maintenance Technician; IT & Data Manager; Biosafety Officer	<ul style="list-style-type: none"> • Responsible as Fire Evacuation Leader Team in case fire at CILM.
CILM Staffs: Interns: Guests:	<ul style="list-style-type: none"> • Read the Safety Manual before start to perform any activity in the laboratory for a new personnel; • Report accident and incident to Lab Manager;; and record nonconformity form. • Involved to the risk assessment, to suggest risk factor on work process;.
Biosafety Officer:	<ul style="list-style-type: none"> • Ensure all safety and emergency procedures are available in the place that needed. • Ensure new staff and guests or interns are read the safety manual before start to perform any activity in the laboratory; • Ensure all risks are handled or eliminated; • Conduct safety audit annually with Deputy Lab Manager and Maintenance Technician; • Conduct risk assessment annually with Deputy Lab Manager and Maintenance Technician.

(Table N° 01: Responsibilities)

 <p>ສູນວິໄຈພະຍາດຊຶມເຊື້ອ ລາວ-ຄຣິສໂຕຟ ເມຣີເຢ Center Infectiology Lao-Christophe Merieux</p>	SAFETY MANUAL			Page 7 of 32
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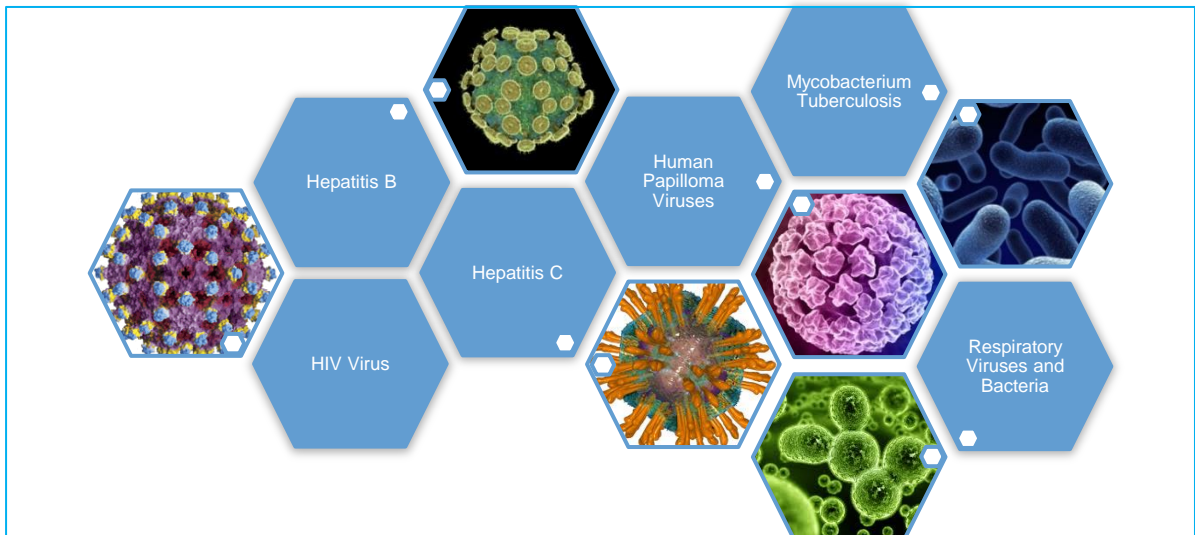
1. General Information

1.1. Risk Group Classification:

CILM laboratory is on risk group classification group 2 and 3
(Refer: Laboratory biosafety manual – 3rd edition) and ISO15190:2003 Requirements

Pathogens are handled at CILM's laboratory:

- Hepatitis B and C Virus;
- HIV;
- Human Papilloma Virus;
- Mycobacterium Tuberculosis;
- Respiratory Virus and Bacteria.



(Picture N° 01: pathogens handling in the laboratory)

Risk Group 1 (no or low individual and community risk)


A microorganism that is unlikely to cause human or animal disease.

Example agent: Non conjugative strains of E. coli, rodent cell lines, Saccharomyces cerevisiae.

Risk Group 2 (moderate individual risk, low community risk)

A pathogen that can cause human or animal disease but is unlikely to be a serious hazard to laboratory workers, the community, livestock or the environment, laboratory exposure may cause serious infection, but effective treatment and preventive measures are available and the risk of spread of infection is limited.

Example agent: Parasites (Plasmodium, Trypanosomes, Leishmania) GI pathogens (Salmonella, Shigella) blood-borne Pathogens (HBV, HCV, Borrelia)

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Risk Group 3 (high individual risk, low community risk)

A pathogen that usually cause serious human or animal disease but does not ordinarily spread from one infected individual to another. Effective treatment and preventive measures are available.

Example agent: Mycobacterium tuberculosis, West Nile Virus, Yellow Fever Virus, Rickettsia rickettsii.

Risk Group 4 (High individual and community risk)

A pathogen that usually causes serious human or animal disease and that can be readily transmitted from one individual to another, directly or indirectly. Effective treatment and preventive measure are not usually available.

Example agent: Ebola virus, Marburg virus, Sabia virus, Equine Morbilli virus.


1.2. Biosafety Level:

CILM laboratory is on BSL 2 and 3 (*Refer: Laboratory biosafety manual – 3rd edition*).

Relation of risk group to biosafety levels, practices and equipment.

