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BSL2 Seminar on

Biosafety and Biosecurity: "Regulations and Guidelines for Biotechnological Researches"

Asst.Prof. Adisak Romsang

President of Biosafety Committee, Faculty of Science, Mahidol University

Dec 20, 2022 @ AI504 Faculty of Food Industry, KMITL

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HAZARD

A source that has a potential to cause harm

BIOHAZARD

Biological agents or toxins
that have potential to cause harm

UNSAFE ACTS & UNSAFE CONDITIONS

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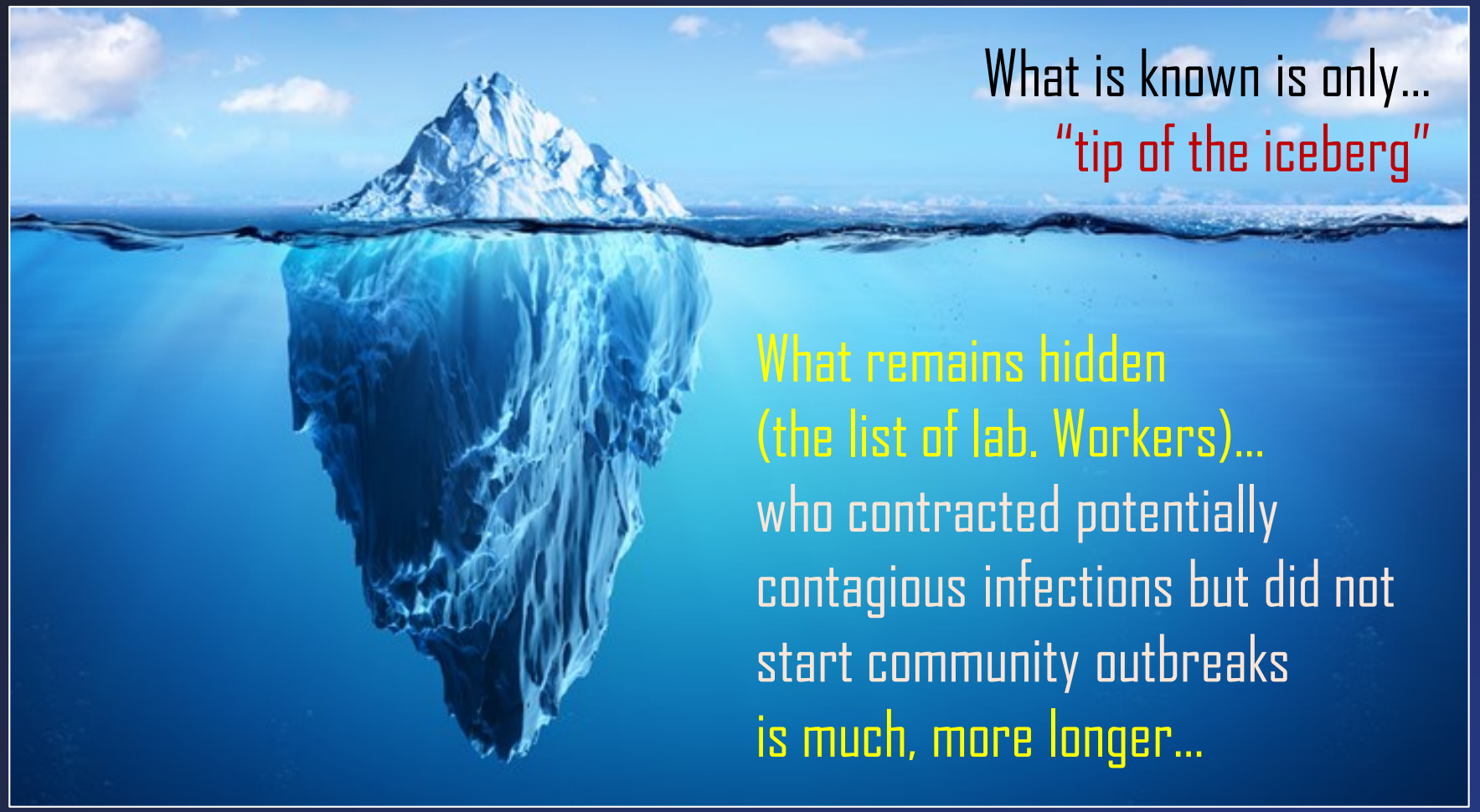
Laboratory-acquired infections (LAI)

Infections that have actually caused illness outside of the lab in general public environment



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5 Routes of LAI

- Parenteral incubations with syringe needles or contaminated sharps
- Spills and splashed onto skin and mucous membranes
- Ingestion or exposure through mouth
- Pipetting or touching mouth or eyes with fingers or contaminated objects
- **80%** Infectious aerosols and droplets – directly or hand contamination

109 infections in 38 states
4 of the LAI were
In children under 4

Lesson Learned:
Training
Tool Target to Students

Supervisor Responsibilities listed:
Advice to Laboratory Directors, Managers, and Faculty Involved with Clinical and Teaching Microbiology Laboratories

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Causes of bio-incident

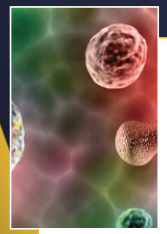
To much work

Lack of attention/ being distracted

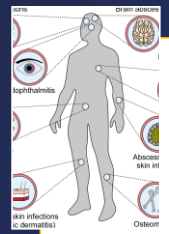
Not enough experience

Not enough training

Three Major Factors



Infectious sources: culture or specimens



Route of transmission: inhale, ingest, contact

Susceptible host: immune, vaccine, age, pregnant

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SAFETY

A state of hazards are controlled!

Law

Regulation

Guideline

Standard

OCCUPATIONAL SAFETY, HEALTH AND ENVIRONMENT ACT B.E. 2554 (A.D. 2011)

BHUMIBOL ADULYADEJ REX.
Given on the 12th Day of January B.E. 2554
Being the 66th Year of the Present Reign

http://web.krisdika.go.th/data/outsitedata/outsite21/file/OCCUPATIONAL_SAFETY,_HEALTH,_AND_ENVIRONMENT_ACT,B.E._2554.pdf

Biosafety : Avoiding the laboratory-acquired infection

To prevent occupational infections, experimental contamination in biomedical and biotechnological laboratories, and release of organisms into the environment

Biosecurity : Intentional release of infectious material and toxins

Professionals and physical security practices and technology to safeguard biohazardous materials and bio-weapon agents

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Biosafety

- Laboratory hazards
- Risk groups
- Hierarchy of Hazards Control
- Biosafety level
- Good Microbiological Practices (GMP)

Biosecurity

- Physical security
- Personnel reliability
- Biological security
- Transportation
- Information security

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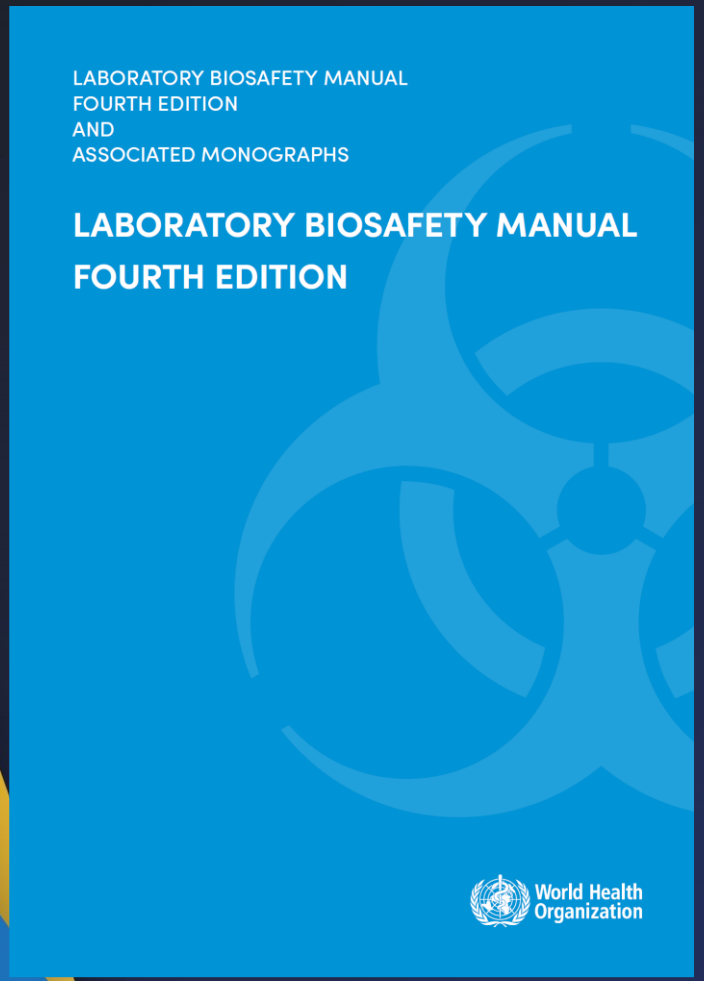
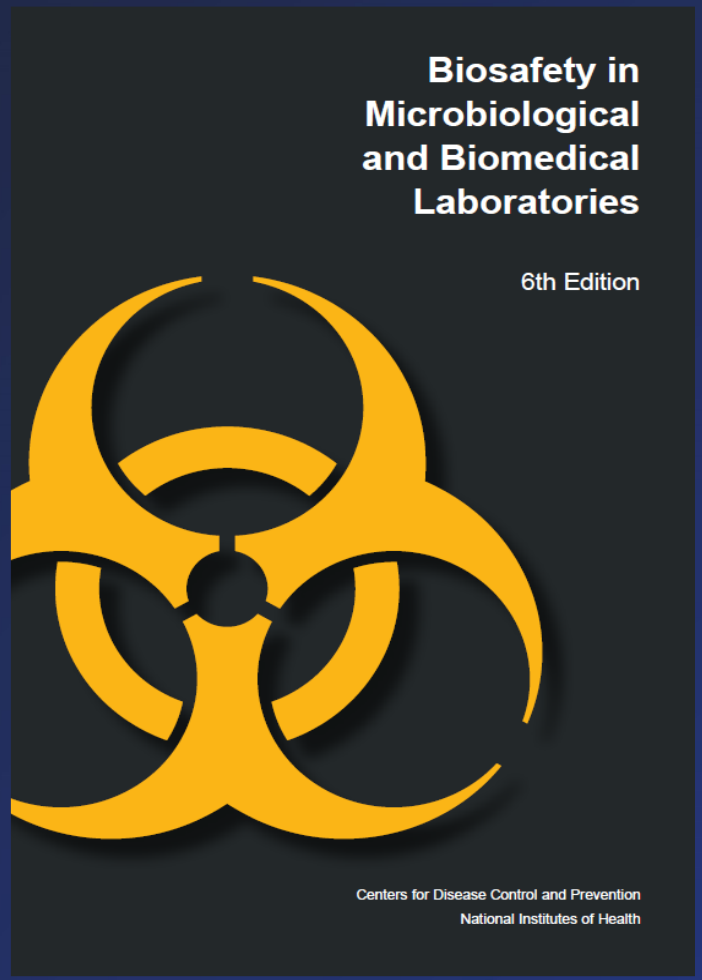
International Guidelines

1. Laboratory Biosafety Manual, 4th edition : World Health Organization
2. Biosafety in Microbiological and Biomedical Laboratories, 6th Edition, USA : BMBL



https://www.who.int/publications/i/item/9789240011311



https://www.cdc.gov/labs/BMBL.html

Legislation related to Biosafety

- **The Pathogens and Animals Toxins Act (2015)**
  - ➢ **Draft Biosafety Act**
  - ➢ **Legislations in regulating GMO in Thailand**
- The Infectious Disease Act (1980)
- The Hazardous Substance Act of B.E.2535 (1992)
- The Food Act (1980)
- The Drug Act (1992)
- The Food and Drug Administration (FDA)
- The Animal Disease Control Act (2001)
- **Occupational Safety, Heath and Environment Act (2011)**

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Pathogens and animal toxins Act
(PAT Act) 2558

Responsibility: Department of Medical Science (DMSc), Ministry of Public Health (MOPH)

Related to international regulations

- International Health Regulation (IHR)
- Global Health Security Agenda (GHSA)
- UNSecurity Council Resolution 1540 (2004)

Action: to control and monitor lab and to perform the laboratory task conform to PAT Act

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Pathogens and animal toxins Act (PAT Act) 2558

Responsibility: Department of Medical Science (DMSc), Ministry of Public Health (MOPH)

Action: to control and monitor lab and to perform the laboratory task conform to PAT Act

- **Pathogens**
  - Microorganisms
    - Virus
    - Bacteria
    - Fungi
    - Parasites
  - Biological agents
    - Synthetic agents
    - Prions
- **Animal Toxins**
  - Poisonous liquid produced by animal
    - Neuro toxin
    - Tetrodo toxin
    - Venom

- Production
- Import
- Export
- Sell
- Transit
- Possession

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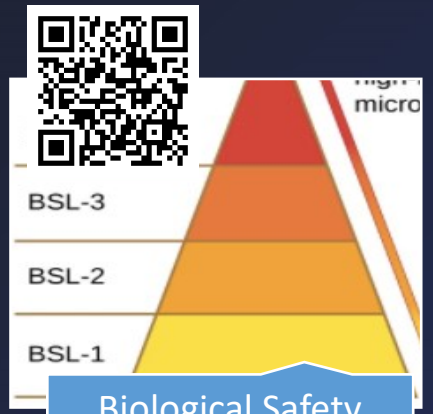
Pathogens and animal toxins Act (PAT Act) 2558

Risk Groups



Biological Safety Levels

Personnel Certification

Laboratory Certification

Project Certification

Regulation

Section 16. No person may use pathogens or animal toxins for the following purposes: (1) to carry out any act which causes danger to other persons or other persons' health.

Punishment

Section 58. Any person who commits an act under section 16 (1) shall be liable to imprisonment for a term of six months to ten years, and to a fine of fifty thousand baht to one million baht.

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Four Risk Groups

Risk Group	Individual risk	Community risk
1	Low	No
2	Moderate	Limited
3	High	Moderate
4	Extreme high	High

B, Bacteria

F, Fungi

V, Virus

P, Parasites

T, Biological substances not prion

R, Prion

List of the Pathogens Intended to be Controlled under Section 18

Attached to the Notification of Ministry of Public Health Re: List of the Pathogens Intended to be Controlled under Section 18 B.E. 2561 (2018)

Codes	Pathogens	Group	Pathogenicity	Additional Information
		Bacteria		
B-2-0001	*Abiotrophia balaena*	2	Human and Animal	Synonym: *Streptococcus balaenus*
B-2-0002	*Abiotrophia defectiva*	2	Human and Animal	Synonym: *Streptococcus defectivus*
B-1-0003	*Acetivibrio ethanolgignens*	1	Human and Animal	

Codes	Pathogens	Group	Pathogenicity	Additional information
		Virus		
V-2-0026	Coronavirus	2	Human and animal	Except Severe acute respiratory syndrome (SARS) coronavirus, Middle East respiratory syndrome (MERS) coronavirus and Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)

Codes	Pathogens	Group	Pathogenicity	Additional information
		Virus		
V-3-0135	Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)	3*	Human and animal	

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Four Risk Groups

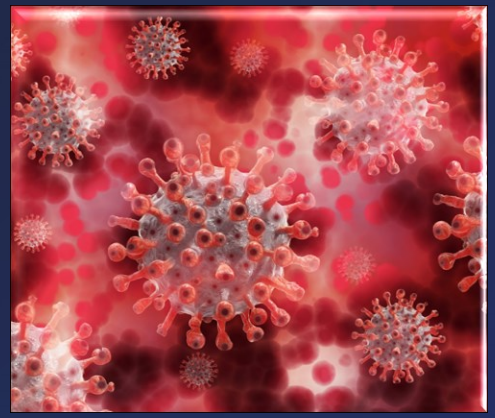
RG-1

- *E. coli* K 12
- Transgenic plants
- Plasmids
- Fungi and molds
- Yeast

RG-2

- Food-borne pathoens
- Human or primate cells
- HSV
- HBV
- Patient specimens
- Human blood and certain body fluids

RG-3



- HIV
- H5N1
- TB
- Anthrax
- MERS-CoV
- SAR-CoV 2 (COVID-19)

RG-4

- Ebola
- Lassa Fever Virus
- Marburg Virus

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Four Risk Groups

NOTIFICATION OF THE MINISTRY OF PUBLIC HEALTH
RE: LIST OF PATHOGENS INTENDED TO BE CONTROLLED UNDER SECTION 18 (NO. 4)
B.E. 2563 (2020)

Clause 1 The B-1-0605 pathogen code as in the attachment to the Notification of the Ministry of Public Health Re: List of Pathogens Intended to be Controlled under Section 18 B.E. 2561 (2018) shall be repealed and replaced with the following:

Codes	Pathogens	Group	Pathogenicity	Additional Information
			Bacteria	
B-1-0605	*Escherichia coli*	1	Human and animal	*Escherichia coli* of the following strains: 1) *Escherichia coli* K-12 and strains developed from *Escherichia coli* K-12 including 5K, 58, 58-161, AB284, AB311, AG1, C2925, C600, Cavalli Hfr, CopyCutte EPI400, DH1, DH5α, DH10B, DP50, EC100D, EMG2, EPI100-T1R, ER2925, ET12567, H1443, HB101, Hfr3000, Hfr 3000 X74, HMS 174, JC9387, JM83, JM101, JM109, KP7600, LE392, M15, MB408, MG1655, Novablue, P678, PA309, PA414, REG-12, S17-1, SCS-110, SM10, STBL2, STBL3, SURE, TB1, TG1, TOP10, W1485, W208, W3110, W945, WA704, WG1, WA704, W1485, W3110, XL1-Blue, XLOLR, Y10, YN2980 2) Strains not developed from *Escherichia coli* K-12 but with low risk and safe use history including B, B-3, B/R, BL21, BL23, C, C41, C43, FDA strain Seattle 1946, K5808, Mach1, Nissle 1917, REG-811, TOPP, W, 25922

3) Species with safe use history with a certificate from the National Center for Genetic Engineering and Biotechnology or that is certified by an internationally accepted organization as well as the following features:

a. Having limitation to survival in the environment

b. Not releasing exotoxin

c. Not causing pathology

d. No genetic material has been added to cause antimicrobial resistance.

"Conditions

3* means Group 3 Bacteria that can mutatis mutandis be operated in Operational Site Level 2 Enhanced (biosafety level 2 enhanced: BSL-2 enhanced) as specified in the notifications issued under Section 6 (4). Culture for further study can be operated in Operational Site Level 3 (BSL-3), except culture of *Burkholderia* in liquid culture medium of no more than five ml of volume per breed per time or solid culture medium of no more than three culture plates or tubes per breed per time which shall be operated in Operational Site Level 2 Enhanced.