RISK GROUP	LABORATORY TYPE	BIOSAFETY LEVEL	LABORATORY PRACTICES	SAFETY EQUIPMENT
1	Basic – Biosafety Level 1	Basic teaching research	GMT	Non; open bench work
2	Basic – Biosafety Level 2	Primary health services, diagnostic services, research	GMT plus protective clothing, biohazard sign	Open bench plus BSC for potential aerosols
3	Containment – Biosafety Level 3	Special diagnostic services, research	As level 2 plus special clothing controlled access, directional airflow	BSC and/or other primary devices for all activities
4	Maximum Containment – Biosafety Level 4	Dangerous pathogen units	As level 3 plus airlock entry, shower exit, special waste disposal	Class III BSC, or positive pressure suits in conjunction with Class II BSCs, double ended autoclave (through the wall), filtered air

(Table N° 02: Biosafety Level)

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2. Safety Management

2.1. Management of staff health:

Safety training

Type of training	Participants	Frequency	Training Record
Fire evacuation practice	CILM staff	Annually	Training record (Certificate if external organization is trainer)
Universal precaution refresh training: <ul style="list-style-type: none"> • Properly PPE using; • Hand washing • How to handle when biological contact with skin, needle stick and sharps injury; . • Properly cleaning and disinfection. • Waste disposal. 	Lab personnel	Every 2 years	Training record
Basic knowledge of pathogens handling in the laboratory.	CILM staff	Annually	Training record
Safety manual	CILM staff, Guest and intern	Before start to perform lab activity and when the manual is updated	Training record


(Table N° 03: Safety training)

2.2. Health checks:

CILM's personnel:

Health-checks must be conducted annually for CILM staff as described below:

- HIV serology markers;
- Hepatitis B serology markers;
- Chest X-ray;
- Hepatitis C serology markers;
- Eye vision;
- Complete blood count;
- Biochemistry;
- Immunology and other.

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Health checks report archiving:

- Original is kept by staff;
- Hard copy version is kept on staff personal file including interns and guests (In room n° 3 or Administrative Director Responsible).

Interns and guests:

Health checks:

For whom that supposed to work or performs activity in the laboratory: Please ready with health checks report and ensuring that you have adequate Hepatitis B immunization before starting to perform any lab activity.

Health checks report or record (copy version) should be given to administrative department.

Immunization status:


Staff, interns, and guest in case of the absence of HBs Antigen, Anti-HBs antibody and Anti-HBc antibody, immunization against Hepatitis B virus has to be undertaken.

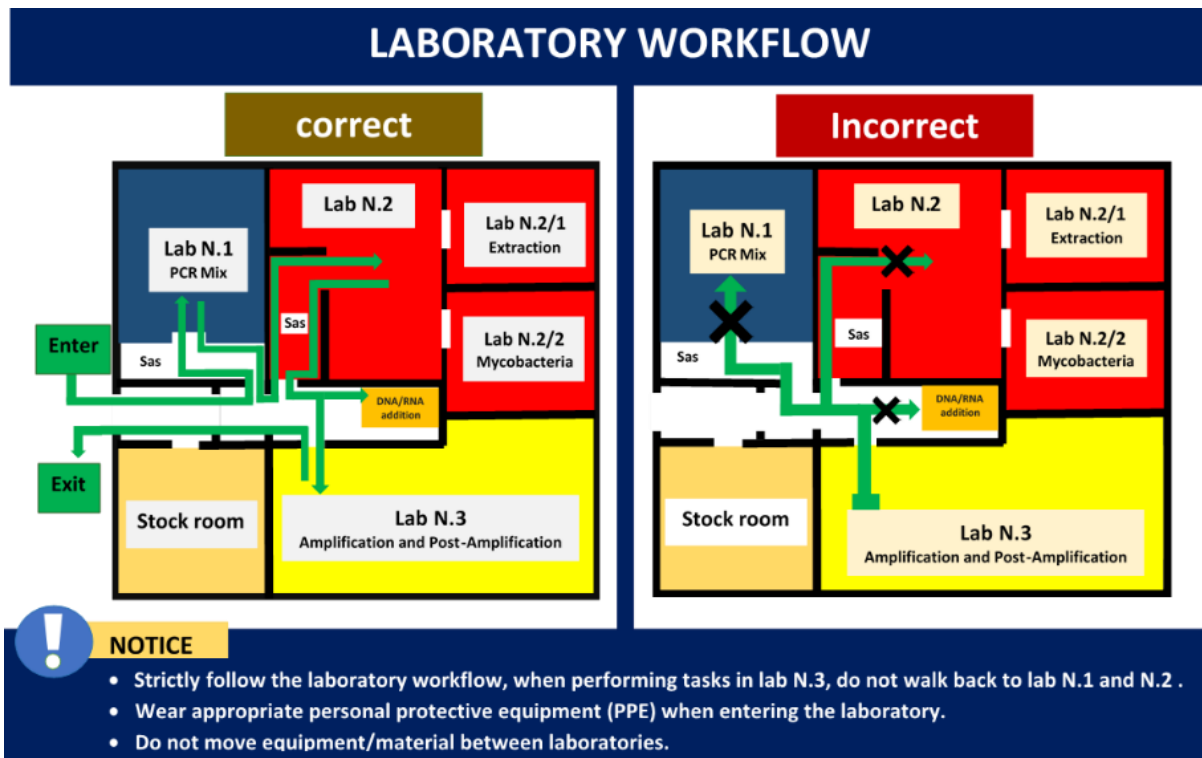
3. Designation for safety

3.1. Facility

CILM laboratory environment are controlled and hand washing sink are available on each lab room and separated as below:

- Laboratory area where analytical is performed,
- Sample reception room;
- Sampling room;
- Bio-bank room;
- Stock room;
- Autoclave room;
- Document archiving room;
- Offices.

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(Picture N° 02: Laboratory workflow)

Physical condition

Temperature:

Temperature control is set up for all refrigerator -80°C and freezer -20°C which is used for storage reagents and samples.

The alarm system will notify to the responsible until the temperature returns to normal range

Ventilation:

Pressure system has been monitoring every day as below:

Negative pressure for clean room such as: Lab-1 which is need cleaned air;


Positive pressure for contaminated room such as: Lab-2, Lab-2.1, Lab-2.2 and Lab-3 which are need to secure the contaminated air, to go outside the room.

Ergonomic factor:

All laboratory activities, workspace and equipment such as: chairs, workstation, computer keyboards, etc. Is designed or positioned to reduce the risk of accidents.

Design for working with viable pathogen:

Design characteristics appropriate to pathogens that perform within the laboratory.