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RG - Animal Toxins

NOTIFICATION OF THE MINISTRY OF PUBLIC HEALTH
RE: LIST OF THE ANIMAL TOXINS INTENDED TO BE CONTROLLED UNDER SECTION 19
B.E. 2562 (2019)

Clause 4 Define the animal toxin codes and such codes shall have the following sequences:

(1) Letter "A" and the number stands for the toxin from

- A01 stands for the toxin from frogs – toads
- A02 stands for the toxin from lizard
- A03 stands for the toxin from millipede
- A04 stands for the toxin from snake
- A05 stands for the toxin from salamander
- A06 stands for the toxin from beetle
- A07 stands for the toxin from centipede
- A08 stands for the toxin from wasp
- A09 stands for the toxin from fish
- A10 stands for the toxins from leech
- A11 stands for the toxins from coral- sea anemone
- A12 stands for the toxins from honeybees and carpenter bees
- A13 stands for the toxins from sponge
- A14 stands for the toxins from ant
- A15 stands for the toxins from sea urchin-starfish
- A16 stands for the toxins from jellyfish
- A17 stands for the toxins from horseshoe crabs
- A18 stands for the toxins from scorpions
- A19 stands for the toxins from spider
- A20 stands for the toxins from snails and octopus
- A99 stands for the toxins from other animals

(2) Number indicating the group of risk from the animal toxins

(3) Number indicating the sequence of the animal toxins

LIST OF THE ANIMAL TOXINS INTENDED TO BE CONTROLLED UNDER SECTION 19

Attached to The Notification of The Ministry of Public Health Re: List of The Animal Toxins Intended to Be Controlled Under Section 19 B.E. 2562 (2019)

Code of Animal Toxins	Poisonous Animals		Group	Additional Information
	Binomial Names	Common Name		
Toxin from Frogs - Toads				
A01-2-0001	*Bombina variegata*	Yellow-bellied toad	2	
A01-2-0002	*Brachycephalus ephippium*	Pumpkin toadlet	2	
A01-2-0003	*Dendrobates auratus*	Green and black dart-poison frog	2	
A01-2-0004	*Dendrobates azureus*	Blue poison dart frog	2	SYNONYM: *Dendrobates tinctorius*
A01-2-0005	*Dendrobates leucomelas*	Yellow-banded poison dart frog	2	
A01-1-0006	*Duttaphrynus melanostictus*	Asian common toad	1	SYNONYM: *Bufo melanostictus*
A01-1-0007	*Lithobates catesbeianus*	American bullfrog	1	SYNONYM: *Rana catesbeiana*
A01-1-0008	*Phrynoidis aspera*	Asian giant toad	1	
A01-2-0009	*Phyllobates aurotaenia*	Poison dart frog	2	
A01-2-0010	*Phyllobates terribilis*	Golden poison frog	2	
A01-2-0011	*Pseudophryne corroboree*	Southern corroboree frog	2	
A01-2-0012	*Pseudophryne pengilleyi*	Northern corroboree frog	2	
Toxin from Lizard				
A02-1-0013	*Heloderma horridum*	Beaded lizard	1	
A02-1-0014	*Heloderma suspectum*	Gila monster lizard	1	
Toxin from Millipede				
A03-1-0015	*Abacion magnum*	Millipede	1	
A03-1-0016	*Acropoditius kinzelbachi*	Millipede	1	
A03-1-0017	*Akamptogonus novarae*	Millipede	1	
A03-1-0018	*Allajulus* spp.	Genus of Millipede	1	Means toxin from animals in

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Four Biosafety Levels

NOTIFICATION OF THE MINISTRY OF PUBLIC HEALTH
RE: CHARACTERISTICS OF THE PLACE OF PRODUCTION OR POSSESSION OF AND OPERATIONS ON PATHOGENS AND ANIMAL TOXINS B.E. 2563 (2020)

(1) Operation Site Level 1 consists of operational sites used to operate Group 1 Pathogens.

(2) Operation Site Level 2 consists of operational sites used to operate pathogens or animal toxins as follows:

(A) Group 1 Pathogens

(B) Group 2 Pathogens

(C) Group 3 Pathogens which can be operated at Operational Site Level 2 Enhanced (biosafety level 2 enhanced: BSL-2 enhanced) as specified in the notification issued under Section 6 (1)

(D) All groups of biological substances

(E) Group 3 Biological Substances which can be operated at Operation Site Level 2 Enhanced (biosafety level 2 enhanced: BSL-2 enhanced) as specified in the notification issued under Section 6 (1)

(F) All groups of animal toxins

(3) Operation Site Level 3 consists of operational sites used to operate pathogens or animal toxins as follows:

(A) Group 1 Pathogens

(B) Group 2 Pathogens

(C) Group 3 Pathogens which can be operated at Operational Site Level 2 Enhanced (biosafety level 2 enhanced: BSL-2 enhanced) as specified in the notification issued under Section 6 (1)

(D) Group 3 Pathogens

(E) All groups of biological substances

(F) Group 3 Biological Substances which can be operated at Operational Site Level 2 Enhanced (biosafety level 2 enhanced: BSL-2 enhanced) as specified in the notification issued under Section 6 (1)

(G) All groups of animal toxins

(4) Operation Site Level 4 consists of operational sites used to operate pathogens or animal toxins from all groups.

https://blqs.dmsc.moph.go.th/assets/bpat/PATEN13.pdf

Operation Site Level 4

Operation Site Level 3

Operation Site Level 2

BSL-2 Enhanced

Operation Site Level 1

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Four Biosafety Levels

Basic BSL Laboratory

BSL-1 – basic lab

BSL-2 – basic lab + aerosol confinement

- Biosafety cabinet

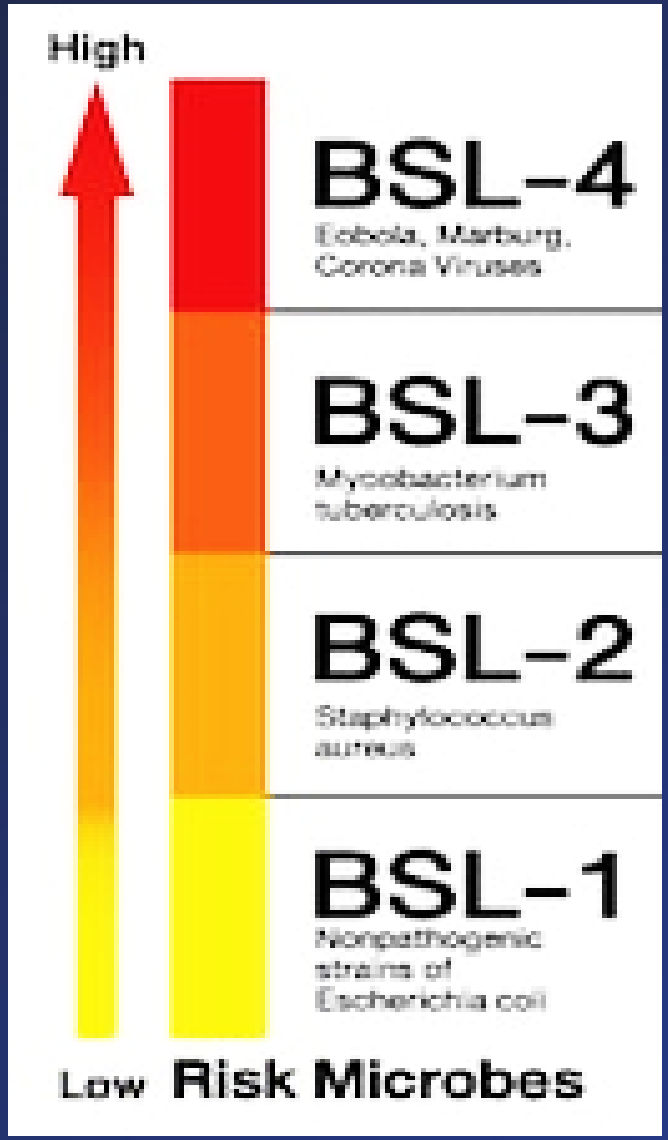
Containment BSL Laboratory

BSL-3 – containment laboratory

- 2 door separation from the building occupants

BSL-4 – maximum containment laboratory

- Separate building from general research population



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Four Biosafety Levels

Biosafety Level	BSL-1	BSL-2	BSL-3	BSL-4
Description	· No Containment · Defined organisms · Unlikely to cause disease	· Containment · Moderate Risk · Disease of varying severity	· High Containment · Aerosol Transmission · Serious/Potentially lethal disease	· Max Containment · "Exotic," High-Risk Agents · Life-threatening disease
Sample Organisms	*E. coli*	Influenza, HIV, Lyme Disease	Tuberculosis	Ebola Virus
Pathogen Type	Agents that present minimal potential hazard to personnel & the environment.	Agents associated with human disease & pose moderate hazards to personnel & the environment.	Indigenous or exotic agents, agents that present a potential for aerosol trans-mission, & agents causing serious or potentially lethal disease.	Dangerous & exotic agents that pose a high risk of aerosol-transmitted lab-oratory infections & life-threatening disease.
Autoclave Requirements	None	None	Pass-thru autoclave with Bioseal required in laboratory room.	Pass-thru autoclave with Bioseal required in laboratory room.

https://blqs.dmsc.moph.go.th/assets/bpat/PATEN13.pdf

https://blqs.dmsc.moph.go.th/en/page-view/150

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Laboratory Animal Facilities

Table 4. ***Animal facility containment levels: summary of practices and safety equipment***

RISK GROUP	CONTAINMENT LEVEL	LABORATORY PRACTICES AND SAFETY EQUIPMENT
1	ABSL-1	Limited access, protective clothing and gloves.
2	ABSL-2	ABSL-1 practices plus: hazard warning signs. Class I or II BSCs for activities that produce aerosols. Decontamination of waste and cages before washing.
3	ABSL-3	ABSL-2 practices plus: controlled access. BSCs and special protective clothing for all activities.
4	ABSL-4	ABSL-3 plus: strictly limited access. Clothing change before entering. Class III BSCs or positive pressure suits. Shower on exit. Decontamination of all wastes before removal from facility.

ABSL, animal facility Biosafety Level; BSCs, biological safety cabinets

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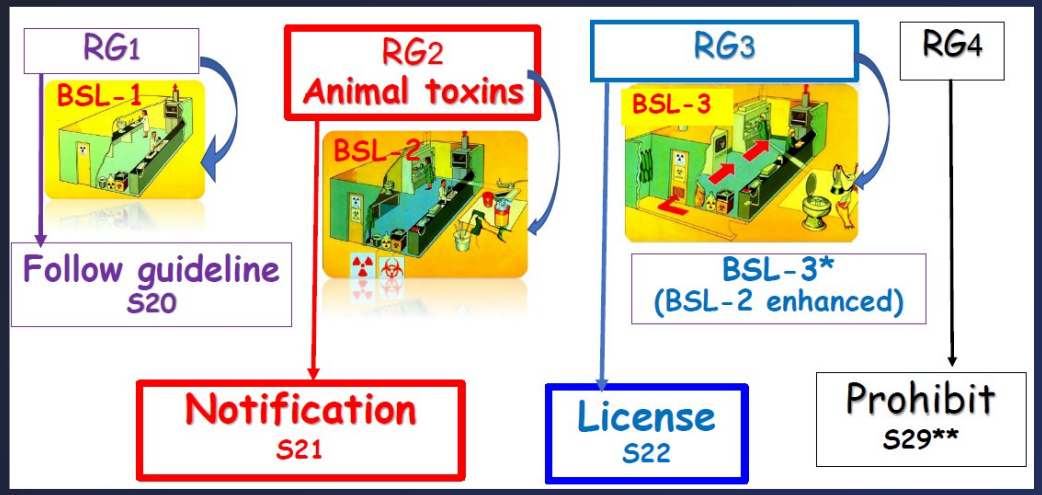
Principles in Biosafety

- Risk assessment : Risk group ≠ BSL
- Each level is appropriate for :
  - Operations performed (aerosol, solid, liquid, volume)
  - Routes of transmission
  - Lab function or activity (clinical, research, isolation and culture)



3* = pathogen within risk group 3 but could be performed in some condition as follow

1. Diagnosis w/o culture : strictly work in BSL-2 and good microbiological practice
2. Diagnosis by molecular testing (Dx): work in BSL-2 enhanced
3. Culture virus: work in BSL-3

- The higher the biosafety level, the more restrictive the laboratory environment will be increasing levels of personnel and environmental protection increasing levels of complexity in SOPs.

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Controlled Activities
by PAT Act 2558

- **Production** — cultivate, mix, prepare, transform, add volume, synthesize, repack or pack in mass
- **Import** — bring/order into
- **Export** — take/send out of the Kingdom
- **Sell** — dispose of, distribute, dispense or exchange for trade purposes, and shall include having in possession for sale
- **Transit** — take/send through Kingdom whether or not there is a transshipment or change of carriers in Kingdom
- **Possession** — to have in possession for the possessor himself/herself or for other persons

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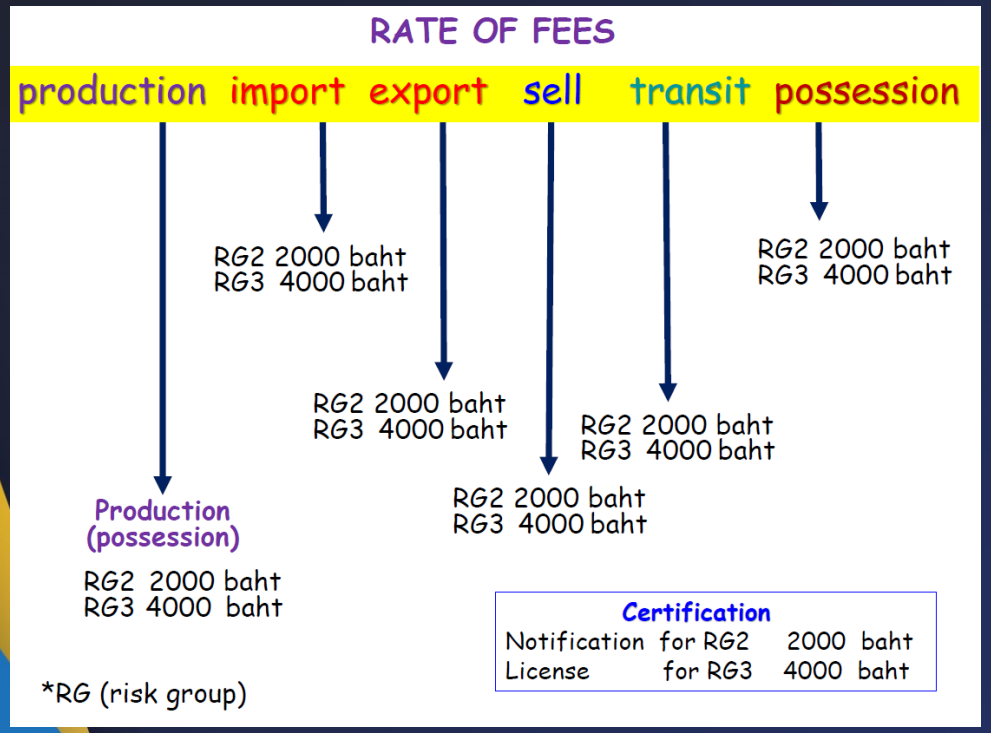
Excempt Activities by PAT Act 2558

- Medical diagnosis (Dx) processes
- Post mortem examination processes
- Laboratory testing for medical and public health purposes
- Ready made products
- Collection of samples of drugs, food, health products, environment



NOTIFICATION OF THE PATHOGENS AND ANIMAL TOXINS COMMITTEE
RE: COMPARISON PURSUANT TO SECTION 80 OF THE PATHOGENS AND ANIMAL TOXINS ACT B.E. 2558 (2015), B.E. 2560 (2017)

List of Comparative Rates
Pursuant to the Pathogens and Animal Toxins Act B.E. 2558 (2015)

No.	Offense	Ground of the Offense	Penal Code		Comparative Fine
			Section	Penalty	Rate
1	Section 6 (5)	An operator or operation personnel violates or breaches the duties prescribed in the Notification issued pursuant to Section 6 (5).	Section 56	Fine penalty not exceeding 50,000 Baht	No. 1 25,000 Baht No. 2 40,000 Baht Following No. 50,000 Baht
2	Section 20	A person who produces, imports, exports, sells, transits or possesses Group 1 Pathogens violates or breaches the Notification issued pursuant to section 6 (4), (10), (11), (12), (13), (14) and (15).	Section 63	Fine penalty not exceeding 50,000 Baht	No. 1 25,000 Baht No. 2 40,000 Baht Following No. 50,000 Baht
3	Section 21 paragraph one	A person who produces, imports, exports, sells, transits or possesses Group 2 Pathogens or Group 1 Animal Toxins violates or breaches the Notification issued pursuant to Section 6 (4), (5), (10), (11), (12), (13), (14), (15), and (18).	Section 64 paragraph two	Fine penalty not exceeding 100,000 Baht	No. 1 50,000 Baht No. 2 75,000 Baht Following No. 100,000 Baht
4	Section 22 paragraph three	A person who produces, imports, exports, sells, transits or possesses Group 3 Pathogens or Group 2 Animal Toxins violates or breaches the Notification issued pursuant to Section 6 (4), (5), (10), (11), (12), (13), (14), (15), and (18).	Section 65 paragraph two	Fine penalty not exceeding 200,000 Baht	No. 1 100,000 Baht No. 2 150,000 Baht Following No. 200,000 Baht
5	Section 25 (1)	A person receiving a certificate of notification or a person receiving a license fails to present the certificate of notification or the license at the open and noticeable place at the premises specified in the certificate of notification or the license.	Section 66 paragraph one	Fine penalty not exceeding 10,000 Baht	No. 1 5,000 Baht No. 2 7,500 Baht Following No. 10,000 Baht
6	Section 25 (2) or (3)	A person receiving a certificate of notification or a person receiving a license - fails to arrange to have a pathogen or animal toxin account and an account related to execution. - fails to arrange to have a document stating details of safety assessment of technologies used in the production of pathogens or animal toxins, and fails to arrange the same to be kept for at least 5 (five) years for inspection by competent officials.	Section 66 paragraph two	Fine penalty not exceeding 50,000 Baht	No. 1 25,000 Baht No. 2 40,000 Baht Following No. 50,000 Baht
7	Section 26	A person receiving a certificate of notification or a person receiving a license fails to submit an application to the Director-General in case where any information is changed from a particular in the certificate of notification or license, or wishes to amend a particular.	Section 67	Fine penalty not exceeding 50,000 Baht	No. 1 25,000 Baht No. 2 40,000 Baht Following No. 50,000 Baht

https://blqs.dmsc.moph.go.th/en/page-view/150

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OPERATORS & OPERATION PERSONNEL

Any recipient of certificate of notification or license shall set up at least one operator and operation personnel in the area. However, this could be the same person.

OPERATOR

a person who controls operations, personnel, SOP, license, and safety systems

OPERATION PERSONNEL

A person who operates or carry out SOP and work instructions, and implement safety systems

QUALIFICATIONS AND DUTIES mentioned in

NOTIFICATION OF THE MINISTRY OF PUBLIC HEALTH
RE: OPERATORS AND OPERATION PERSONNEL UNDER PATHOGENS AND ANIMAL TOXINS ACT, B.E. 2558 (2015) B.E. 2561 (2018)

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Risk = Probability x Severity

Consequences of exposure/ release	Severe	Moderate	High	Very high
	Minor to Major	Low	Moderate	High
	Negligible	Very low	Low	Moderate
		Unlikely to happen	Possibly could happen	Likely could happen
		Likelihood of exposure/release		

1. Know/understand your biohazard (biological agents/toxins)

2. Know what controls are available in your lab/department/faculty

3. Conduct activity-based risk assessment of your biohazard.

4. Decide if risk is acceptable. If not, then add additional controls.

Biorisk assessment process

Process of evaluating the biorisk from a biohazard, taking into account the adequacy of any existing available controls and then decide whether or not the particular biorisk is acceptable.

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PERSON
PROCEDURE
PRACTICE

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Approval No. MUSC 2021-013

Conferment of Biosafety Certificate
Faculty of Science, Mahidol University

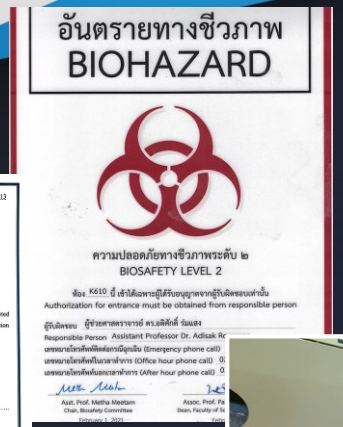
Title of Project: Analysis on *Drosophila* defense mechanisms particularly targeted on *Pseudomonas aeruginosa* virulence factors during an infection
Principle Investigator: Assistant Professor Dr. Adisak Romsang
Name of Institution: Department of Biotechnology, Faculty of Science

Approved by The Committee on Biosafety Faculty of Science, Mahidol University

Signature of Chairman: (Assist. Prof. Adisak Romsang)

Signature of Dean of Faculty of Science: (Assoc.Prof. Palangpon Kongsaeree)
Dean of Faculty of Science, Mahidol University

Date of Approval: 27 August 2021
Date of Expiration: 30 September 2023


อันตรายทางชีวภาพ
BIOHAZARD

ความปลอดภัยทางชีวภาพระดับ ๒
BIOSAFETY LEVEL 2

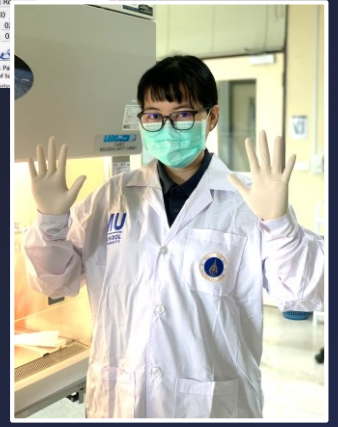
ห้อง K610 นี้ เข้าได้เฉพาะผู้ได้รับอนุญาตจากผู้รับผิดชอบเท่านั้น
Authorization for entrance must be obtained from responsible person

ผู้รับผิดชอบ ผู้ช่วยศาสตราจารย์ ดร.อดิศักดิ์ รื่นแสง
Responsible Person Assistant Professor Dr. Adisak Ro

เบอร์โทรศัพท์ฉุกเฉิน (Emergency phone call)
เบอร์โทรศัพท์ในเวลาทำการ (Office hour phone call)
เบอร์โทรศัพท์นอกเวลาทำการ (After hour phone call)

Asst. Prof. Metha Meetam
Chair, Biosafety Committee
February 1, 2021

Assoc. Prof. Pa
Dean, Faculty of Sc



Bioagent & Place

- Biological agent (Risk Group)
- Laboratory & Facility
- Safety Equipment & PPE

People

- IBC/BSO
- PI/Researcher
- RA/Students
- Related personnel

Activity & Practice

- Biological Safety Level (BSL)
- Safety Operating Procedures (SOP)
- Pathogen Safety Data Sheets (PSDS)

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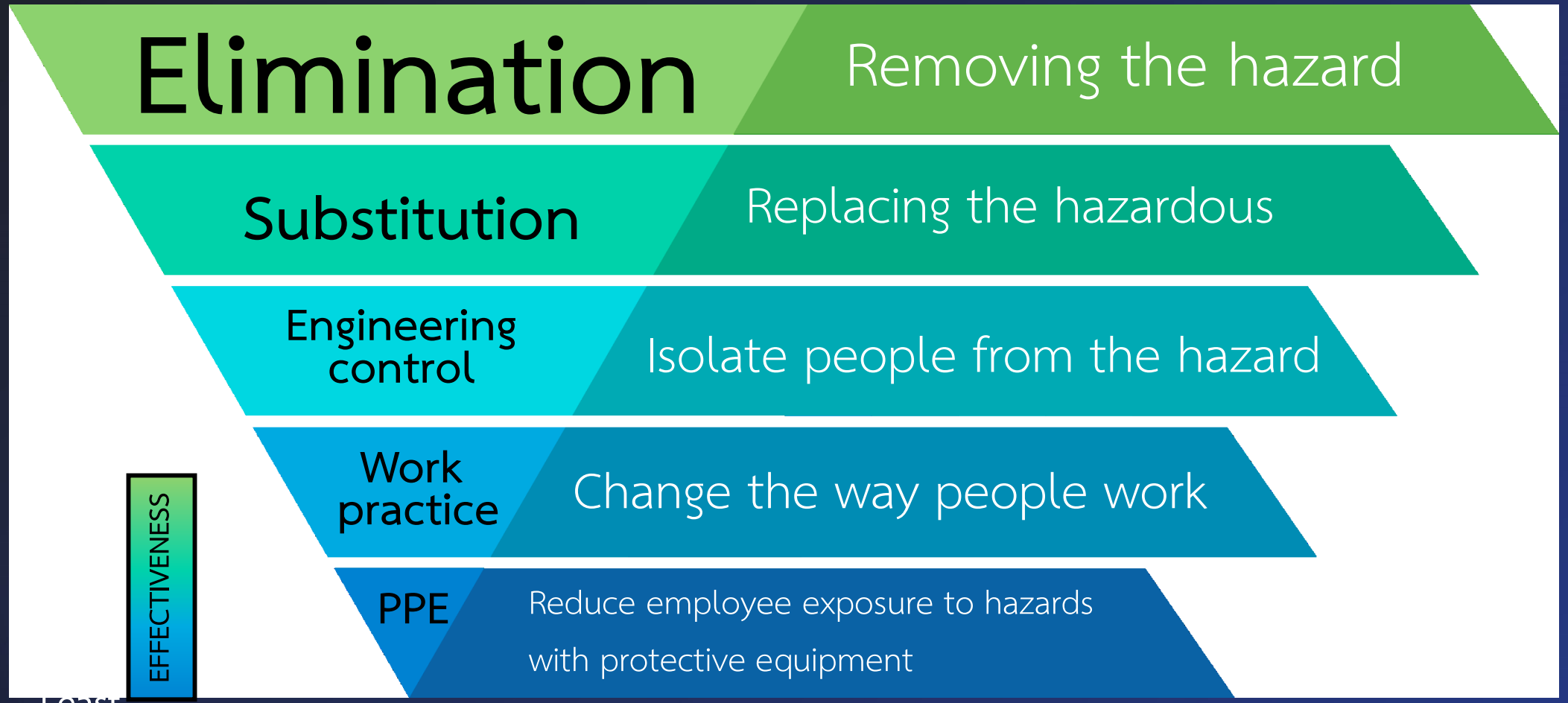
HIERARCHY OF HAZARD CONTROLS



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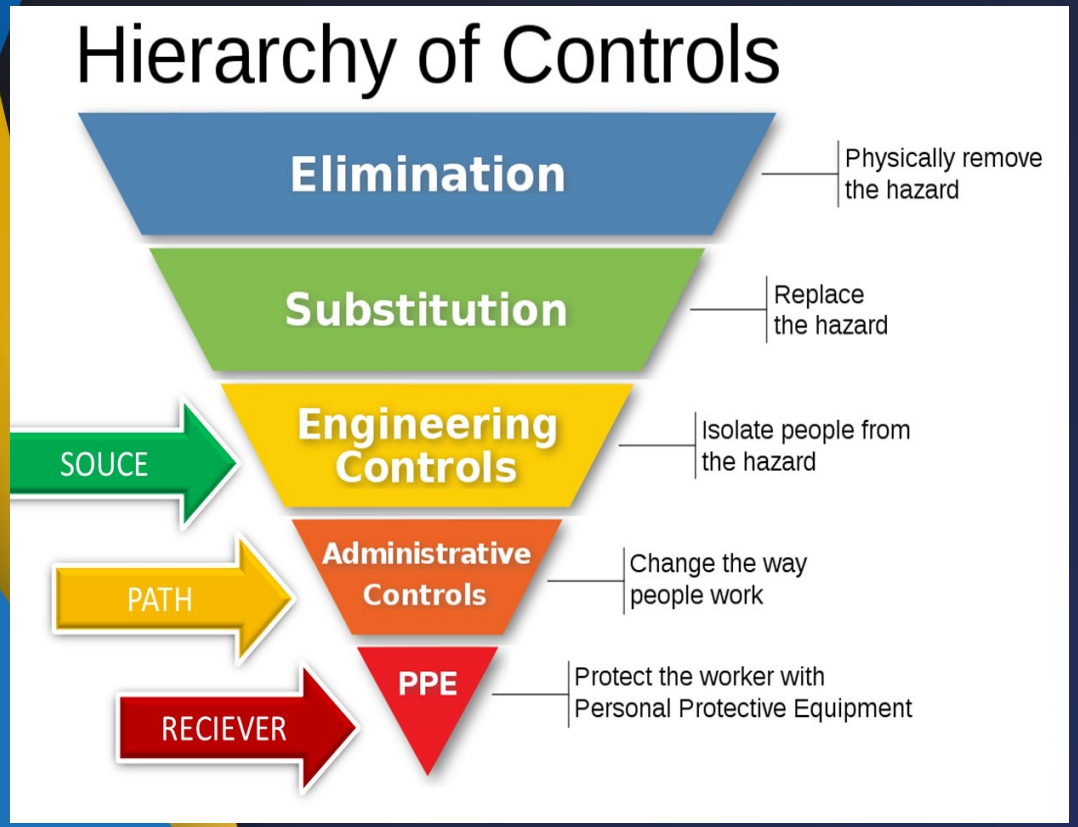
Four Primary Controls for Biosafety



1. **Engineering Controls**
   ข้อกำหนดทางวิศวกรรม
2. **Administrative Controls**
   การบริหารจัดการที่ดี
3. **Practices and Procedures**
   วิธีปฏิบัติที่เป็นมาตรฐาน
4. **Personal Protective Equipment**
   อุปกรณ์ป้องกนอันตรายเฉพาะบุคคล

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Engineering Controls

Technology based, reduce or eliminate exposure to hazards by changes at the source of the hazard

Containment : Primary VS Secondary Containment Biosafety Levels

Facility Laboratory Design : BSL1, 2, 3, and 4

- Facilities, furnishings, work surfaces, floor finishes
- Large equipment (space around)
- Placement with motion movement (airflow)
- Handwashing sink (no hand operation)
- Eye wash station and Emergency showers
- Safety Equipment i.e. Biological Safety Cabinets

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Engineering Controls

NOTIFICATION OF THE MINISTRY OF PUBLIC HEALTH
RE: CHARACTERISTICS OF THE PLACE OF PRODUCTION OR POSSESSION OF AND OPERATIONS ON PATHOGENS AND ANIMAL TOXINS B.E. 2563 (2020)

(1) Operation Site Level 1 consists of operational sites used to operate Group 1 Pathogens.

(2) Operation Site Level 2 consists of operational sites used to operate pathogens or animal toxins as follows:

(A) Group 1 Pathogens

(B) Group 2 Pathogens

(C) Group 3 Pathogens which can be operated at Operational Site Level 2 Enhanced (biosafety level 2 enhanced: BSL-2 enhanced) as specified in the notification issued under Section 6 (1)

(D) All groups of biological substances

(E) Group 3 Biological Substances which can be operated at Operation Site Level 2 Enhanced (biosafety level 2 enhanced: BSL-2 enhanced) as specified in the notification issued under Section 6 (1)

(F) All groups of animal toxins

(3) Operation Site Level 3 consists of operational sites used to operate pathogens or animal toxins as follows:

(A) Group 1 Pathogens

(B) Group 2 Pathogens

(C) Group 3 Pathogens which can be operated at Operational Site Level 2 Enhanced (biosafety level 2 enhanced: BSL-2 enhanced) as specified in the notification issued under Section 6 (1)

(D) Group 3 Pathogens

(E) All groups of biological substances

(F) Group 3 Biological Substances which can be operated at Operational Site Level 2 Enhanced (biosafety level 2 enhanced: BSL-2 enhanced) as specified in the notification issued under Section 6 (1)

(G) All groups of animal toxins

(4) Operation Site Level 4 consists of operational sites used to operate pathogens or animal toxins from all groups.

https://blqs.dmsc.moph.go.th/assets/bpat/PATEN13.pdf

Operation Site Level 4

Operation Site Level 3

Operation Site Level 2

BSL-2 Enhanced

Operation Site Level 1

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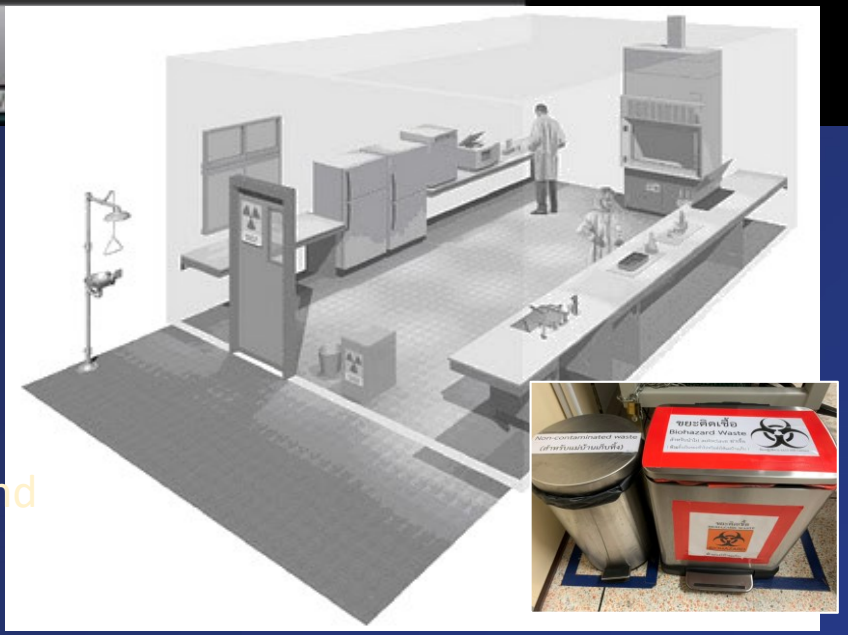
Clause 7: Characteristics of Operation Site Level 1

BSL-1

- ✓ a closed space or a sectioned room (inside is visible);
- ✓ easy-to-clean structure and facilities;
- ✓ lockable door; sufficient equipment and tools;
- ✓ sturdy tables/benches and chairs (waterproof surface, easily cleaned, resistant to chemicals and disinfectants);
- ✓ hand washing basins;
- ✓ have space for cleaning materials and places for collecting and storing solid waste separating from other types of waste;
- ✓ adequate sound, temperature and lighting



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Clause 9: Equipment in Operation Site Level 1

BSL-1

(1) containers or packages of tightly closed containers which does not leak;

(2) tools and equipment suitable for storing containers;

(3) tools and equipment for transporting or moving which prevent containers from falling;

(4) waste bins with lids which can be opened without a hand touch;

(5) tools and equipment for destroying pathogens such as an autoclave or other appropriate methods for destroying pathogens;

(6) equipment or saline solution for eye wash;

(7) first aid kits; and

(8) biological spill kits with a minimum of liquid disinfectants, absorbent materials and personal protective equipment consisting of operating clothes, rubber gloves, safety glasses, and face masks as well as equipment for collecting contaminated materials such as tweezers, dustpan sets, and garbage bags for infectious waste.

Clause 10 Containers or packages of containers specified in Clause 9 shall be labelled with information about scientific names and dates of production or containment.

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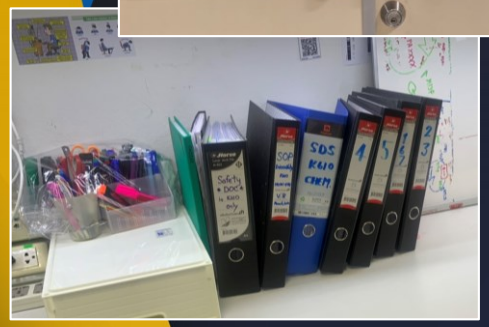

Clause 11: Safety and Quality Systems in OSL-1

BSL-1

(1) having security of place of production or possession and controls of procedures on storage, production, import, export, sale, transit, or possession;

(2) having measures to control access by unrelated persons;

(3) using technically appropriate personal protective equipment;

(4) having collection, storage, moving, and disposal of infectious solid waste which are in accordance with the laws on public health;

(5) having technically appropriate cleaning of materials, equipment, and contaminated materials;

(6) recording transactions and quantities of productions or possessions;

(7) having roper accident reporting and investigations;

(8) having practices for prevention and control of animals and insects in the operational sites; and

(9) having measures to prevent the spread of contamination to the environment.

Clause 8: Operation Site Level 1 with animals

BSL-1

(1) being an animal room separate from other rooms equipped with appropriate ventilation and temperature control;

(2) having a room floor made of materials that are easy to clean, smooth, strong, able to carry the weight, waterproof, and acid and alkali resistant. In case of floor drain, there shall be a tightly closed lid that can only be opened when draining water;

(3) having a self-closing door; and

(4) having characteristics of places, equipment, and animal care management which are in accordance with the laws on animals for science.