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Door signs:

Emergency exit, Biohazard warning, chemical storage, PPE use and forbidden signs.

Lab security:

Laboratory access controlled:

Access to the CILM’s laboratory is controlled and restricted to habilitated staff only, by using badge scan system.

Permission of using lab budge scanner:

- Lab personnel, Maintenance Technician and Quality/Biosafety Officer
- Data and IT Manager authorized to access when necessary for IT problem shooting.

For visitor and intern safety:

Entering to CILM center:

Please inform the Reception to record your (guest/visitor) information and receive the visitor card (please attach the visitor card all the time during the visiting).



(Picture N° 03: Visitor card)

Lab entrance authorization:


For whom that supposed to work or performs lab activity: Please ask Lab Manager for authorize access and budge scan permission, authorized and permission will be granted according to objectives and tasks..

NOTE: please keep the badge safely and securely by your own.

Prior documents or training before start performing any lab activity:

Biosafety Officer must ensure that reading or training record on safety manual (LRM-MAN002 – Safety Manual) is presence and kept those records on QUALITY TRAINING folder on quality cabinet Room n°6.

Other documents related should be read or trained before start to perform each activity according to mission or task to perform at CILM.

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4. Staffing, Procedure, Documentation, Inspection and Records

4.1. Biosafety Officer

Responsible for develop, maintain and monitor and effective laboratory safety management system and authorized to stop unsafe activity.

4.2. Procedure

Safety Manual, SOPs and instructions or flowchart or job aid that concerning hazards and safety are reviewed annually by the Biosafety Officer, Lab Manager and other personnel that related to the safety. As showing below:

- LRM-MAN002 – Safety Manual with its annexes;
- LRM-SSP002 – Risk assessment procedure;
- LRM-EMP001 – Waste management procedure.

4.3. Safety Programme Audits and Inspection

Safety programme audits:

The safety audit program will be conducted by using safety checklist annex 14: safety checklist (Refer: ISO15190:2003 requirements).

Safety inspection

Safety Officer is responsible for ensuring that safety inspection is undertaken at least annually including ensuring status of spill kit and first aid kit is always available.


- LRM-MAN002-A05 – First aid maintenance form
- LRM-MAN002-A07 – Spill kit maintenance form

Maintenance Technician is responsible for the proper state of readiness and function of fire emergency extinguishers, alarms and evacuation procedures; including emergency showers and eye washers.

- LRM-HSP001-A12 Fire extinguisher inspection
- LRM-HSP001-A11 Safety shower, eye washer and sink maintenance

Lab Manager is responsible for the proper containment and control for the storage of flammable and combustible, infective, radioactive toxic materials and the status of decontamination and disposal procedure.

- LRM-PSP003 – Stock management

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4.4. Safety Manual

Safety manual is review every two years by Safety Officer and Lab Manager. The manual is including the following topic:

4.5. Record

Records have been kept and destroyed in accordance with ISO15189:2012 requirements.

Occupational illness, injury and adverse incident records

In case any incident, nonconformity form must be documented and kept as nonconformity procedure described.

Risk assessment records

Risk assessment is performed annually by Biosafety Officer, Deputy Lab Manager and Maintenance Technician.

Risk assessment report is archiving in the “Health/safety environment” folder at quality cabinet (responsible by Biosafety Officer).

Hazardous waste records

The record of waste autoclave follow up form that **completed** is achieving in the “Autoclave follow-up form” folder in room n°6 (responsible by Lab Technician).

5. Identification of Hazards

Waste is clearly defined and labeled as: general waste, infectious waste and chemical waste.


- General waste is take by waste company to destroy or manage as local rule;
- Infectious waste including sharps, must be autoclaved and then incineration;
- For the chemical waste is not autoclave, only incineration.

Refer to: LRM-EMP001 – Waste management procedure.

6. Training

Safety training is first priority to conduct for a new lab employee.

Lab personnel must read this safety manual and documented training record. The training records is archiving in “quality training” folder in quality cabinet (responsible by Biosafety Officer).

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7. Laboratory Personnel Responsibilities

Food, drink and cosmetic:

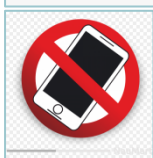
These below rule must be applied all the time when you are in the laboratory.



Do not eat, drink, smoke and stored food in the laboratory;



Do not makeup and handling contact lenes in the laboratory;



Do not bring and touch your personal phone in the laboratory;

(Picture N° 04: Forbidden signs in the laboratory)

8. Personnel Protective Equipment (PPE)

PPE is always available in the laboratory including Sampling Room, Sample Preparation Room and Bio-bank Room.


PPE should be worn every time when you enter into each laboratory room according to the PPE signs post on each lab door.

Example: signage of Lab N° 01



(Picture N° 05: Laboratory door signs)

According to the picture n° 05: that is mean you have to wear: gloves, coat, cap, goggles/safety glasses, facemask and change your shoes before you enter to lab n° 1.

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PPE including: Lab coat, gloves, ice glove, over sleeves, cap, masks, mask N95, goggles or safety glasses, shoes and overshoes.



(Picture N° 06: PPE)


Proper donning and doffing of PPE:

DONNING		DOFFING	
Step 1	Perform hand hygiene	Step 1	Gloves
Step 2	Lab coat or gown	Step 2	Goggles
Step 3	Mask or Mask N95	Step 3	Lab coat or gown
Step 4	Goggles	Step 4	Mask or mask N95
Step 5	Gloves	Step 5	Perform hand hygiene





(Table N° 04: Used of PPE)

Key point to remember:


1. Perform hands hygiene prior to donning and after removing (doffing) PPE.
2. Don PPE before contact with biological or hazard objects, generally before entering the laboratory room.
3. Discard used PPE appropriately in infectious waste bin.
4. Lab coat, goggles and shoes that are reusable place in designed receptacle for reprocessing.
5. Do not wear the the same disposable PPE between patients, and remember to discard after each use.