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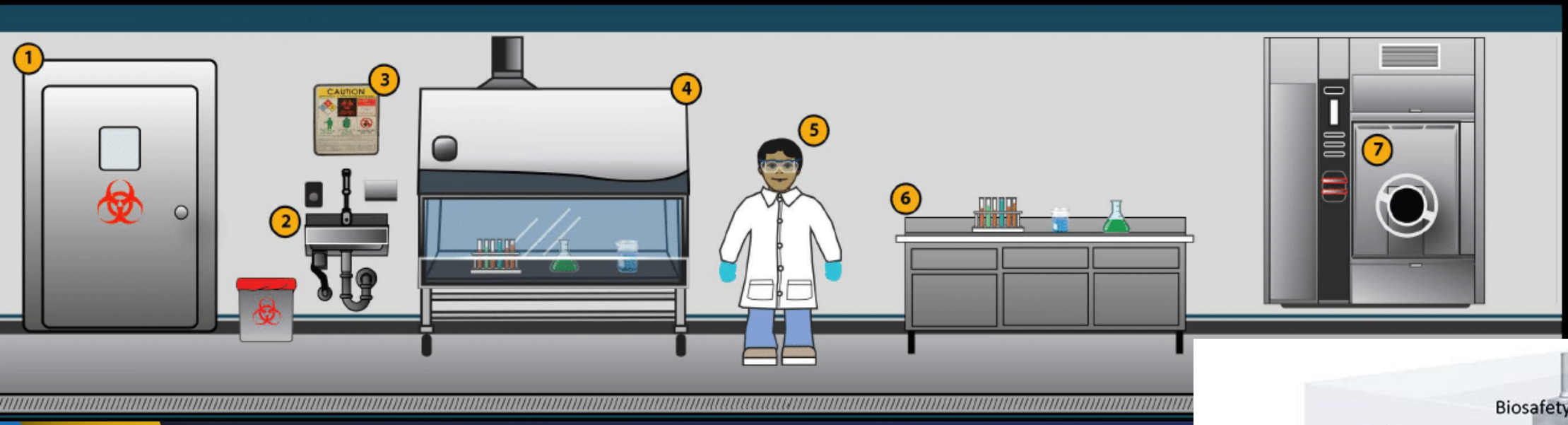
Clause 12: Characteristics of Operation Site Level 2

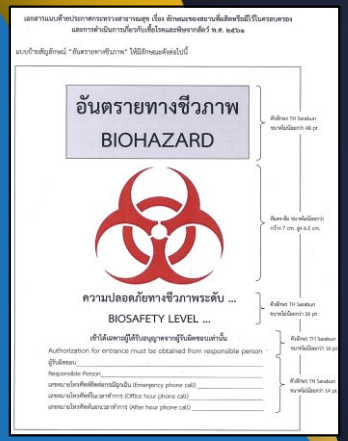
BSL-2

BSL2

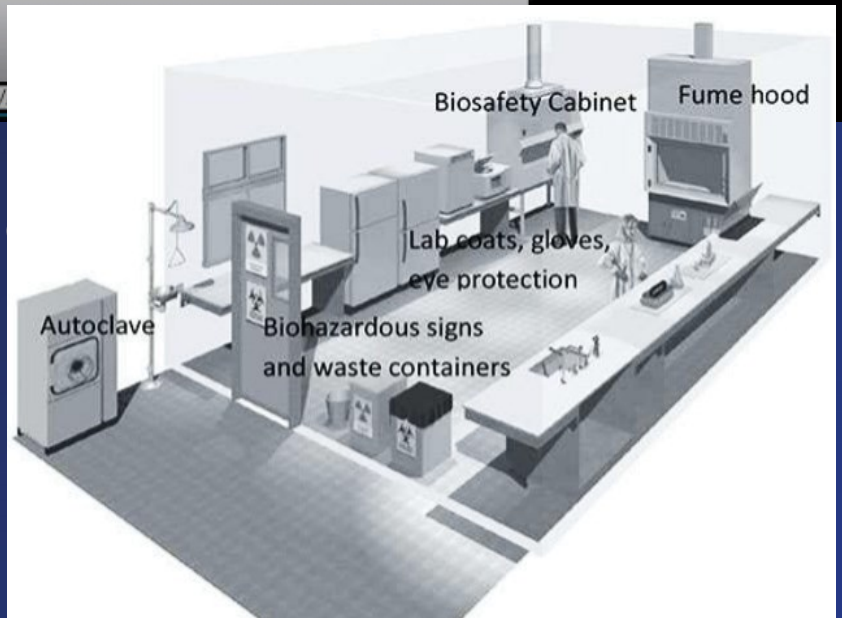


BSL2

1. controlled access
2. hand washing sink
3. sharp hazards warning policy
4. physical containment device
5. personal protective equipment
6. laboratory bench
7. autoclave



- ✓ Have the same as OSL-1 in clause 7 with additional items;
- ✓ Have measures to control people with the right to enter and
- ✓ Have a biohazard sign on the doors;
- ✓ Have an appropriate containments for bioagents or toxins (Biological safety cabinet/BSC or Fume hood)
- ✓ Label all equipment and tools exposed to bioagents
- ✓ (IBC-approved) Lab SOP
- ✓ Detailed biosecurity system, keep all data at least 3 years



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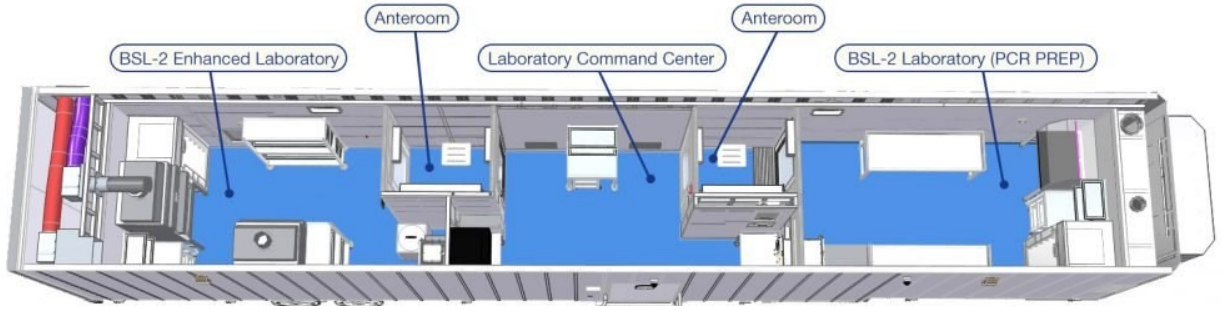
Clause 19 and 22: BSL-2 Enhanced

BSL-2*

Clause 19 Information about pathogens or animal toxins possessed shall have the following details:

(1) In case of operations on Group 3 Pathogens which can be conducted in Operational Site Level 2 Enhanced as specified in notifications issued under Section 6 (1), pathogen safety data sheets (PSDS) shall be provided and include types, sources of pathogens, disease carriers, disease transmission, pathogenesis, symptoms, treatments and vaccines, personal protective equipment, first aid in case of accidents, destruction methods, and disposal methods; and



Clause 22 Operational Site Level 2 Enhanced (biosafety level 2 enhanced: BSL-2 enhanced) shall have the following additional details:

(1) Separating laboratories for operations; and

(2) Having technically appropriate personal protective equipment.

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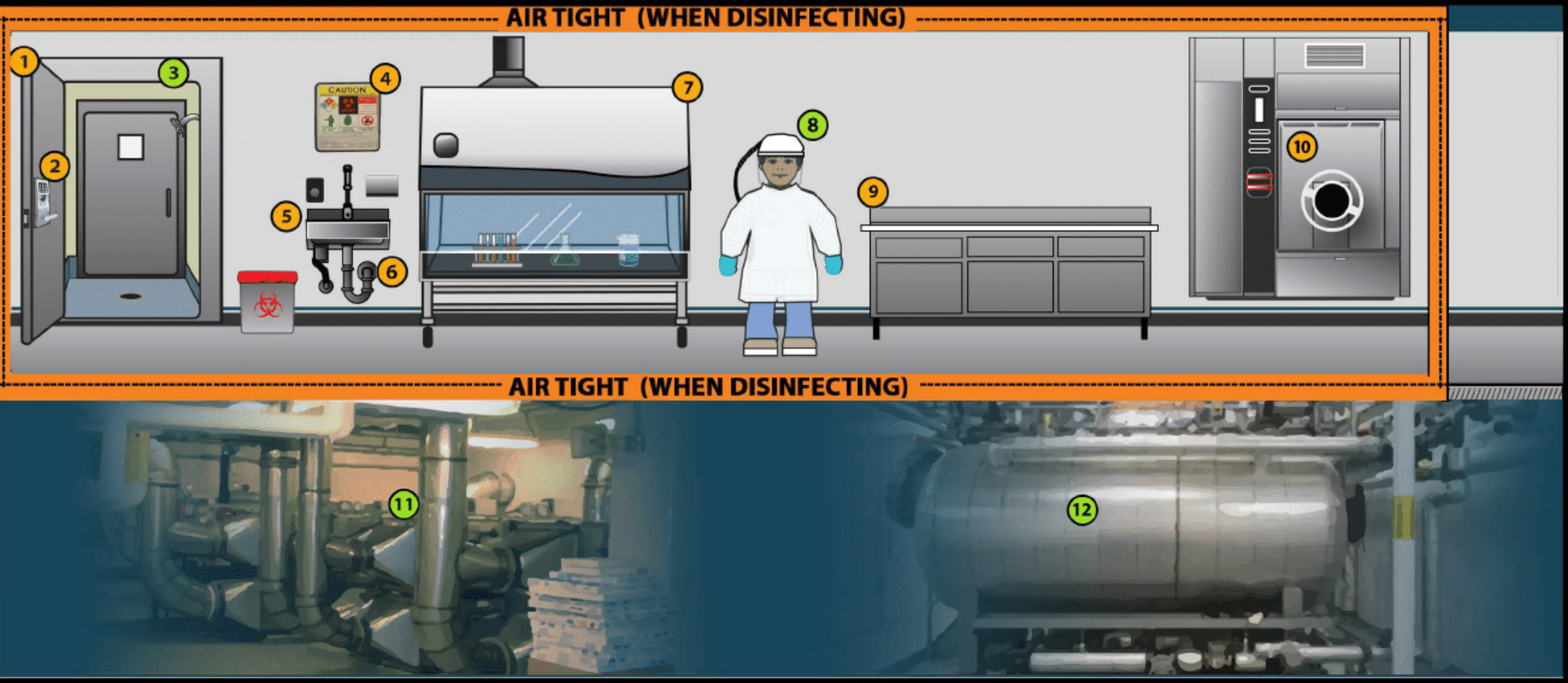
Clause 23: Characteristics of Operation Site Level 3

BSL-3

BSL3 (WITH RISK-BASED ENHANCEMENTS)



BSL3

1. self-closing, double-door access
2. controlled access
3. personal shower out
4. sharp hazards warning policy
5. hand washing sink
6. sealed penetrations
7. physical containment device
8. powered air purifying respirator
9. laboratory bench
10. autoclave
11. exhaust HEPA filter
12. effluent decontamination system

https://blqs.dmsc.moph.go.th/assets/bpat/PATEN13.pdf

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Clause 31: Characteristics of Operation Site Level 4

BSL-4

https://blqs.dmsc.moph.go.th/assets/bpat/PATEN13.pdf

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Safety Equipment

Autoclave

Centrifuge

Biosafety cabinet

Sharp disposal containers

Pipetting aids

Loop incinerator

Leakproof vessels

Vacuum line protection

Transportation containers

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Safety Equipment

BSC

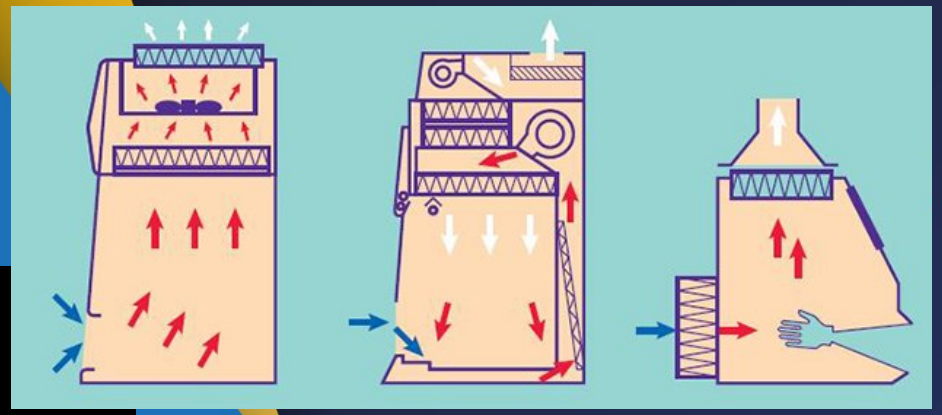
- Classification
- Filters (HEPA, ULPA)
- Handling and maintenance
- Certification

Centrifuge

- Cup-closed buckets
- Capped tubes
- Aerosol/Droplet
- Spill management

Autoclave

- Samples
- Sterilization processes
- Spore test
- Certification



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Administrative Controls

- Medical Surveillance and Immunization
- Training & Education
  - ✓Lab specific policies and procedures
  - ✓Biosafety training
  - ✓Occupational Health Law and Regulation
- Resources
  - ✓Website, Biosafety page, Faculty Website, Biosafety Manual, Training Video
- Door signs
  - ✓Entrance and Exit
  - ✓Emergency exit, and hazard indicators
- Equipment and maintenance plan and action

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Medical Surveillance

- The systematic assessment of staff exposed or potentially exposed to occupational hazards. This assessment monitors individuals for adverse health effects and determines the effectiveness of exposure prevention strategies.
- Decide on which medical surveillance method will be the best option for your lab i.e. available vaccine, baseline serum, symptom monitoring, medical emergency response procedures
- **Before working**: baseline serum sample, immunization, know symptoms of illness
  - Hepatitis A, B
  - Influenza
  - Others: Rubella, Measles, Chicken pox, Rabies, or Vaccinia
- **Any accident in Lab:** Report and Evaluate
- **Any exposure:** Be observant for symptoms and report symptoms
- **With symptoms:** notify contact person/PI, go to doctor and report for evaluation
- **Without symptoms:** notify contact person/PI, observation, and report for evaluation

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Medical Surveillance

Table 2: Medical Surveillance and Immunization Assessment.

Name of Biological Material	Vaccinations			Prophylaxis		Medical Surveillance		Treatment
	Available (yes or no) State the name of the vaccine	Effective (yes or no)	Vaccination Waiver Needed (yes or no)	Required (yes or no)	State the type of the prophylaxis	Serum Collection Recommended for Baseline Reference Needed (yes or no)	Annual Medical Monitoring Required (yes or no) State the test name	List drugs that will be effective against the pathogen strains used in your laboratory
Acinetobacter spp.	No	ND	ND	No	ND	No	No	imipenem or meropenem, polymyxins
Bacillus cereus	No	ND	ND	No	ND	No	No	Imipenem, vancomycin, chloramphenicol, aminoglycosides, ciprofloxacin
Escherichia coli	No	ND	ND	No	ND	No	No	Aminoglycosides, fluoroquinolones

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Administrative Controls

Training & Education

(6) Being a person whose name appears on a certificate of notification or a license as the operator. Have the operator receives biosafety and biosecurity training courses certified by the agencies or organizations under the Department of Medical Sciences within one hundred and eighty days from the date of receiving the certificate of notification or the date of receiving the license and to be retrained at least once every three years.

- ✓ One-on-one practical training in laboratory (with an exam)
- ✓ Safety Equipment, Tools and PPE Practice Training
- ✓ Biosafety and Biosecurity Training Program
- ✓ Safety and Occupational Health Training Program
- ✓ Emergency Action Plan Training Program

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Administrative Controls

Resources

CERTIFICATE OF COMPLETION

This is to recognize that

ADISAK ROMSANG

Has successfully completed the workshop on "Fundamental Biosafety for BSL-2"
at Faculty of Science, Mahidol University
June 14-15, 2022

Adisak Romsang
Assist. Prof. Adisak Romsang
Chair, Biosafety Committee

P. Kongsaeree
Assoc. Prof. Palangpon Kongsaeree
Dean, Faculty of Science
Mahidol University

No. A2022-0629-029

Approval No. MUSC 2021-013

Conferment of Biosafety Certificate
Faculty of Science, Mahidol University

Title of Project: Analysis on *Drosophila* defense mechanisms particularly targeted on *Pseudomonas aeruginosa* virulence factors during an infection

Principle Investigator: Assistant Professor Dr. Adisak Romsang

Name of Institution: Department of Biotechnology, Faculty of Science

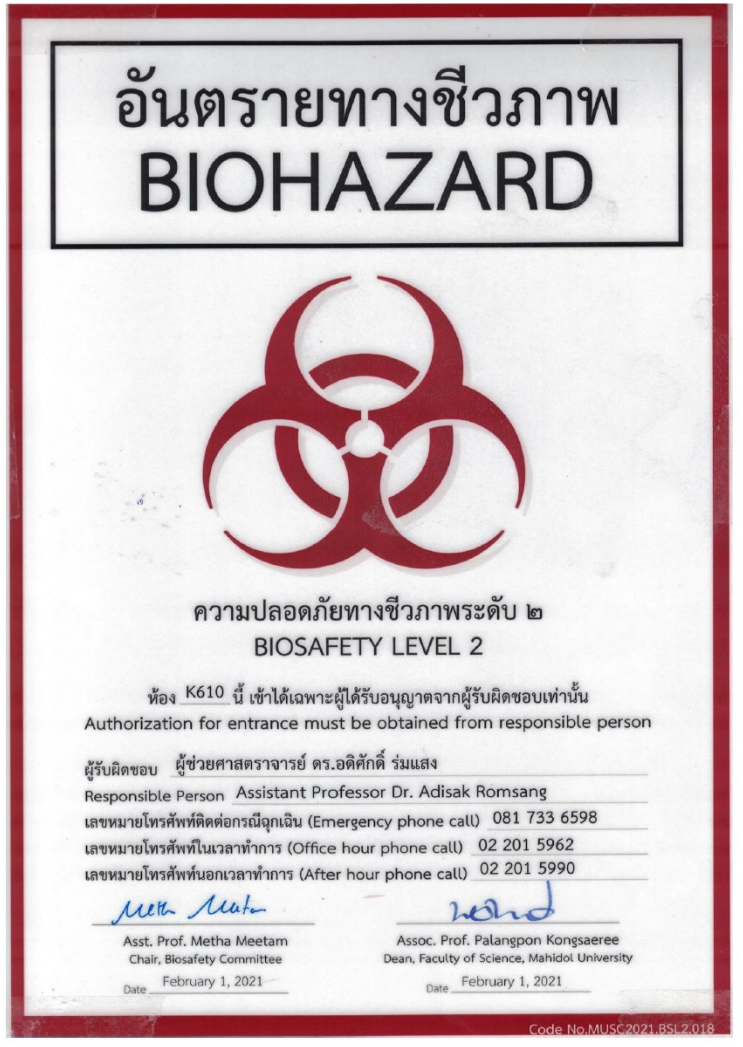
Approved by The Committee on Biosafety Faculty of Science, Mahidol University

Signature of Chairman: Adisak Romsang
(Assist. Prof. Adisak Romsang)

Signature of Dean of Faculty of Science: P. Kongsaeree
(Assoc.Prof. Palangpon Kongsaeree)
Dean of Faculty of Science, Mahidol University

Date of Approval: .....27 August 2021.....

Date of Expiration: .....30 September 2023.....



อันตรายทางชีวภาพ
BIOHAZARD

ความปลอดภัยทางชีวภาพระดับ ๒
BIOSAFETY LEVEL 2

ห้อง K610 นี้ เข้าได้เฉพาะผู้ได้รับอนุญาตจากผู้รับผิดชอบเท่านั้น
Authorization for entrance must be obtained from responsible person

ผู้รับผิดชอบ ผู้ช่วยศาสตราจารย์ ดร.อดิศักดิ์ ร่มแสง
Responsible Person Assistant Professor Dr. Adisak Romsang
เลขหมายโทรศัพท์ติดต่อกรณีฉุกเฉิน (Emergency phone call) 081 733 6598
เลขหมายโทรศัพท์ในเวลาทำการ (Office hour phone call) 02 201 5962
เลขหมายโทรศัพท์นอกเวลาทำการ (After hour phone call) 02 201 5990

Asst. Prof. Metha Meetam
Chair, Biosafety Committee
Date February 1, 2021

Assoc. Prof. Palangpon Kongsaeree
Dean, Faculty of Science, Mahidol University
Date February 1, 2021

Code No.MUSC2021.BSL2.018

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Safety Data Sheet (SDS)

Public Health Agency of Canada | Agence de la santé publique du Canada

Canada

Public Health Agency of Canada
www.publichealth.gc.ca

Français | Home | Contact Us | Help | Search | Canada.ca

Home > Laboratory Biosafety and Biosecurity > Pathogen Safety Data Sheets and Risk Assessment

Main Menu

- About the Agency
- Infectious Diseases
- Chronic Diseases
- Travel Health
- Food Safety
- Immunization & Vaccines
- Emergency Preparedness & Response
- Health Promotion
- Injury Prevention
- Lab Biosafety & Biosecurity
- Surveillance

Explore

- Media Room

+/- TEXT PRINT SHARE

Pathogen Safety Data Sheets and Risk Assessment

Pathogen Safety Data Sheets (PSDSs) (previously titled Material Safety Data Sheets for infectious substances) are technical documents that describe the hazardous properties of a human pathogen and recommendations for work involving these agents in a laboratory setting. These documents have been produced by the Public Health Agency of Canada (the Agency) as educational and informational resources for laboratory personnel working with these infectious substances. Please note that work involving pathogens in Canada may require compliance with international, national, and provincial laws and guidelines.The PSDS App is available as a free download for your devices in the Android, Amazon, Apple, and Window stores.

For those working with animal pathogens, your will find more information on the Canadian Food Inspection Agency's Disease Agent Information page.

Please note that although the information, opinions, and

Laboratory Biosafety and Biosecurity

- Biosecurity
- Licensing Program
- *Human Pathogens and Toxins Act*
- Canadian Biosafety

PSDS

Pathogen Safety Data Sheets (PSDSs) are technical documents that describe the hazardous properties of a human pathogen and recommendations for work involving these agents in a laboratory setting.

http://www.phac-aspc.gc.ca/lab-bio/res/psds-ftss/index-eng.php

ESCHERICHIA COLI

PATHOGEN SAFETY DATA SHEET - INFECTIOUS SUBSTANCES

SECTION I - INFECTIOUS AGENT

NAME: *Escherichia coli*, enteroinvasive

SYNONYM OR CROSS REFERENCE: EIEC [1, 2], intestinal pathogenic *E. coli* [1], bacillary dysentery [1].

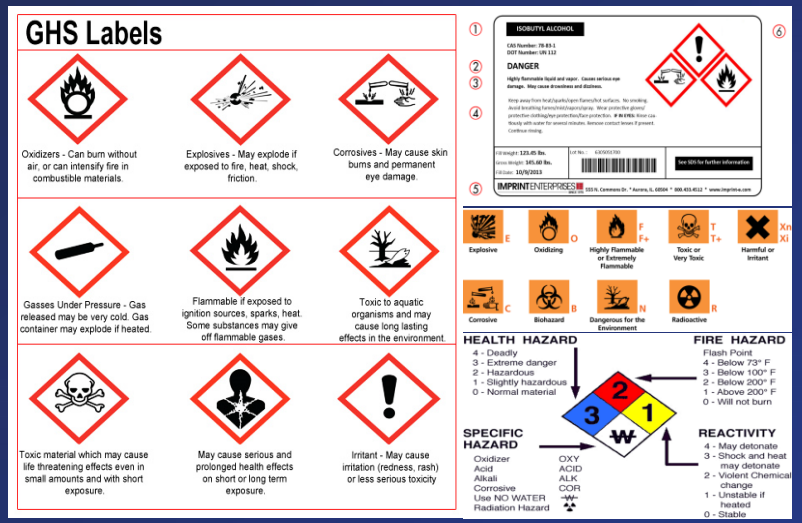
CHARACTERISTICS: Enteroinvasive *Escherichia coli* (EIEC) are in the family Enterobacteriaceae [2]. They are Gram negative, rod shaped, non-spore forming, motile with peritrichous flagella or nonmotile, grow on MacConkey agar (colonies are 2 to 3 mm in diameter and red or colorless), and are capable of aerobic or anaerobic growth [3]. Strains belonging to EIEC are biochemically, genetically, and pathogenically closely related to *Shigella* spp. [1].

SECTION II - HAZARD IDENTIFICATION

PATHOGENICITY/TOXICITY: EIEC causes bacillary dysentery [1], an acute ulcerative infection of the large intestine [1, 4]. EIEC invade cells of the colon and causes watery

Safety Data Sheet

A **Safety Data Sheet (SDS or MSDS)** is a document that contains information on the potential hazards (health, fire, reactivity and environmental) and how to work safely with the chemical product.



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Practices and Procedures

- SOP Writing and Implementation
- General Safety Guidelines
- Good Laboratory Practice
- Good Microbiological Practice
- Hand Washing
- Specific Procedures
  - Centrifuges
  - Needles & Syringes and other sharps
  - Pipettes
  - Blenders, Grinders, Sonicators & Lyophilizes
  - Inoculation Loops
  - Cryostats

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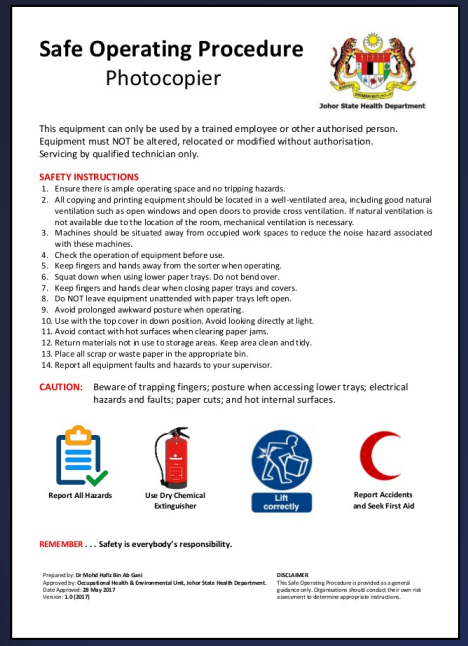
Safety Operating Procedures

A set of written instructions that describes, in detail, how to perform a laboratory process or experiment safely and effectively.

Prevention



Safe Operating Procedure
Photocopier

Johor State Health Department

This equipment can only be used by a trained employee or other authorised person.
Equipment must NOT be altered, relocated or modified without authorisation.
Servicing by qualified technician only.

SAFETY INSTRUCTIONS

1. Ensure there is ample operating space and no tripping hazards.
2. All copying and printing equipment should be located in a well-ventilated area, including good natural ventilation such as open windows and open doors to provide cross ventilation. If natural ventilation is not available due to the location of the room, mechanical ventilation is necessary.
3. Machines should be situated away from occupied work spaces to reduce the noise hazard associated with these machines.
4. Check the operation of equipment before use.
5. Keep fingers and hands away from the sorter when operating.
6. Squat down when using lower paper trays. Do not bend over.
7. Keep fingers and hands clear when closing paper trays and covers.
8. Do NOT leave equipment unattended with paper trays left open.
9. Avoid prolonged awkward posture when operating.
10. Use with the top cover in down position. Avoid looking directly at light.
11. Avoid contact with hot surfaces when clearing paper jams.
12. Return materials not in use to storage areas. Keep area clean and tidy.
13. Place all scrap or waste paper in the appropriate bin.
14. Report all equipment faults and hazards to your supervisor.

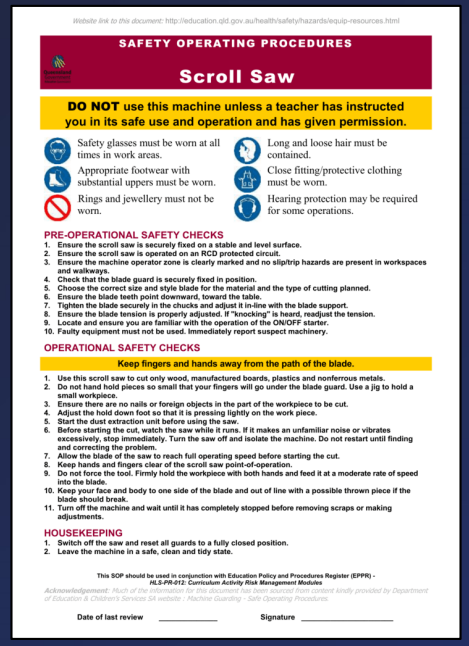
CAUTION: Beware of trapping fingers; posture when accessing lower trays; electrical hazards and faults; paper cuts; and hot internal surfaces.

Report All Hazards | Use Dry Chemical Extinguisher | Lift correctly | Report Accidents and Seek First Aid

REMEMBER . . . Safety is everybody's responsibility.

Prepared by: Dr Mohd Hafiz Bin Ab Gani
Approved by: Occupational Health & Environmental Unit, Johor State Health Department.
Date Approved: 28 May 2017
Version: 1.0 (20.7)

DISCLAIMER
This Safe Operating Procedure is provided as a general guidance only. Organisations should conduct their own risk assessment to determine appropriate instructions.



Website link to this document: http://education.qld.gov.au/health/safety/hazards/equip-resources.html

SAFETY OPERATING PROCEDURES

Scroll Saw

DO NOT use this machine unless a teacher has instructed you in its safe use and operation and has given permission.

- Safety glasses must be worn at all times in work areas.
- Appropriate footwear with substantial uppers must be worn.
- Rings and jewellery must not be worn.
- Long and loose hair must be contained.
- Close fitting/protective clothing must be worn.
- Hearing protection may be required for some operations.

PRE-OPERATIONAL SAFETY CHECKS

1. Ensure the scroll saw is securely fixed on a stable and level surface.
2. Ensure the scroll saw is operated on an RCD protected circuit.
3. Ensure the machine operator zone is clearly marked and no slip/trip hazards are present in workspaces and walkways.
4. Check that the blade guard is securely fixed in position.
5. Choose the correct size and style blade for the material and the type of cutting planned.
6. Ensure the blade teeth point downward, toward the table.
7. Tighten the blade securely in the chucks and adjust it in-line with the blade support.
8. Ensure the blade tension is properly adjusted. If "knocking" is heard, readjust the tension.
9. Locate and ensure you are familiar with the operation of the ON/OFF starter.
10. Faulty equipment must not be used. Immediately report suspect machinery.

OPERATIONAL SAFETY CHECKS

Keep fingers and hands away from the path of the blade.

1. Use this scroll saw to cut only wood, manufactured boards, plastics and nonferrous metals.
2. Do not hand hold pieces so small that your fingers will go under the blade guard. Use a jig to hold a small workpiece.
3. Ensure there are no nails or foreign objects in the part of the workpiece to be cut.
4. Adjust the hold down foot so that it is pressing lightly on the work piece.
5. Start the dust extraction unit before using the saw.
6. Before starting the cut, watch the saw while it runs. If it makes an unfamiliar noise or vibrates excessively, stop immediately. Turn the saw off and isolate the machine. Do not restart until finding and correcting the problem.
7. Allow the blade of the saw to reach full operating speed before starting the cut.
8. Keep hands and fingers clear of the scroll saw point-of-operation.
9. Do not force the tool. Firmly hold the workpiece with both hands and feed it at a moderate rate of speed into the blade.
10. Keep your face and body to one side of the blade and out of line with a possible thrown piece if the blade should break.
11. Turn off the machine and wait until it has completely stopped before removing scraps or making adjustments.

HOUSEKEEPING

1. Switch off the saw and reset all guards to a fully closed position.
2. Leave the machine in a safe, clean and tidy state.

This SOP should be used in conjunction with Education Policy and Procedures Register (EPPR) - *HLS-PR-012: Curriculum Activity Risk Management Modules*

Acknowledgement: Much of the information for this document has been sourced from content kindly provided by Department of Education & Children's Services SA website : Machine Guarding - Safe Operating Procedures.

Date of last review _____ Signature _____

Control

PORTABLE FIRE EXTINGUISHERS

IN CASE OF FIRE:

- Call the fire department immediately.
- Do not use an extinguisher without proper training.
- Know which extinguisher is correct for what type of fire.
- Only use portable extinguishers when the fire is contained to a small area.

FIRE CLASSIFICATION:

A — Use for ordinary combustibles. Contains water.
C — Use for electrical fires. Do not use water on these fires! Contains dry chemicals, carbon dioxide or halogenated agents to smother the fire with foam.
B — Use for flammable liquids. Contains dry chemicals or halogenated agents to smother the fire with foam.
D — Use for combustible metals. Contains special liquids or dry powder agent.

P. A. S. S. OPERATING PROCEDURE

PULL the pin. Hold the extinguisher with the nozzle pointing away from you, and release the locking mechanism.

AIM the nozzle at the base of the fire.

SQUEEZE the lever slowly and evenly.

SWEEP from side-to-side at the base of the flame.

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Safety Operating Procedures

BIOSAFETY SOP

Step-by-step instructions on executing activities when working with biohazard (biological agents/toxins) so that the operator and environment are protected.

- ✓ Which pathogen(s)/toxin(s) you are working with?
- ✓ What are the risks associated with your pathogen(s)/toxin(s)?
- ✓ What experimental procedures will be performed ?
- ✓ How to minimize associated risks for experimental procedure?
  - → engineering control, medical surveillance, SOPs, institutional policy

Contents of the SOP are depended on the specialization.

Write a practical SOP that your personnel "CAN" do/adhere to.

SOP is "custom-made" DO NOT COPY.

Biosafety SOP should be concised, not experimental SOP.

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Safety Operating Procedures

Biosafety Level 2 (BSL2)

Standard Operating Procedures (SOPs)

Center for emerging bacterial infections (EBI)
ESPReL number: 2-0130-0050-2
6th floor Charlermprakiet Building
Faculty of Science, Mahidol University

Principal Investigator: Asst.Prof. Adisak Romsang, Ph.D.

The tenth edition, July 2022
Revised by Asst.Prof. Adisak Romsang and K610 members

All lab users must read and understand this SOP before conduct work in the laboratory.

Emergency contacts:

Principle Investigator Project:	Asst.Prof. Dr.Adisak Romsang Tel: 02-201-5962 and 081-733-6598 Email: adisak.rom@mahidol.ac.th
Mentor:	Prof. Dr.Skorn Mongkolsuk Tel: 02-201-5988 and 089-771-6377 Email: skorn@cri.or.th
Safety Officer:	Asst.Prof. Dr.Adisak Romsang Tel: 02-201-5962 and 081-733-6598 Email: adisak.rom@mahidol.ac.th
Laboratory room:	K610, K-building, SCMU Tel: 02-201-5962 Email: ebi_mu@hotmail.com

EBI Center, Biosafety Officer Chief:

Asst.Prof. Dr.Adisak Romsang	Tel: 02-201-5962 and 081-733-6598 Email: adisak.rom@mahidol.ac.th

Faculty of Science Student Health Care:	02-201-5203		
Faculty of Science Security Officer:	02-201-5028		
Mahidol University Security Officer:	02-441-4400 ext. 1170-4		
Faculty of Science Maintenance Officer:	02-201-5087		
Ramathipbodii Hospital:	02-354-7308-9		
Police:	191	Phayathai Police Station:	02-354-6957
Fire Station:	199	Phayathai Fire Station:	5087, 5998
Ambulance and Rescue:	1554	Medical Emergency Call:	1669

Faculty of Science Security Office: 5990
Faculty of Science Electrical Office: 5337, 5999
Faculty of Science Safety Officer: 086-746-9206 (Mr. Sumet)
Faculty of Science Biosafety Officer: 081-806-0911 (Ms. Worawan)
Ramathibodi Hospital: 0-2201-1000
Police: 191, **Phayathai Police Station:** 0-2354-6957
Phayathai Fire Station: 199, 0-2354-6858

Content

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Biological Safety Cabinet

TYPE OF PROTECTION	BSC SELECTION
Personnel protection, microorganisms in Risk Groups 1–3	Class I, Class II, Class III
Personnel protection, microorganisms in Risk Group 4, glove-box laboratory	Class III
Personnel protection, microorganisms in Risk Group 4, suit laboratory	Class I, Class II
Product protection	Class II, Class III only if laminar flow included
Volatile radionuclide/chemical protection, minute amounts	Class IIB1, Class IIA2 vented to the outside
Volatile radionuclide/chemical protection	Class I, Class IIB2, Class III

Fume Hood

Laminar Flow/Clean Bench

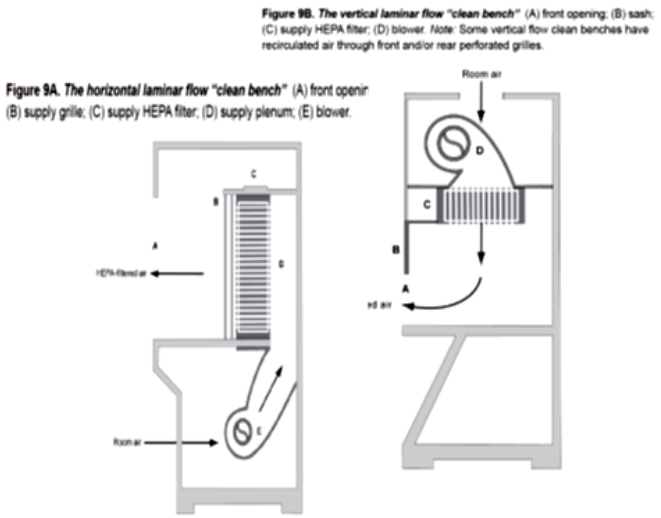
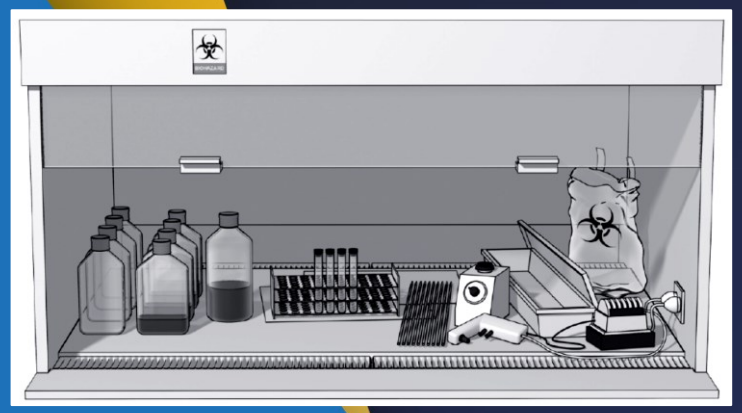
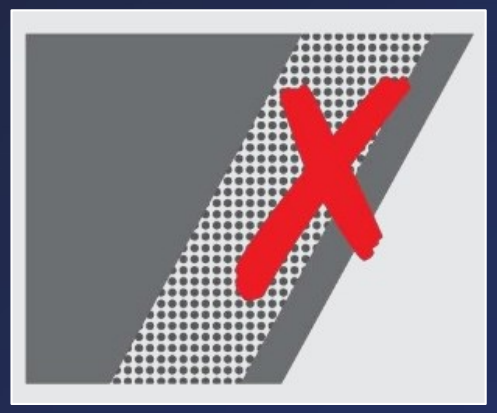


Figure 9B. *The vertical laminar flow "clean bench"* (A) front opening; (B) sash; (C) supply HEPA filter; (D) blower. *Note:* Some vertical flow clean benches have recirculated air through front and/or rear perforated grilles.

Figure 9A. *The horizontal laminar flow "clean bench"* (A) front openir (B) supply grille; (C) supply HEPA filter; (D) supply plenum; (E) blower.