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9. Biological Safety Equipment

Equipment	Location	When to use	How to use	Who can use & maintenance
	Lab n° 2.2 and Lab n° 3	When samples and chemical spilling on the floor, inside the BSC and in the centrifuge.	Annex 6: LRM-MAN002-A06 – Spill kit Job aid; Annex 16: LRM-MAN002-A16 - Instruction of spill inside the BSC handle	<p>Biosafety Officer is ensuring the readiness of the spill kit (Annex 07: LRM-MAN002-A07 – Spill kit maintenance form)</p> <p>Lab staff responsible to follow the instruction appropriately.</p>
	Sampling room	Use for ache and accident injuries.	Injury: staff should consults with the Laboratory Manager or the Laboratory Deputy before accessing to the first aid kit	<p>Biosafety Officer is ensuring the readiness of the first aid kit (Annex 05: LRM-MAN002-A05 – First aid maintenance form)</p> <p>Lab staff: should ensure that before taking/or using any medicine they had read the instruction of use.</p>
 Eye wash	Available on every lab near the sink Normal saline for sampling room	When there is a spill of sample, chemical or solutions in the eyes.	Annex 08: LRM-MAN002-A08 – Disinfection when skin and eyes contacted with hazard object of hazard samples job aid; Annex 13: LRM-MAN002-A13 - Instruction of using Normal Saline solution for eye wash	<p>Lab staff should ensure the appropriate use.</p> <p>Maintenance Technician is ensuring of the readiness of the equipment (Refer to: LRM-HSP001-A11 Safety shower, eye washer and sink maintenance)</p>
 Shower	Available on Lab n° 3	When there is spill or splash of samples or chemical spill on the laboratory staff.	Annex 09: LRM-MAN002-A09 – Emergency Shower job aid	<p>Lab staff should ensure the appropriate use.</p> <p>Maintenance Technician is ensuring of the readiness of the equipment (Refer to: LRM-HSP001-A11 Safety shower, eye washer and sink maintenance)</p>

(Table N° 05: Used of Biological Safety Equipment)

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Biological Safety Cabinets (BSCs) and chemical safety hoods

BSCs are calibrated once a year and only trained personnel permitted to use the equipment.

Type of BSC is ESCO Class II Type A2, designation is appropriate to use for pathogens on risk group 2 and 3. Location is in Lab-2.1 and Lab-2.2.

Chemical cabinet hood is located in Lab-3, only trained personnel permitted to use the equipment and maintenance once a week.

10. Good housekeeping practices

Work area must be kept tidy, all equipment and work surfaces that are used for processing contaminated materials must be cleaned and disinfection with alcohol 70% and whenever spill or other contamination has occurred.

11. Safe work practices

The rules below must be applied in the laboratory every time:



Keep your hands away from your face avoid touching your eyes, nose, or mouth with gloved hands;



Strictly wear appropriate PPE according to PPE signs that posted on each laboratory room..



Minimize or eliminate (if possible) the use of sharps. If required work very carefully with sharp instruments.



Work carefully to minimize the potential for aerosol formation. Confine aerosol as close as possible to their source of generation (in other words, use of a biosafety cabinet).



Disinfect work surfaces and equipment after use.




Wash your hands after removing gloves and protective clothing, after contact with contaminated materials, and before leaving the laboratory. (Annex 02: LRM-MAN002-A03 – Hands washing job aid)

(Picture N° 07: Safe work practice)

12. Aerosols

To reduce the possibility of personal contact with harmful aerosols, whether of chemical or biological origin the below rules must be applied:

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- Samples should be centrifuged only in safety-capped enclosures;
- Samples being vortex-agitated should be contained in containers with lids;
- Pre-analysis and analysis should be performing inside the cabinet or BSC

13. Chemical safety

13.1.Storage

Chemical are stored in appropriate lockable cabinet (chemical cabinet) at Lab-3 with labels required and presence of:

- Annex 01: LRM-MAN002-A01 – MSDS sheets folder
- Annex 02: LRM-MAN002-A02 – R and S list

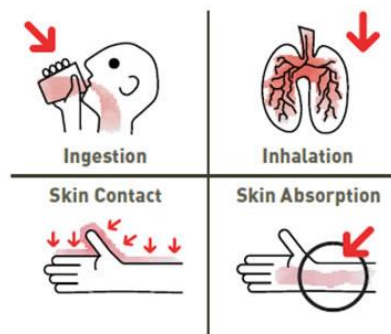
PPE required must be worn at all times when performing chemical activities and entering to chemical analytical areas.

Forbidden:

- Chemicals should not be stored in alphabetical order but according to their class and reactivity;
- Do not store chemicals above the eye level;
- Store separately acids from bases.

13.2.Routes of Exposure

Exposure to hazardous chemicals may occur by: Ingestion, inhalation, skin contact and skin absorption as showing in the picture below:



(Picture N° 08: Routes of chemical expose)

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13.3. Classification

BASIC HAZARD GROUPS

Flammables
Corrosives
Oxidizers
Carcinogens
Water Reactives
Toxics
Pyrophorics

With the wide variety of chemicals used in laboratories, the list below is prioritized for materials that are **COMMONLY** used in a research laboratory. This chart indicates the most obvious chemical incompatibilities, and provides a segregation plan. For more specific chemical incompatibility information, please consult the manufacturer's MSDS, available at <http://www.ehs.ucsb.edu/units/labsfty/labrsc/chemistry/lchemmsds.htm> or contact EH&S at X8243.


<p>ACIDS</p> <ul style="list-style-type: none"> Acetic Acid ●Chromic Acid Hydrochloric Acid Hydrofluoric Acid ●Nitric Acid Phosphoric Acid Sulfuric Acid ●Indicates strong oxidizing acids, store per <u>oxidizers</u> section <p><u>Storage Precautions:</u></p> <ul style="list-style-type: none"> ⇒Store bottles on low shelf areas, or in acid cabinets. ⇒Segregate oxidizing acids from organic acids, AND flammable materials. ⇒Segregate acids from bases, AND from active metals such as sodium, potassium, etc. ⇒Segregate acids from chemicals which could generate toxic gases such as sodium cyanide, iron sulfide, etc. 	<p>BASES</p> <ul style="list-style-type: none"> Ammonium Hydroxide Potassium Hydroxide Sodium Hydroxide <p><u>Storage Precautions:</u></p> <ul style="list-style-type: none"> ⇒Separate bases from acids. ⇒Store bottles on low shelf areas, or in acid cabinets.
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<p>FLAMMABLES-fuels are reducing agents</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 25%;">Acetone</td> <td style="width: 25%;">Ethyl Acetate</td> <td style="width: 25%;">Isopropyl Alcohol</td> <td style="width: 25%;">Toluene</td> </tr> <tr> <td>Benzene</td> <td>Ethyl Ether</td> <td>Methanol</td> <td>Xylene</td> </tr> <tr> <td>Cyclohexane</td> <td>Gasoline</td> <td>Propanol</td> <td></td> </tr> <tr> <td>Ethanol</td> <td>Hexane</td> <td>Tetrahydrofuran</td> <td></td> </tr> </table> <p><u>Storage Precautions:</u></p> <ul style="list-style-type: none"> ⇒Store in approved flammable storage cabinet(s) (required if there is more than 10 gallons in the lab). ⇒Separate from oxidizing acids and oxidizers. ⇒Keep away from any source of ignition(flames, localized heat or sparks). ⇒Use only "flammable storage" (desparked) refrigerators or freezers. 	Acetone	Ethyl Acetate	Isopropyl Alcohol	Toluene	Benzene	Ethyl Ether	Methanol	Xylene	Cyclohexane	Gasoline	Propanol		Ethanol	Hexane	Tetrahydrofuran	
Acetone	Ethyl Acetate	Isopropyl Alcohol	Toluene													
Benzene	Ethyl Ether	Methanol	Xylene													
Cyclohexane	Gasoline	Propanol														
Ethanol	Hexane	Tetrahydrofuran														

<p>OXIDIZERS-react violently with organics.</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;"><u>Solids</u></td> <td style="width: 50%;"><u>Liquids</u></td> </tr> <tr> <td>Calcium Hypochlorite</td> <td>Bromine</td> </tr> <tr> <td>Ferric Chloride</td> <td>Hydrogen Peroxide</td> </tr> <tr> <td>Iodine</td> <td>Nitric Acid</td> </tr> <tr> <td>Nitrates, Salts of</td> <td>Perchloric Acid</td> </tr> <tr> <td>Peroxides, Salts of</td> <td>Chromic Acid</td> </tr> <tr> <td>Potassium Ferricyanide</td> <td></td> </tr> <tr> <td>Sodium Nitrite</td> <td></td> </tr> </table> <p><u>Storage Precautions:</u></p> <ul style="list-style-type: none"> ⇒Keep away from flammables, organic solvents, and other combustible materials (i.e. paper, wood, etc.). ⇒Keep away from reducing agents. ⇒Store in a cool, dry place. 	<u>Solids</u>	<u>Liquids</u>	Calcium Hypochlorite	Bromine	Ferric Chloride	Hydrogen Peroxide	Iodine	Nitric Acid	Nitrates, Salts of	Perchloric Acid	Peroxides, Salts of	Chromic Acid	Potassium Ferricyanide		Sodium Nitrite		<p>PEROXIDE-FORMING CHEMICALS-peroxides can be explosive and shock-sensitive.</p> <p>Ethers and acetals with α-hydrogen</p> $-\overset{\text{H}}{\underset{ }{\text{C}}}-\text{O}-\overset{\text{H}}{\underset{ }{\text{C}}}-$ (e.g. ethyl ether, tetrahydrofuran) <p>Alkenes with allylic hydrogen</p> $>\text{C}=\overset{\text{H}}{\underset{ }{\text{C}}}-$ (e.g. cyclohexene) <p>For a more complete list of these materials visit our website at http://www.ehs.ucsb.edu/units/labsfty/labrsc/lflamable.htm#formers</p> <p><u>Storage Precautions:</u></p> <ul style="list-style-type: none"> ⇒Dispose before expected date of initial peroxide formation. ⇒Label containers with receiving, opening, and disposal dates. ⇒Store in airtight containers in a dark, cool, and dry place.
<u>Solids</u>	<u>Liquids</u>																
Calcium Hypochlorite	Bromine																
Ferric Chloride	Hydrogen Peroxide																
Iodine	Nitric Acid																
Nitrates, Salts of	Perchloric Acid																
Peroxides, Salts of	Chromic Acid																
Potassium Ferricyanide																	
Sodium Nitrite																	

<p>PYROPHORIC SUBSTANCES-spontaneously ignite in air.</p> <ul style="list-style-type: none"> Some finely divided metals Some organoaluminum compounds (LiAlH₄, Al(CH₃)₃) Silane ●Phosphorus, Yellow ●Phosphorus, yellow should be stored and cut under water <p><u>Storage Precautions:</u></p> <ul style="list-style-type: none"> ⇒Rigorously exclude air and water from container. ⇒Store away from flammables. ⇒Store in a cool, dry place. 	<p>WATER REACTIVE CHEMICALS-reacts violently with water to yield flammable or toxic gases.</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;"><u>Solids</u></td> <td style="width: 50%;"><u>Liquids</u></td> </tr> <tr> <td>Calcium Carbide</td> <td>Phosphorus Trichloride</td> </tr> <tr> <td>●Lithium</td> <td>Thionyl Chloride</td> </tr> <tr> <td>●Magnesium</td> <td></td> </tr> <tr> <td>●Potassium</td> <td></td> </tr> <tr> <td>●Sodium</td> <td></td> </tr> <tr> <td>●Lithium, Potassium, and Sodium should be stored under Kerosene or Mineral Oil</td> <td></td> </tr> </table> <p><u>Storage Precautions:</u></p> <ul style="list-style-type: none"> ⇒Rigorously avoid exposure to water and air. ⇒Store away from flammables ⇒Store in a cool, dry place. 	<u>Solids</u>	<u>Liquids</u>	Calcium Carbide	Phosphorus Trichloride	●Lithium	Thionyl Chloride	●Magnesium		●Potassium		●Sodium		●Lithium, Potassium, and Sodium should be stored under Kerosene or Mineral Oil	
<u>Solids</u>	<u>Liquids</u>														
Calcium Carbide	Phosphorus Trichloride														
●Lithium	Thionyl Chloride														
●Magnesium															
●Potassium															
●Sodium															
●Lithium, Potassium, and Sodium should be stored under Kerosene or Mineral Oil															