"NOT USE IN REPLACE OF BSC"





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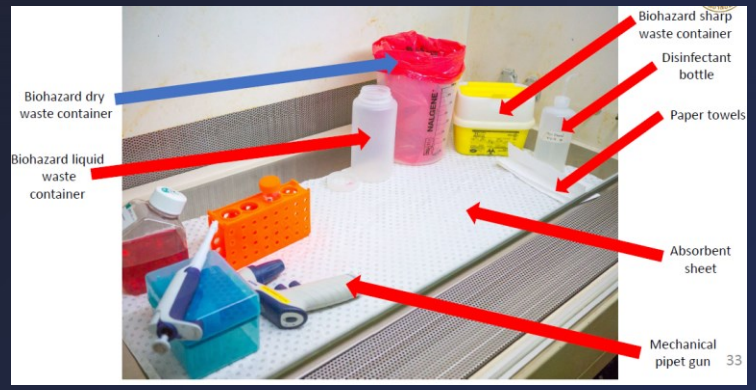
Biowaste Management



- Avoid/Reduce
- Reuse
- Recycle
- Waste to energy
- Disposal of waste

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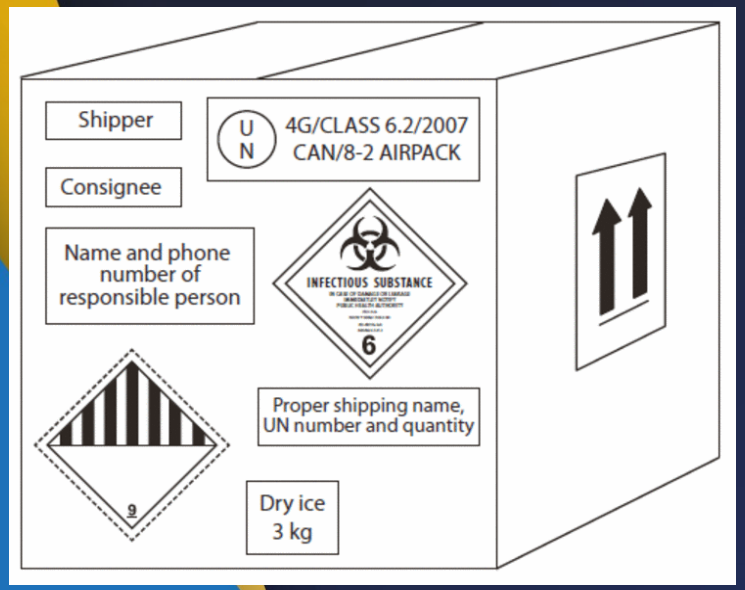
Bioagent Transportation

RG-1 pathogens can be handled inside biosafety cabinets or on designated bench areas and transferred using lab basket.

RG-2 pathogens must be handled inside **level-2 biosafety cabinets** or transferred with double packaging containment between cabinet, incubator, and freezer in the laboratory area only.

International Air Transport Association (IATA)

Material Transfer Agreement (MTA)



Item	Category A	Category B	Waste
Classification	UN2814 Infectious Substance, affecting humans UN2900 Infectious Substance, affecting animals	UN3373 Biological Substance, Category B	UN2814 or UN2900 if waste contains Category A UN3291 if waste contains Category B
Packaging Selection	Type Cat A Type Cat B, if permitted in Section 5.16	Type Cat A or B	Type Cat A or B
Documentation	Yes	No, if meeting the conditions of Exemption 1.39.	Yes, unless meeting the conditions of Exemption 1.39.
Labels & Markings	Yes. Class 6.2 Label UN Number & Shipping name.	Yes. Category B mark & 24 hr number	Yes. Class 6.2 Label.
Placards	Yes, if: • ERAP is required 7.1(7) • Over 500 kg	Yes, if: • Over 500 kg	Yes, if: • Over 500 kg

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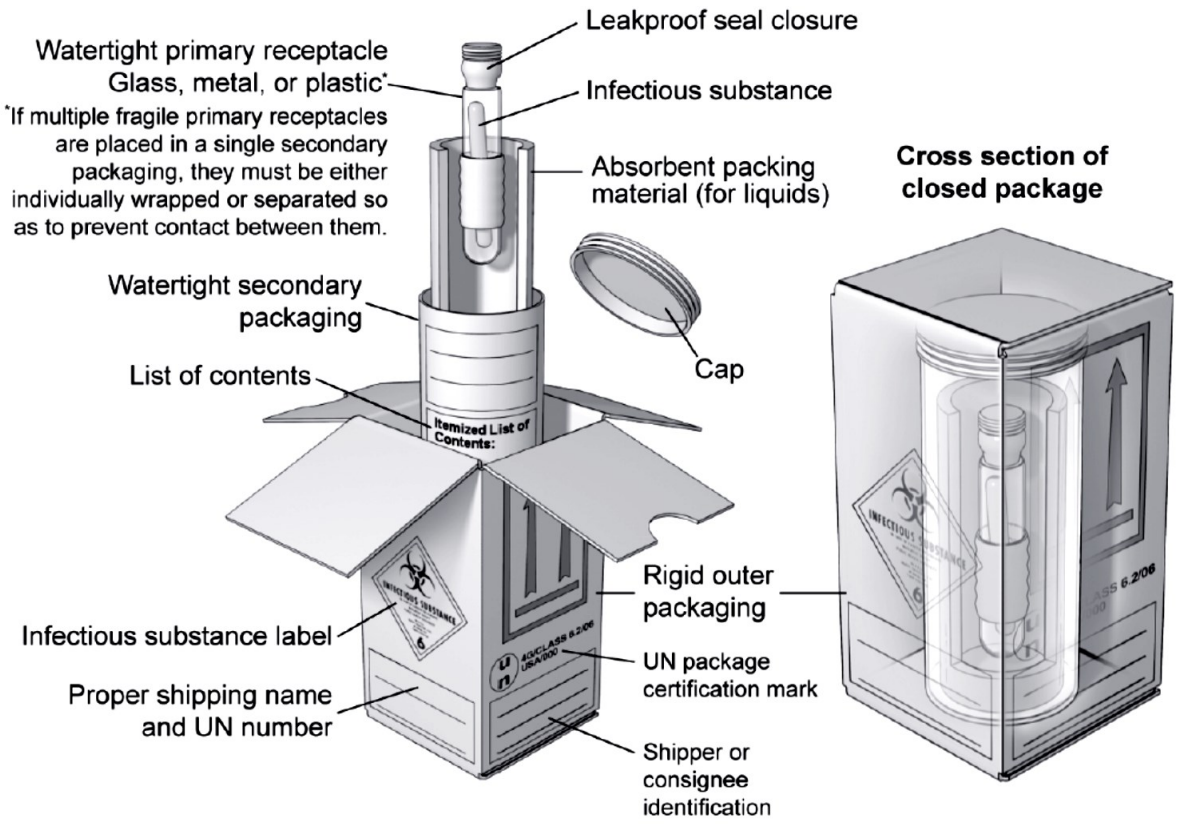
Bioagent Transportation

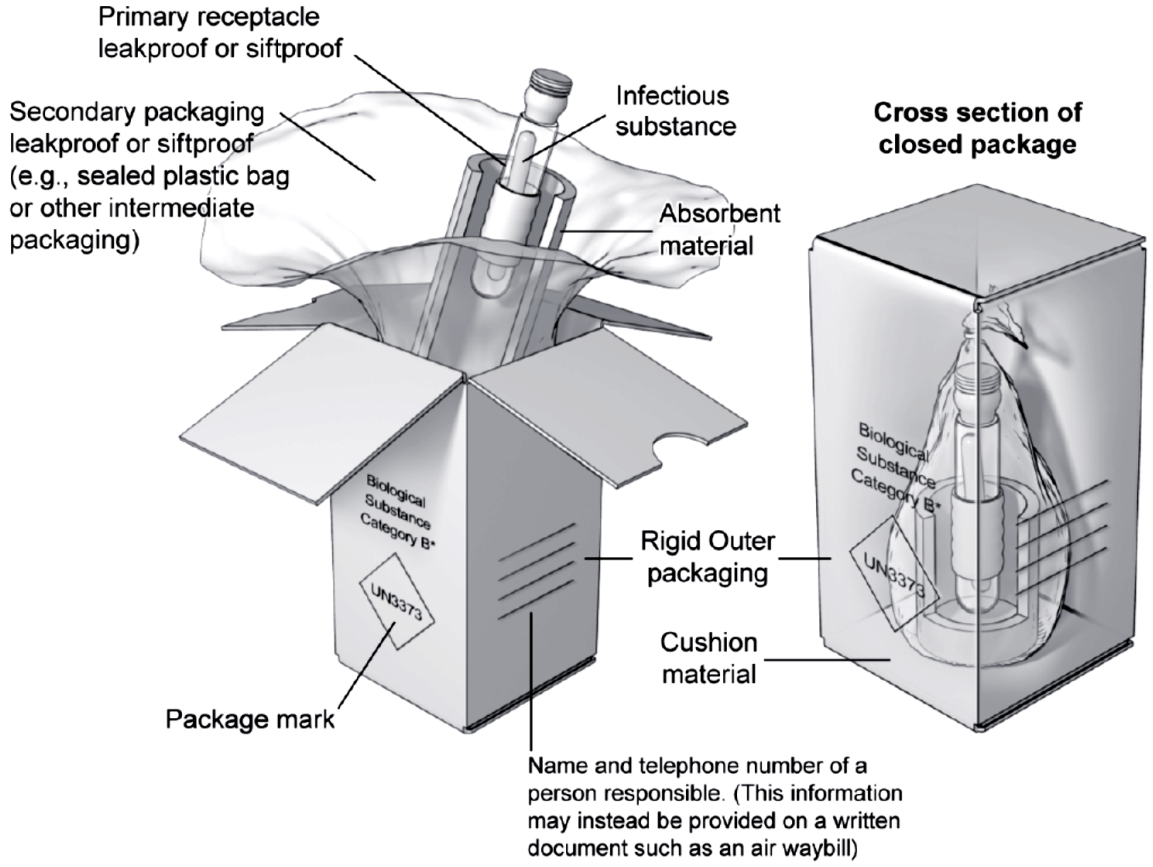
Category A Infectious Substance (UN 2814 and UN 2900)

Figure 1. ***A Category A UN Standard Triple Packaging***



Biological specimen, Category B (UN 3373)

Figure 2. ***A Category B Non-specification Triple Packaging***



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Spill Response Procedure

- ❑ Do not panic, react immediately with consciousness
- ❑ First priority – protect of personnel
- ❑ Stop working and always alert others
- ❑ Evaluate nature of spill to determine the level of response
- ❑ Material response to spills must be available in Lab
- ❑ Don appropriate PPE and disinfectant to contain spill
- ❑ Decontamination of facility and equipment
- ❑ Packaging and disposal of contaminate waste materials
- ❑ Proper documentation of incident

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Spill Response Procedure

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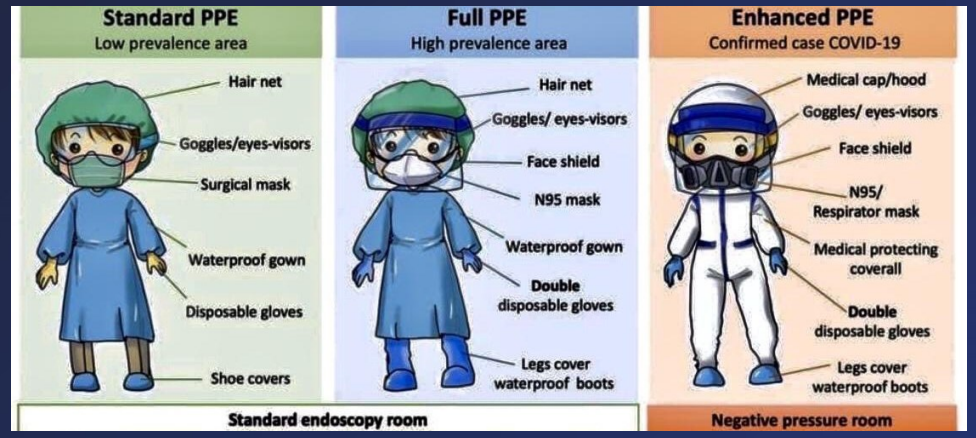
Personal Protective Equipment



- PPE is the important and the last line of defense.
- Responsibility of both operator and operation personnel to ensure that PPE is worn correctly.
- PPE is depended on the research work “risk assessment”
- Transmission : airborne, droplet, and contact isolation
- Biological Safety Level (BSL) : 1, 2, 3, 4

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Personal Protective Equipment

PLACE : Clause 11 (3) using technically appropriate PPE; (8) Spill kits contain PPE

OPERATOR : Clause 8 (d) Provide and control the use of PPE as appropriate

OPERATION PERSONNEL : Clause 12 (c) Use PPE appropriately and conform with RG

Occ Safety, Health, and Environment Acct (2011) : Section 22 PPE as stipulated by the Director-General.

International Standardization and Organization : ISO
European Standards : EN
Australia Standards/New Zealand Standards : AS/NZS
American National Standards Institute : ANSI
Japanese Industrial Standards : JIS
The national Institute for Occupational Safety and Health : NIOSH
Occupational Safety and Health Administration : OSHA
National Fire Protection Association : NFPA

Table 11. ***Personal protective equipment***

EQUIPMENT	HAZARD CORRECTED	SAFETY FEATURES
Laboratory coats, gowns, coveralls	Contamination of clothing	• Back opening • Cover street clothing
Plastic aprons	Contamination of clothing	• Waterproof
Footwear	Impact and splash	• Closed-toe
Goggles	Impact and splash	• Impact-resistant lenses (must be optically correct or worn over corrective eye glasses) • Side shields
Safety spectacles	Impact	• Impact-resistant lenses (must be optically correct) • Side shields
Face shields	Impact and splash	• Shield entire face • Easily removable in case of accident
Respirators	Inhalation of aerosols	• Designs available include single-use disposable; full-face or half-face air purifying; full-face or hooded powered air purifying (PAPR); and supplied air respirators
Gloves	Direct contact with microorganisms Cuts	• Disposable microbiologically approved latex, vinyl or nitrile • Hand protection • Mesh

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Personal Protective Equipment

Laboratory coat

Gown

Coverall

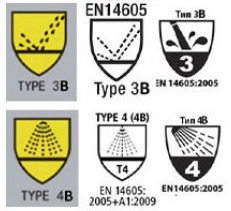
Apron

TYPE	คุณสมบัติ
TYPE 1	ป้องกันก๊าซรั่วเข้า
TYPE 2	ป้องกันฝุ่น น้ำ สะออง
TYPE 3	ป้องกันของเหลวที่มีแรงดันสูง
TYPE 4	ป้องกันของเหลวกระเด็นใส่
TYPE 5	ป้องกันอนุภาคขนาดเล็กที่เป็นอันตราย
TYPE 6	ป้องกันของเหลวหยดใส่

(ยิ่งเลขน้อย ยิ่งป้องกันได้ดี)

ตัวอักษร B แปลว่ากันเชื้อโรค

(ตัวอย่าง)



มาตรฐาน ISO	
ISO 16603:2004	ทนทานต่อเลือด สารคัดหลั่ง
ISO 16604:2004	ทนทานต่อเชื้อโรค
ISO 22610:2018	ทนแรงดันน้ำปนเปื้อน
ISO 22611	ทนต่อสเปรย์น้ำปนเปื้อน
ISO 22612:2005	ทนต่อการซึมผ่านของเชื้อโรค

รหัสที่ควรมองหา

EN14126

(แปลว่าป้องกันเชื้อโรคได้)

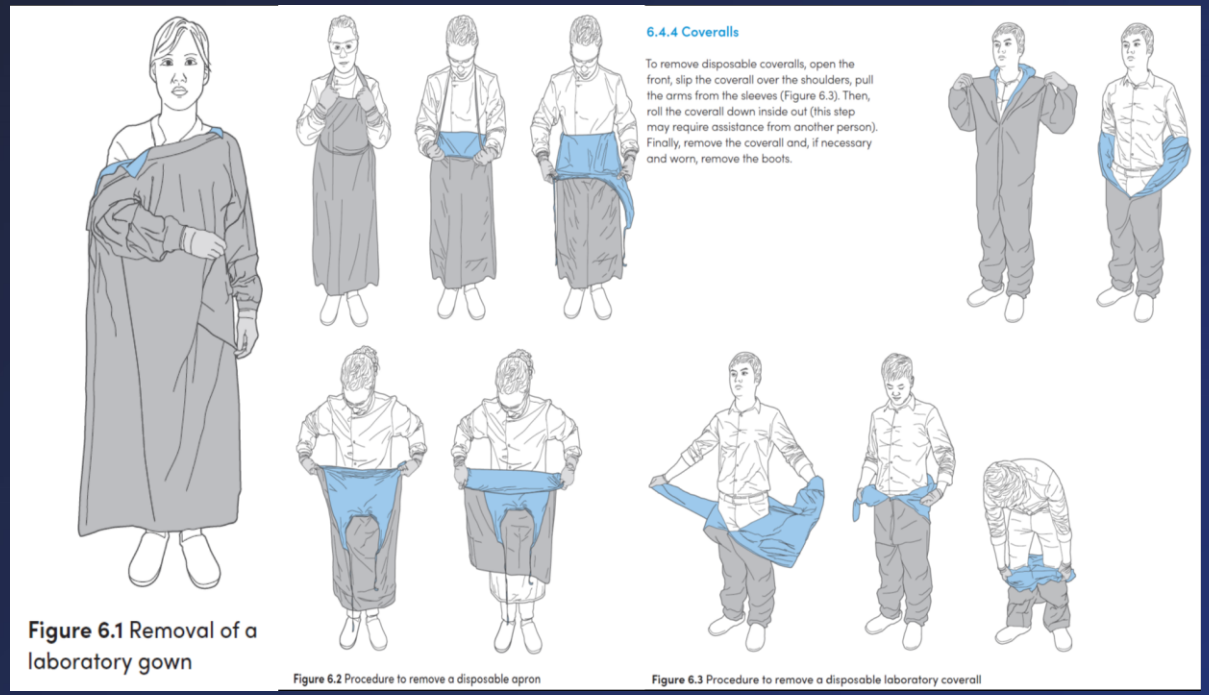


Figure 6.1 Removal of a laboratory gown

6.4.4 Coveralls

To remove disposable coveralls, open the front, slip the coverall over the shoulders, pull the arms from the sleeves (Figure 6.3). Then, roll the coverall down inside out (this step may require assistance from another person). Finally, remove the coverall and, if necessary and worn, remove the boots.

Figure 6.2 Procedure to remove a disposable apron

Figure 6.3 Procedure to remove a disposable laboratory coverall

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Personal Protective Equipment

Air-purifying respirator

Supplied air respirator

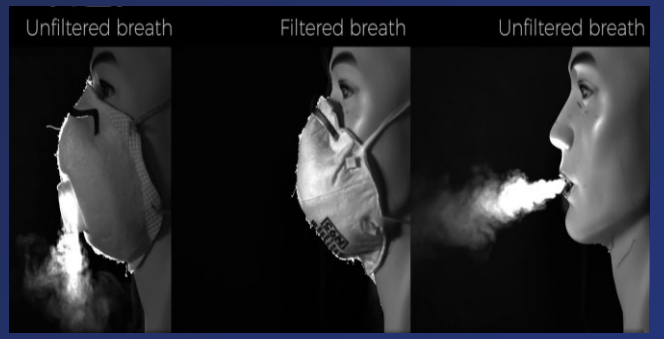
Mask Type	Standards	Filtration Effectiveness		
Single-Use Face Mask 	**China:** YY/T0969	3.0 Microns: ≥95% 0.1 Microns: ✕		
Surgical Mask 	**China:** YY 0469	3.0 Microns: ≥95% 0.1 Microns: ≥30%		
	USA: ASTM F2100	Level 1	Level 2	Level 3
		3.0 Microns: ≥95% 0.1 Microns: ≥95%	3.0 Microns: ≥98% 0.1 Microns: ≥98%	3.0 Microns: ≥98% 0.1 Microns: ≥98%
	Europe: EN 14683	Type I	Type II	Type III
		3.0 Microns: ≥95% 0.1 Microns: ✕	3.0 Microns: ≥98% 0.1 Microns: ✕	3.0 Microns: ≥98% 0.1 Microns: ✕
Respirator Mask 	**USA:** NIOSH (42 CFR 84) **China:** GB2626	N95 / KN95	N99 / KN99	N100 / KN100
		0.3 Microns: ≥95%	0.3 Microns ≥99%	0.3 Microns ≥99.97%
	Europe: EN 149:2001	FFP1	FFP2	FFP3
		0.3 Microns: ≥80%	0.3 Microns: ≥94%	0.3 Microns: 99%

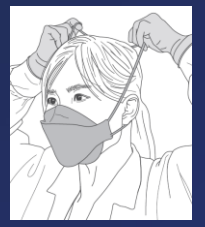
Elastomeric respirator

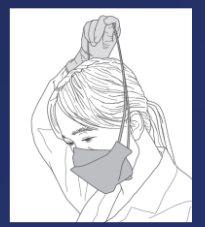
Powered Air Purifying Respirator

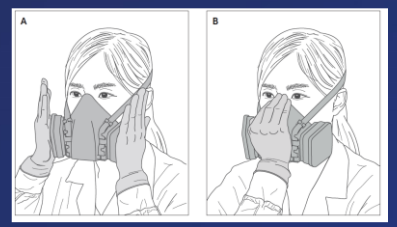
Particulate respirator

Sanitary & Surgical masks









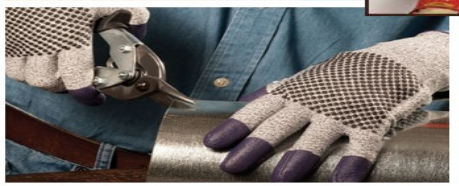
GLOVES

➢ Selection according to the nature of works and people wearing

➢ In a biological laboratory, gloves must be always worn dealing with a potential exposure to microorganisms, blood or fluid from a human or animal body.