(Picture N° 09: Chemical classification, storage and precaution)

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13.4. Hazard symbol



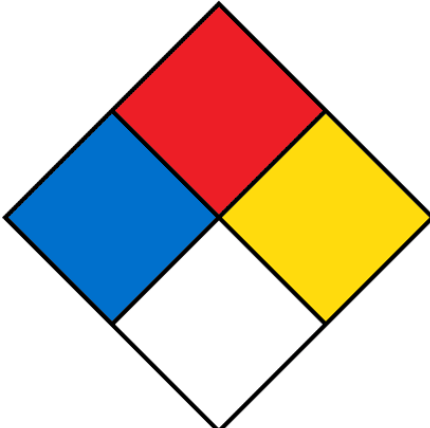
(Picture N° 10: Hazard symbol)

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13.5.NFPA Rating Explanation Guide


NFPA Rating Explanation Guide

<p>HEALTH HAZARD</p> <div style="background-color: blue; color: white; padding: 5px;"> <p>4 = Can be lethal</p> <p>3 = Can cause serious or permanent injury</p> <p>2 = Can cause temporary incapacitation or residual injury</p> <p>1 = Can cause significant irritation</p> <p>0 = No hazard</p> </div>	<p>FLAMMABILITY HAZARD</p> <div style="background-color: red; color: white; padding: 5px;"> <p>4 Below 22°C</p> <p>=</p> <p>3 Below 38°C</p> <p>=</p> <p>2 Below 93°C</p> <p>=</p> <p>1 Above 93°C</p> <p>=</p> <p>0 Will not burn</p> </div>
<div style="border: 2px solid black; padding: 5px;"> <p>SPECIAL HAZARD</p> <p>OX= Oxidizing</p> <p>SA= Simple asphyxiants</p> <p>W = Reacts violently or explosively with water</p> </div>	<div style="background-color: yellow; padding: 5px;"> <p>INSTABILITY HAZARD</p> <p>4 May explode at normal temperatures and pressures</p> <p>=</p> <p>3 May explode at high temperature or shock</p> <p>=</p> <p>2 Violent chemical change at high temperature or pressure</p> <p>=</p> <p>1 Normally stable. High temperatures make unstable</p> <p>=</p> <p>0 stable</p> <p>=</p> </div>



This chart for reference only – For complete specifications consults the NFPA 704 Standard

(Picture N° 11: NFPA Rating Explanation Guide)

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14. Fire precaution

The fire triangles or combustion triangles: are simple models for understanding the necessary ingredients for most fires. The triangle illustrates the three elements a fire needs to ignite: **heat, fuel, and an oxidizing agent** (usually oxygen).











A fire naturally occurs when the elements are present and combined in the right mixture. A fire can be prevented or extinguished by removing any one of the elements in the fire triangle.



For example, covering a fire with a fire blanket removes the oxygen part of the triangle and can extinguish a fire.

(Picture N° 12: Fire triangles)

Type of fire:

		Ordinary Combustibles	Wood, Paper, Cloth, Etc.
		Flammable Liquids	Grease, Oil, Paint, Solvents
		Live Electrical Equipment	Electrical Panel, Motor, Wiring, Etc.
		Combustible Metal	Magnesium, Aluminum, Etc.
		Commercial Cooking Equipment	Cooking Oils, Animal Fats, Vegetable Oils


(Picture N° 13: Type of fire)

14.1. Constructions

CILM laboratory is adequate designed by based upon the type of laboratory hazard and primary exit routes. CILM's laboratory is well separated from electricity room.

14.2. Secondary exits

Secondary exit is in the Lab-2 and step of safe evacuation for personnel from laboratory is trained. (Picture N° 6: CILM fire evacuation plan).

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14.3. Alarm systems

Automatic smoke or heat detection and alarm systems have been provided for every area in the center. Alarm system have been yearly tested (*see LRM-HSP001 – General maintenance and cleaning*)

14.4. Fire risk reduction strategies

Only small amount as necessary as one working day's consumption of flammable gasses and liquids has been kept in the technical areas of the laboratory. Flammable gases and liquid are only conducted in Fume hood.

Spill kit is providing in Lab-3 that conduct chemicals.
Flammable liquids and gases are only stored in chemical cabinet.

14.5. Fire safety training program


CILM personnel have been trained on the below topic:

- Recognition and evaluation of fire;;
- Behavior to reduce the risk of fire;
- All actions to take when fires occur;