➢ **Avoid reusing gloves.** If necessary, gloves must be properly and effectively washed, removed, cleaned and decontaminated.

GLOVES



GLOVES

➢ Gloves must be removed and then hand washed properly after working with pathogens, contaminants or after working in BSC and before leaving the lab.

➢ Used gloves placed in a biohazard waste disposal container.

Glove allergy

1. Allergy to powder causes an irritation around the hands worn.
2. Slow allergy symptoms appear after 24 hours of exposure.
3. Caused by the reaction of immuno-antibody E contained in natural latex proteins.

- If you have an allergic reaction, use powder-free gloves, such as nitrile gloves.

Personal Protective Equipment

Personal Protective Equipment

Safety glasses

- Lens and Cover: Polycarbonate (PC), Polyvinyl acetate (PVA)

Cover

Eyecup

ANSI std Z87.1
MIL-PRF-32432
CAN/CSA-Z94.3
EN 166-1F
AS/NZS 1337.1

Safety goggles

Direct vent

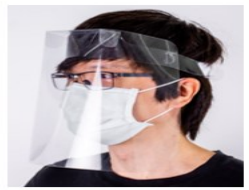
Indirect vent

Non ventilated

Face shield

- Face and neck protection; fit with gown or head protection

Headgear



Foot Protection

EN 20345
มอก.523-2554

No perforated shoes, sandals or cloth sneakers
Comfortable, rubber soled, and cover the entire foot
Heat/Chemical/Germ resistant
Metatarsal/Steel-toed safety

Some laboratories have to use lab shoes only, not use the public ones in lab.

Shoe Cover

- disposable
- Usually in BSL-3 or spill responses
- Carefully dof (not infecting/contaminating)

Hearing Protection

- EAR PLUG
  - PREMOLD-EAR PLUG
  - EAR PLUG/EAR INSERT
- EAR MUFF
- A positive-pressure suits - high noise!

ANSI S3.19-1974

Head Protection

EN 397:2012

Japanese helmet
มอก.368-2554

EN 352-3, EN 166 (3B), EN 1731 (F), EN 397

Cap

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"INSIDE OUT"

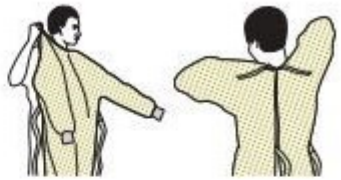
Personal Protective Equipment

SEQUENCE FOR PUTTING ON PERSONAL PROTECTIVE EQUIPMENT (PPE)

The type of PPE used will vary based on the level of precautions required, such as standard and contact, droplet or airborne infection isolation precautions. The procedure for putting on and removing PPE should be tailored to the specific type of PPE.

1. GOWN

- Fully cover torso from neck to knees, arms to end of wrists, and wrap around the back
- Fasten in back of neck and waist



2. MASK OR RESPIRATOR

- Secure ties or elastic bands at middle of head and neck
- Fit flexible band to nose bridge
- Fit snug to face and below chin
- Fit-check respirator

3. GOGGLES OR FACE SHIELD

- Place over face and eyes and adjust to fit

4. GLOVES

- Extend to cover wrist of isolation gown

USE SAFE WORK PRACTICES TO PROTECT YOURSELF AND LIMIT THE SPREAD OF CONTAMINATION

- Keep hands away from face
- Limit surfaces touched
- Change gloves when torn or heavily contaminated
- Perform hand hygiene

CDC

SEQUENCE TO DON PPE

1. GOWN
- Cover torso neck to knees, arms to wrists
- Fasten in back of neck and waist

2. MASK OR RESPIRATOR
- Fit flexible band to nose bridge
- Fit snug to face and below chin
- Fit-check respirator

3. GOGGLES OR FACE SHIELD
- Place over face & eyes, adjust to fit

4. GLOVES
- Extend to cover wrist of isolation gown

SEQUENCE TO DOFF PPE

1. GLOVES
- Peel off leaving inside-out, discard

2. GOGGLES OR FACE SHIELD
- Handle by head band or ear pieces
- Discard in waste container

3. GOWN
- Touch inside of gown only, turn inside out
- Fold or roll into a bundle and discard

4. MASK OR RESPIRATOR
- Grasp bottom, then ties/elastic, remove
- Discard in waste container

PERFORM HAND HYGIENE!

KAISER PERMANENTE®

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PPE

Personal = personal item, no sharing, no taking outside the lab

Protective = meet the standard with trusted quality

Equipment = must be accessible, applied/used, throw away correctly

- Safety must not fail, Be attention with much + consistent
- PPE selection: nature of works, people, and situation
- PPE must be present, check before and clean after.
- **Washing hand is required before & after PPE applied.**

Personal Protective Equipment

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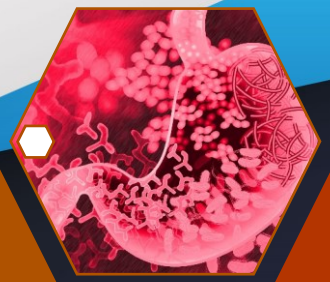
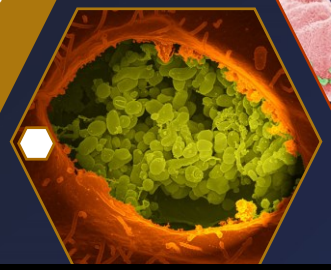
Recombinant DNA technology

Marker gene, particularly antibiotic resistant gene



Interaction between transferred gene and host (end product/product effects)

Ability of vector to survive outside lab (Vector)



Source of DNA to be transferred (Host)

virulence | pathogenicity | infectious dose | environmental stability | route of spread | communicability | operations | quantity | availability of vaccine or treatment | gene product effects

NOTIFICATION OF THE MINISTRY OF PUBLIC HEALTH
RE: SAFETY ASSESSMENT OF TECHNOLOGIES USED IN THE PRODUCTION OF PATHOGENS AND ANIMAL TOXINS, B.E. 2561 (2018)

Clause 4 The pathogens and animal toxins producer shall prepare a safety assessment report of the technologies used in the production of pathogens or animal toxins in the following cases:

(1) Produce pathogens.

(a) Group 1 Pathogens: Only for producing over 1,000 liters of liquid pathogens or over 200 kilograms of solid pathogens.

(b) Group 2 Pathogens: Only for producing over 10 liters of liquid pathogens or over 1 kilogram of solid pathogens.

(c) Group 3 Pathogens

(2) Produce animal toxins with a lethal dose (LD_{50}) less than 100 ng/kg body weight.

(3) Implement technologies allowing the pathogen to alter their genes and resulting in the increased harm or virulence.

(4) Implement technologies allowing animal toxins to alter their properties and resulting in the increased harm.

Clause 5 The producer of pathogens or animal toxins under Clause 4 shall submit a report for the safety assessment of technologies used in the production of pathogens or animal toxins to the Department of Medical Sciences, Ministry of Public Health within thirty days from the commencement date of production of pathogens or animal toxins.

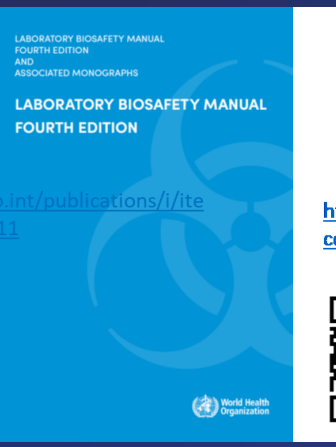
https://blqs.dmsc.moph.go.th/assets/bpat/PATEN20.pdf

https://blqs.dmsc.moph.go.th/en/page-view/150

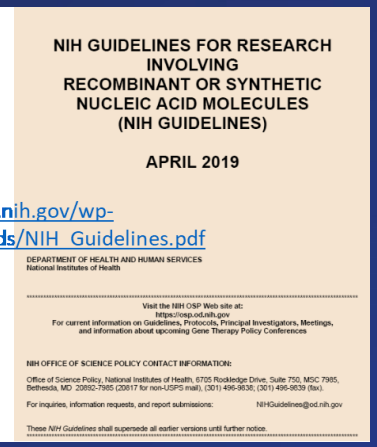
Report form for evaluating the safety of technology used to produce pathogens or animal toxins

- ✓ Location of the laboratory
- ✓ Nature of the laboratory
- ✓ Name of pathogen/animal poison to produce
- ✓ Quantity to be produced
- ✓ Reasons for the need to produce pathogens or animal toxins
- ✓ Purpose of producing pathogens or animal toxins (specify the results, output or products obtained from the production process)
- ✓ Processing time
- ✓ Equipment used to produce pathogens or animal toxins
- ✓ Technology used to produce pathogens or animal toxins
- ✓ Products resulting from the use of such technology that may affect the safety of individuals, the environment or the public.
- ✓ Determination of measures or methods to eliminate or reduce the impact and monitoring measures
- ✓ Reference documents (if any)

https://www.who.int/publications/i/item/9789240011311



https://osp.od.nih.gov/wp-content/uploads/NIH_Guidelines.pdf



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Recombinant DNA technology

Genetic Modified Organisms

Risk Assessment

Consideration of Risk 1-4

Consideration of Biosafety Level 1-4

BSL

Infrastructure and Facilities

Tools and Equipment

SOP

Source of recombinant DNA from donor

Vector ability

Probability of natural DNA exchange

Habitat of donor and recipient

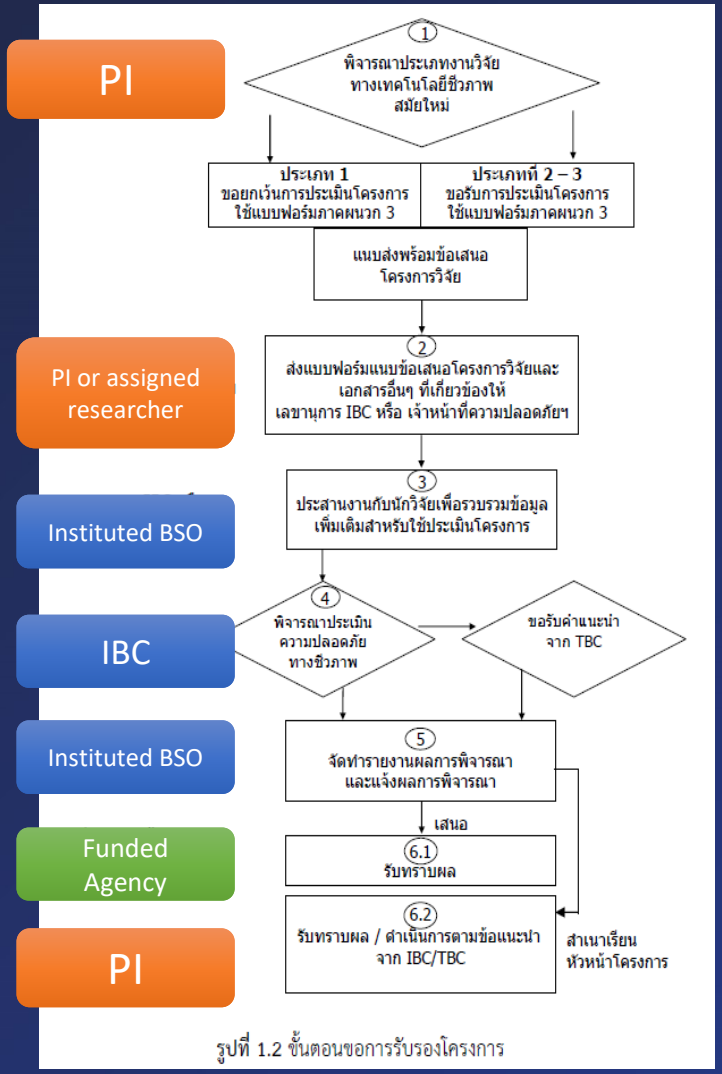
Ability to breeding

Effect of inserted gene in other host gene function

Ability to survive in harsh conditions

Use of antibiotic resistant gene

Pathogenicity, toxicity, carcinogenicity, allergenicity



รูปที่ 1.2 ขั้นตอนขอการรับรองโครงการ

https://www.biotec.or.th/biosafety/images/document/G01-Biosafety%20Guideline.pdf

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Recombinant DNA technology

Category 1 → BSL-1 or 2

- Low risk
- Inform IBC

Category 2 → BSL-1 or 2

- Medium-level risk
- IBC approval

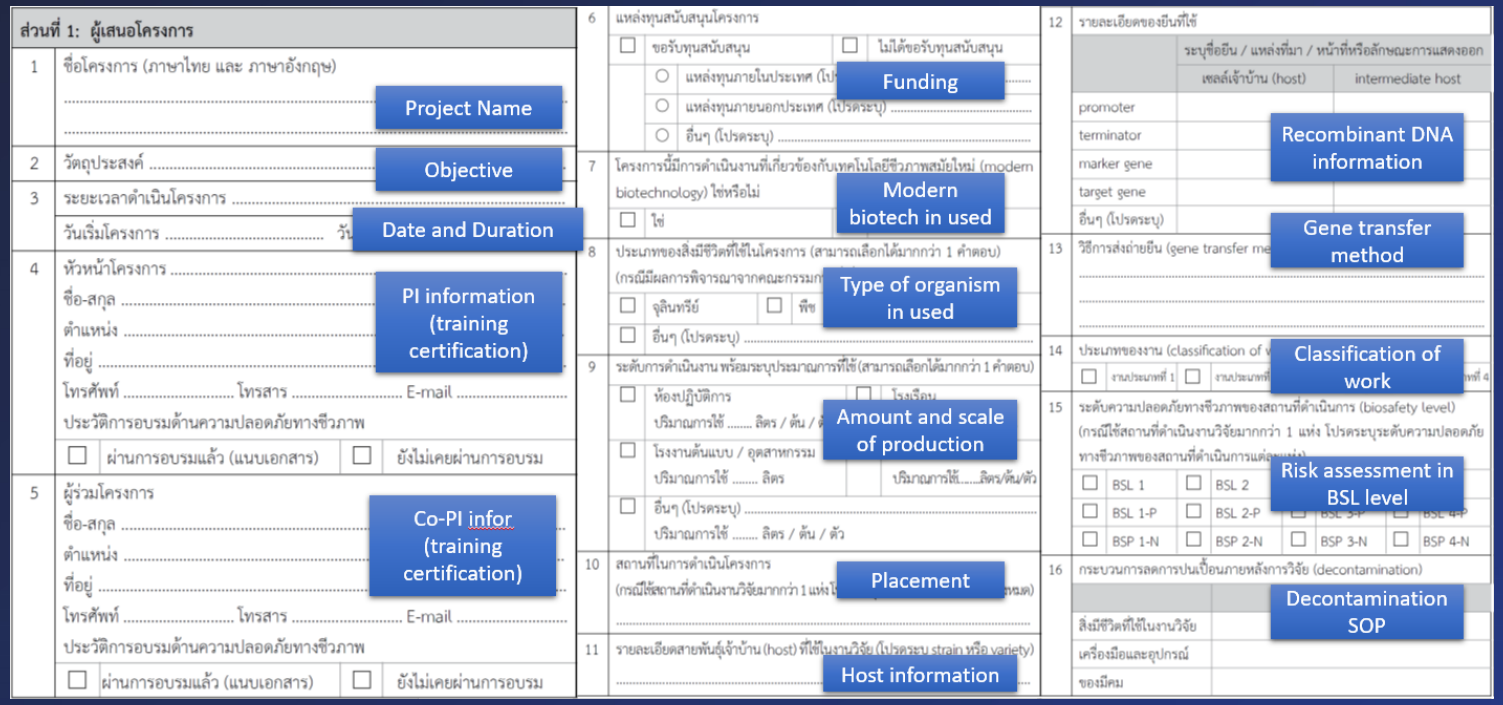
Category 3 → BSL-2 or 3 or 4

- High risk
- IBC approval

Category 4 / Not allow in Thailand

- Recombination in RG-4
- Uncontrolled/unknown with high risk
- Bioterrorism purpose

Application form for consideration of modern biotechnology projects

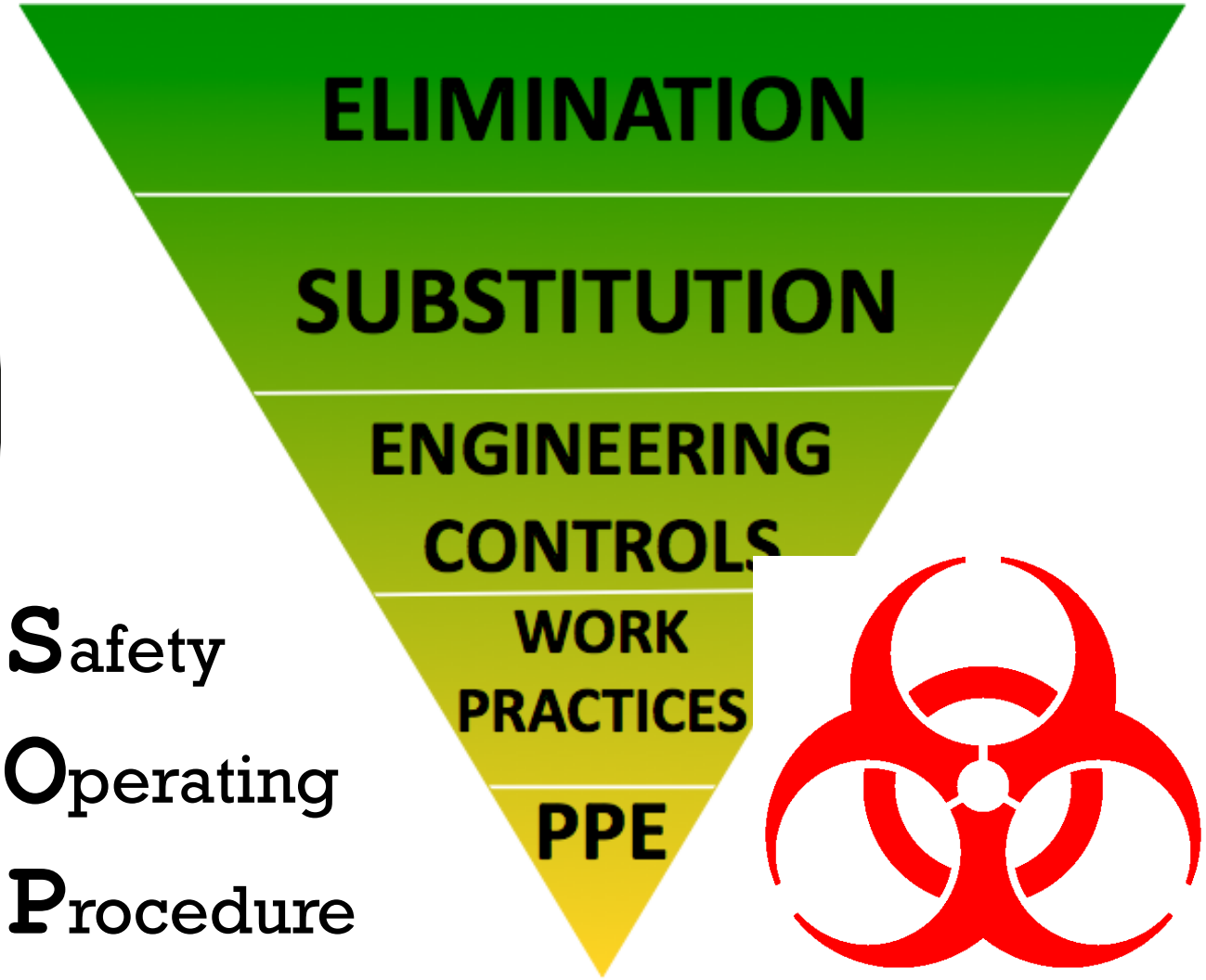


Biosafety & Biosecurity

UNSAFE ACTS &
UNSAFE CONDITIONS

Risk = Probability x Severity

Risk Management



Safety

Operating

Procedure

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Faculty of Science

REFERENCES

K610 SOP

http://ajrscbt.wix.com/k610-scmu#!lab-safety/c1rhw

Faculty of Science (Research Unit)

http://www.sc.mahidol.ac.th/scre/biosafety.htm → แนวปฏิบัติเพื่อความปลอดภัย มหาวิทยาลัยมหิดล