14.6. Emergency evacuations

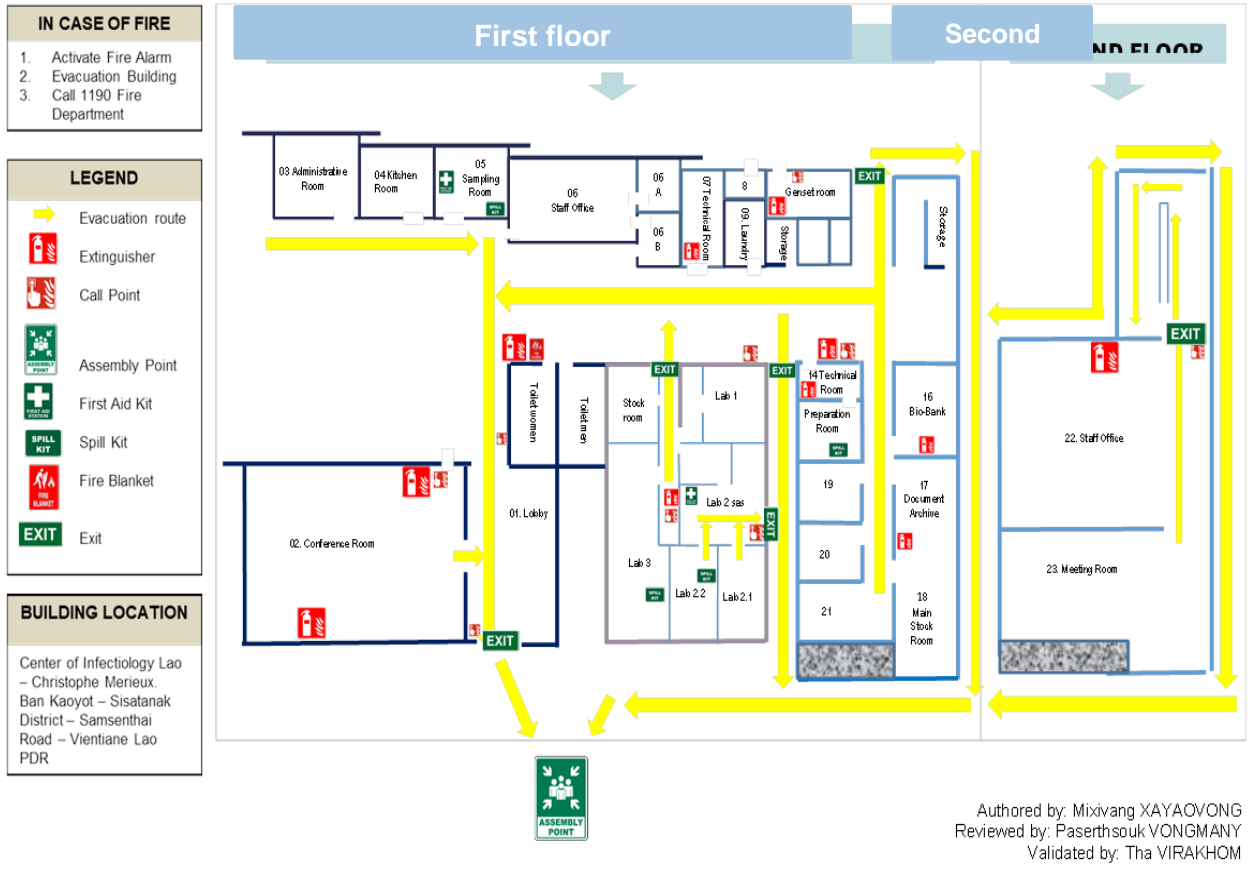
These below steps are the process to handle in case of fire:

- a. When fire alarm triggering, all personnel have to stop immediately their work and don't be panic;
- b. Inform others staff and managers;
- c. Use the fire extinguisher;
- d. Call to emergency unit (*see Table n° 06: Emergency unit contacts*);
- e. Leave all belongings behind and proceed calmly to the evacuation of the building to the assembly point by following exit signs in case of higher fire;
- f. Do not go close to the fire location when fire is clam down or stopped.


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CILM evacuation map

CILM EVACUATION MAP



(Picture N° 14: CILM fire evacuation plan)

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14.7. Electricity equipment

14.7.1. Extinguisher

Definition: Is a portable device that discharges a jet of water, foam, gas, or other material to extinguish a fire.

Fire Extinguisher Type and Use Guide						
FIRE CLASS	WATER	DRY POWDER	FOAM	CO2	WET CHEMICAL	SPECIAL POWDER
Carbonaceous Materials 	✓	✓	✓	✗	✓	✗
Flammable Liquids 	✗	✓	✓	✓	✗	✗
Flammable Gases 	✗	✓	✗	✗	✗	✗
Flammable Metals 	✗	✗	✗	✗	✗	✓
Electrical Equipment 	✗	✓	✗	✓	✗	✗
Cooking Oils 	✗	✗	✗	✗	✓	✗

(Picture n° 15: Fire extinguisher type and use guide)

Note:

The use of extinguisher equipment is refer to: *LRM-MAN002-A10 – Fire Extinguisher Job aid*, Maintenance part is refer to the procedure: *LRM-HSP001-General maintenance and cleaning*.


14.7.2. Fire blankets



(Picture n° 16: Fire blanket)






Definition: is a sheet of flexible material, typically woven fibreglass, used to smother a fire in an emergency.

Note: the use of fire blanket is refer to: *LRM-MAN002-A11 – Fire blanket job aid*

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14.8. Emergency contact

CILM Emergency Phone Numbers		
Mr. Tha VIRAKHOM	Maintenance Technical	020 28268393
Dr. Silaphet SOMPHAVONG	Lab Manager	020 28316280
Dr. Inthalaphone KEOVICHIT	Deputy Lab Manager	020 77163874
Mrs. Mixivang XAYAOVONG	Quality/Biosafety officer	020 28304006


 FIRE	1190 → 021 212703
 POLICE	1191
 AMBULANCE	1195
 ELECTRICITY	1199 → 021 212808
 RESCUE	1623 → 020 55668825 1624 → 020 23449090 1625 → 020 59966111 1628 → 020 55518854

(Table N° 06: Emergency contact)

15. Transports of samples

Biosafety Officer is responsible for provision of appropriate guidance and direction to all sites that submit samples to the laboratory.





All samples have been transported to the laboratory in such manner as to prevent contamination of workers, patients, or the environment. (Refer to LRM-MAN003 – Service Manual V.04).

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16. Waste disposal

Waste is clearly identified as 3 groups of waste in CILM such as: general waste, infectious waste including sharps and chemical waste (Refer to LRM-EMP001 – Waste management procedure).