Mahidol University (COSHEM)

http://www.coshem.mahidol.ac.th/

Thailand Law and Regulations

http://blqs.dmsc.moph.go.th/page-view/99

http://www.ratchakitcha.soc.go.th/DATA/PDF/2561/E/043/1.PDF

International organizations

WHO → http://www.fsis.usda.gov/wps/portal/fsis/topics/science/laboratories-and-procedures/guidebooks-and-methods/microbiology-laboratory-guidebook/microbiology-laboratory-guidebook

US – CDC → http://www.cdc.gov/hicpac/pdf/guidelines/Disinfection_Nov_2008.pdf

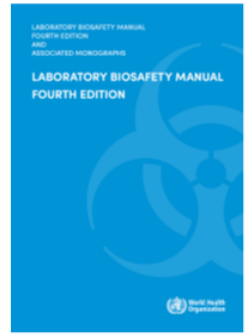
OSHA → https://www.osha.gov

Pathogens and animal toxins Act (PAT Act) 2558

https://blqs.dmsc.moph.go.th/page-view/386

Department of Medical Science (DMSc), Ministry of Public Health (MOPH)

Laboratory biosafety manual, 4th edition



https://www.who.int/publications/i/item/9789240011311

Biosafety in Microbiological and Biomedical Laboratories (BMBL) 6th Edition

https://www.cdc.gov/labs/BMBL.html

Mahidol University
Faculty of Science

INTRODUCTION

Mahidol Science Biosafety Committee (MUSC-IBC)

Tel. 022015041

E-mail: musc.biosafety@hotmail.com

Mahidol University
Faculty of Science

MU-IBC

https://coshem.mahidol.ac.th/

คำสั่งมหาวิทยาลัยมหิดล
ที่ ๔๗๘ / ๒๕๖๔

เรื่อง แต่งตั้งคณะกรรมการอำนวยการความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงาน มหาวิทยาลัยมหิดล และคณะกรรมการความปลอดภัยเฉพาะทางชุดต่าง ๆ

.....

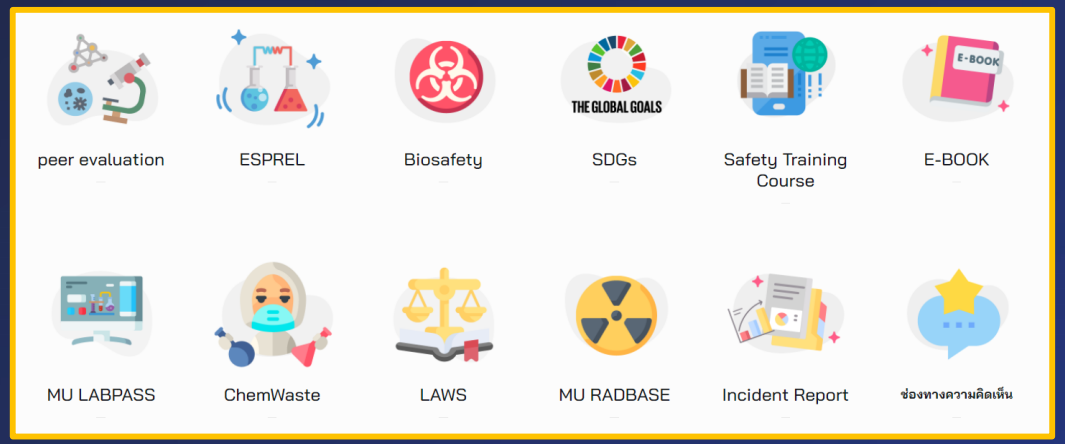
เพื่อให้การบริหารจัดการความปลอดภัยของมหาวิทยาลัยมหิดล มีประสิทธิภาพในการเสริมสร้างความปลอดภัยให้แก่นักศึกษาและบุคลากรทุกระดับ มีองค์ประกอบคณะกรรมการความปลอดภัยครอบคลุมทุกภารกิจที่หลากหลาย จึงเห็นควรให้ยกเลิกคำสั่งมหาวิทยาลัยมหิดล ที่ ๓๕/๒๕๖๐ ลงวันที่ ๔ มกราคม พ.ศ. ๒๕๖๐ และให้แต่งตั้งคณะกรรมการอำนวยการความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงาน มหาวิทยาลัยมหิดล และคณะกรรมการความปลอดภัยเฉพาะทางชุดต่าง ๆ ดังต่อไปนี้

๑. คณะกรรมการอำนวยการความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงาน มหาวิทยาลัยมหิดล (MU Executive Committee for Safety, Occupational Health and Workplace Environment)

๑. อธิการบดี	ประธาน
๒. รองอธิการบดีฝ่ายสิ่งแวดล้อมและการพัฒนาอย่างยั่งยืน	รองประธาน
๓. รองอธิการบดี	กรรมการ
๔. รองอธิการบดีฝ่ายการศึกษา	กรรมการ
๕. รองอธิการบดีฝ่ายนโยบายและแผน	กรรมการ
๖. รองอธิการบดีฝ่ายวิจัยและวิชาการ	กรรมการ

๒. คณะกรรมการควบคุมความปลอดภัยทางชีวภาพ (Biosafety Committee, IBC)

๑. รองอธิการบดีฝ่ายสิ่งแวดล้อมและการพัฒนาอย่างยั่งยืน	ที่ปรึกษา
๒. รองอธิการบดีฝ่ายวิจัยและวิชาการ	ที่ปรึกษา
๓. ศาสตราจารย์เกียรติคุณ ดร.ศรีสิน คูสมิทธิ์	ที่ปรึกษา
๔. ศาสตราจารย์เกียรติคุณ ดร.ฟิไลพันธ์ พุธวัฒนะ	ที่ปรึกษา
๕. รองศาสตราจารย์อรุณี ธิติธัญญานนท์	ที่ปรึกษา
๖. อาจารย์ ดร.กฤษฎา ใจชื้น	ที่ปรึกษา
๗. รองศาสตราจารย์ ดร.ชลภัทร สุขเกษม (คณะแพทยศาสตร์โรงพยาบาลรามาธิบดี)	ประธาน
๘. ศาสตราจารย์ ดร.ธารารัชต์ ธารากุล (คณะแพทยศาสตร์ศิริราชพยาบาล)	กรรมการ
๙. ศาสตราจารย์ ดร.สร้อยศิริ ทวีบูรณ์ (คณะทันตแพทยศาสตร์)	กรรมการ
๑๐. รองศาสตราจารย์ ดร.พงศกร ตันติลีปิกร (ผู้ช่วยอธิการบดีฝ่ายวิจัยและวิชาการ)	กรรมการ
๑๑. รองศาสตราจารย์ ดร.จักร์กริช หิรัญเพชรรัตน์ (คณะสาธารณสุขศาสตร์)	กรรมการ
๑๒. รองศาสตราจารย์ ดร.บุษบา ฤกษ์อำนวยโชค (คณะแพทยศาสตร์โรงพยาบาลรามาธิบดี)	กรรมการ
๑๓. ผู้ช่วยศาสตราจารย์ ดร.เมธา มีแต้ม (คณะวิทยาศาสตร์)	กรรมการ
๑๔. ผู้ช่วยศาสตราจารย์ ดร.รุ่งโรจน์ เชิดตระกูลเกียรติ (คณะเทคนิคการแพทย์)	กรรมการ
๑๕. ผู้ช่วยศาสตราจารย์ ดร.กอบพร บุญนาค (คณะเวชศาสตร์เขตร้อน)	กรรมการ
๑๖. ผู้ช่วยศาสตราจารย์ ดร.กฤษณ์ ถิรพันธุ์เมธี (คณะเภสัชศาสตร์)	กรรมการ
๑๗. ผู้ช่วยศาสตราจารย์ ดร.สุรีย์วัลย์ สิทธิจันดา (คณะสิ่งแวดล้อมและทรัพยากรศาสตร์)	กรรมการ
๑๘. อาจารย์ ดร.กิตติพงศ์ ไพบูลย์สุขวงศ์ (สถาบันชีววิทยาศาสตร์โมเลกุล)	กรรมการ
๑๙. อาจารย์ ดร.วงศ์วรุตม์ บุญญานุโกมล (โครงการจัดตั้งวิทยาเขตอำนาจเจริญ)	กรรมการ



https://coshem.mahidol.ac.th/index.php/ebook/

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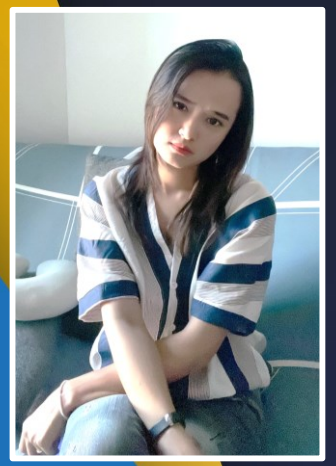

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MUSC-BSO

คำสั่งคณะวิทยาศาสตร์ มหาวิทยาลัยมหิดล
ที่ ๐๕๓. /๒๕๖๕
เรื่อง แต่งตั้งคณะกรรมการควบคุมความปลอดภัยทางชีวภาพ คณะวิทยาศาสตร์

เพื่อให้การควบคุมดูแลความปลอดภัยทางชีวภาพ และการพิจารณาให้การรับรองโครงการวิจัยที่เกี่ยวข้องกับเชื้อโรคและพิษจากสัตว์ และงานที่เกี่ยวข้องกับสิ่งมีชีวิตที่มีการดัดแปลงพันธุกรรมให้เป็นไปด้วยความเรียบร้อยและมีความปลอดภัยทางชีวภาพสูงสุด คณะวิทยาศาสตร์ จึงเห็นสมควรยกเลิกคำสั่งคณะวิทยาศาสตร์ ที่ ๑๕๐/๒๕๖๔ ลงวันที่ ๑๔ มิถุนายน พ.ศ. ๒๕๖๔ และเห็นควรให้มีการแต่งตั้งคณะกรรมการควบคุมความปลอดภัยทางชีวภาพ โดยมีรายนามดังนี้

	รองคณบดีฝ่ายวิจัยและวิเทศสัมพันธ์ คณะวิทยาศาสตร์		ที่ปรึกษา
	รองศาสตราจารย์ พญ.อรุณี	ธิติธัญญานนท์	ที่ปรึกษา
๑.	ผู้ช่วยศาสตราจารย์ ดร.อดิศักดิ์	ร่มแสง	ประธานคณะกรรมการ
๒.	รองศาสตราจารย์ ดร.มาริสา	พลพวก	รองประธานคณะกรรมการ
๓.	ศาสตราจารย์อาวุโส ดร.นพ.นรัตถพล	เจริญพันธุ์	กรรมการ
๔.	รองศาสตราจารย์ ดร.ธเนศ	กังสมัครศิลป์	กรรมการ
๕.	รองศาสตราจารย์ ดร.พรทิพย์	ชัยชมภู	กรรมการ
๖.	รองศาสตราจารย์ ดร.สุรางค์	ชาญกำแหงเดชา	กรรมการ
๗.	ผู้ช่วยศาสตราจารย์ ดร.เมธา	มีแต้ม	กรรมการ
๘.	ผู้ช่วยศาสตราจารย์ ดร.กรกมล	เลิศสุวรรณ	กรรมการ
๙.	ผู้ช่วยศาสตราจารย์ ดร.วรวิทย์	ศุภมั่งมี	กรรมการ
๑๐.	ผู้ช่วยศาสตราจารย์ ดร.สุรเดช	ศิริพัฒนพิพงษ์	กรรมการ
๑๑.	ผู้ช่วยศาสตราจารย์ ดร.นพ.ณัฐพล	ภาณุพินธุ	กรรมการ
๑๒.	ผู้ช่วยศาสตราจารย์ ดร.พรินท์พิดา	สนธิพันธ์	กรรมการ
๑๓.	ผู้ช่วยศาสตราจารย์ ดร.นพ.พรรษกร	ตันรัตนะ	กรรมการ
๑๔.	ผู้ช่วยศาสตราจารย์ ดร.ธวัชชัย	ชัยจรัสพงษ์	กรรมการ
๑๕.	อาจารย์ ดร.รดีกร	อัครวงศาพัฒน์	กรรมการ
๑๖.	อาจารย์ ดร.เยาวรินทร์	นครภักดี	กรรมการ
๑๘.	นางสาววรวัลย์	เดชาวิชิตเลิศ	เลขานุการ

...../๒

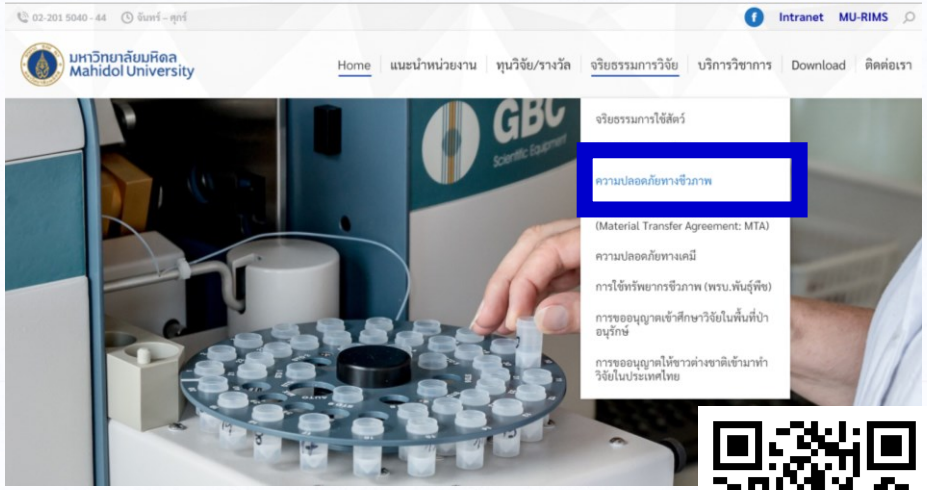
ทั้งนี้ให้มีอำนาจหน้าที่ ดังนี้

๑. พิจารณากลั่นกรองและกำหนดระดับความปลอดภัยทางชีวภาพ (biosafety level, BSL) ของโครงการที่เสนอคำรับรองความปลอดภัยทางชีวภาพ
๒. ออกหนังสือรับรองโครงการวิจัยที่จัดอยู่ในความปลอดภัยทางชีวภาพระดับที่ ๒ (BSL 2) แล้วรายงานผลการพิจารณาโครงการวิจัยให้คณะอนุกรรมการควบคุมความปลอดภัยทางชีวภาพ มหาวิทยาลัยมหิดลทราบ
๓. พิจารณากลั่นกรองโครงการวิจัยที่จัดอยู่ในความปลอดภัยทางชีวภาพระดับที่ ๓ (BSL 3) และให้ความเห็นเสนอต่อคณะอนุกรรมการควบคุมความปลอดภัยทางชีวภาพ มหาวิทยาลัยมหิดล เพื่อพิจารณาและให้คำรับรองต่อไป
๔. กำกับดูแลการใช้และตรวจสอบความปลอดภัยทางชีวภาพของห้องปฏิบัติการต่าง ๆ ของคณะวิทยาศาสตร์

ทั้งนี้ ตั้งแต่บัดนี้เป็นต้นไป

สั่ง ณ วันที่ ๗ กุมภาพันธ์ พ.ศ. ๒๕๖๕

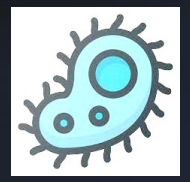
(รองศาสตราจารย์ ดร.พลังพล คงเสรี)
คณบดีคณะวิทยาศาสตร์ มหาวิทยาลัยมหิดล



https://research.sc.mahidol.ac.th/biosafety/

Mahidol University
Faculty of Science

Scientific Research Scopes in MUSC


Bacteria


Yeast and Fungi


Virus

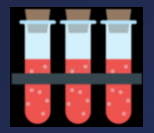

Plants


Insects


Aquatic animals


Animal models


Cell lines


Clinical samples


Environmental samples


Genetic engineering


Industrial scale


Synthetic biology


System biology


Others related

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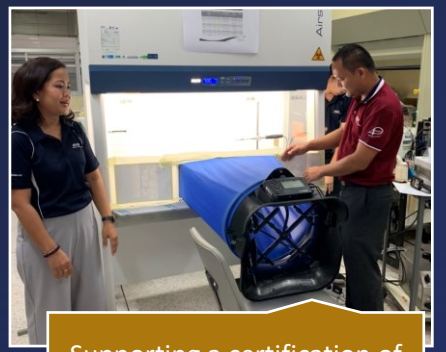
Activities driven by MUSC-IBC

โครงการขอยกเว้น/รับรอง
MUSC-IBC ในปี 2564

Research project evaluation/approval

Policy makers and Facilitators for biosafety works



Supporting a certification of related facilities

BSL-2,3 training courses certified by DMSC, MOPH

BSC Certification **88** in 64

Autoclave Certification **59** in 64

BSL2 Laboratories **48**

BSL1 Laboratories **15**

Biosafety training for grad/undergrad students

Contributing in MU-IBC activities

MUSC-IBC visiting, sharing and learning

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Biosafety Training Course

The 6th First Training Course approved by Dept. Medical Science, Thailand (total 22).

Unique workshop training for scientists and students in diverse fields of study.

Seven training activities were done with > 1000 certified participants.

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Advisory board of the Asian Federation of Biotechnology (AFOB)

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Acknowledgements

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Thank you

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