This table below is describing CILM waste management:

<p>General waste</p> 	<p>General waste is containing in the black bag, in a black or green bins that labeled as general waste in every room in the center. Waste company brought to eliminate at KM 36.</p>
<p>Infectious waste</p> 	<p>Infectious waste are:</p> <ul style="list-style-type: none"> • Blood products, cultures and stocks of infectious agents, • Waste from patients in isolation wards; • Discarded diagnostic samples containing blood and body fluids • Contaminated materials (swabs, bandages) and equipment (such as disposable medical devices) without needles • Needles or sharps. <p>These infectious wastes in the laboratory is containing in red bag in the red bins. It's has been autoclaved before incineration. And the waste company truck will bring it to incinerate at KM 36.</p>
<p>Chemical waste</p> 	<p>Chemical waste is: Mercury, solvents, electrophoresis gels. Comprise substances specified under, chemical waste should not be autoclaved but it should be re-active first before discard. Then the waste company will bring to KM 36 for incineration.</p>
<p>Reuse materials</p> 	<p>For glasses that need to reuse, it must be autoclaved in the clean autoclave machine at 121°C/10 minutes.</p>


(Table N° 07: Waste management)

17. Autoclave

According to the type of waste there are 2 autoclaves such as:

- Dirty autoclave use for all biohazard waste including TB coat.
- Clean autoclave use for sterile recycle glass, lab coats and consumables.

This equipment should be calibrated yearly and the calibration report should be archive in folder name's "CERTIFICATION OF CALIBRATION"

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18. Risk assessment

Risk assessment should be performed annually by Lab Managers, Maintenance Technician and Biosafety Officer.

To evaluate the laboratory's risk related to the facilities and its activities (biosafety and biosecurity) for CILM personnel and user's health, safety and security and to eliminate their causes. Corrective and preventive action should be taken.

Risk assessment report should be kept in folder name's "HEALTH/SAFETY ENVIRONMENT".

19. Signs

There are three different types of signs each with its' own color code as described in below:




BLUE or GREEN: means instruction, safety and security;
 Note: Some instruction of emergency or facilities are red color because it is very important and want people to focus or easier to find.

YELLOW or ORANGE: means warnings;

RED: means dangerous, forbidden and fire activities are mentioned.



(Picture N° 17: Signs)

 <p>ສູນວິໄຈພະຍາດຊືມເຊື້ອ ລາວ-ຄຣິສໂຕຟ ເມຣີເຢ ສວລມ CILM Center Infectiology Lao-Christophe Merieux</p>	SAFETY MANUAL			Page 30 of 32
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20. Emergency response

SOPs or procedure for emergency handling are available as below:

- LRM-MAN002-A01 – MSDS sheets folder
- LRM-MAN002-A02 – R and S list
- LRM-MAN002-A04 – First aid kit Job aid
- LRM-MAN002-A06 – Spill kit Job aid
- LRM-MAN002-A08 – Disinfection when skin and eyes contacted with hazard object of hazard samples job aid;
- LRM-MAN002-A09 – Emergency Shower job aid
- LRM-MAN002-A10 – Fire Extinguisher Job aid
- LRM-MAN002-A13 - Instruction of using Normal Saline solution for eye wash
- LRM-MAN002-A15 – Instruction for biological contamination with skin, injury and sharp or needle stick handle;
- LRM-MAN002-A16 - Instruction of spill inside the BSC handle;
- LRM-MAN002-A18 - Instruction of ice burned handle;
- LRM-MAN002-A17 - Instruction of hot water burned handle;
- Instruction for fire evacuation (*Picture N° 14: CILM fire evacuation plan*);

MAHOSOT CONTACTS	
Dr. Valy KEOLOUANGKHODE, Head of Infectious Disease Ward:	020 5576-2642
Dr. Sivilay THAMMASACK, IDW Physician:	020 2820-4411

(Table N° 08: Mahosot contacts)

21. Hygiene


Work area should be keep tidy and clean at all time, work surface and equipment that are used for processing contaminated material should be appropriate disinfected with alcohol 70% at the end of each working shift and weekly by lab staff and lab cleaner

By complete these below documents:

- LRM-HSP001-A01 - Laboratory cleaning checklist and
- LRM-HSP001-A08 - Laboratory cleaning schedule and performance,

LRM-EQP030-A02 - Logbook template completed form should be kept in folder name's "CLEANUP SCHEDULE AND REPORT WASTE INCINARATION CERTIFICATE"

(See LRM-HSP001 – General maintenance and cleaning)

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ANNEX

- Annex 01: LRM-MAN002-A01 – MSDS sheets folder
- Annex 02: LRM-MAN002-A02 – R and S list
- Annex 02: LRM-MAN002-A03 – Hands washing job aid
- Annex 04: LRM-MAN002-A04 – First aid kit Job aid
- Annex 05: LRM-MAN002-A05 – First aid maintenance form
- Annex 06: LRM-MAN002-A06 – Spill kit Job aid
- Annex 07: LRM-MAN002-A07 – Spill kit maintenance form
- Annex 08: LRM-MAN002-A08 – Disinfection when skin and eyes contacted with hazard object of hazard samples job aid;
- Annex 09: LRM-MAN002-A09 – Emergency Shower job aid
- Annex 10: LRM-MAN002-A10 – Fire Extinguisher Job aid
- Annex 11: LRM-MAN002-A11 – Fire blanket job aid
- Annex 13: LRM-MAN002-A13 - Instruction of using Normal Saline solution for eye wash
- Annex 14: LRM-MAN002-A14 - Safety checklist
- Annex 15: LRM-MAN002-A15 – Instruction for biological contamination with skin, injury and sharp or needle stick handle
- Annex 16: LRM-MAN002-A16 - Instruction of spill inside the BSC handle
- Annex 17: LRM-MAN002-A17 - Instruction of hot water burned handle
- Annex 18: LRM-MAN002-A18 - Instruction of ice burned handle