Lab Bio-safety

GTIIT

EHS Office

CONTENTS

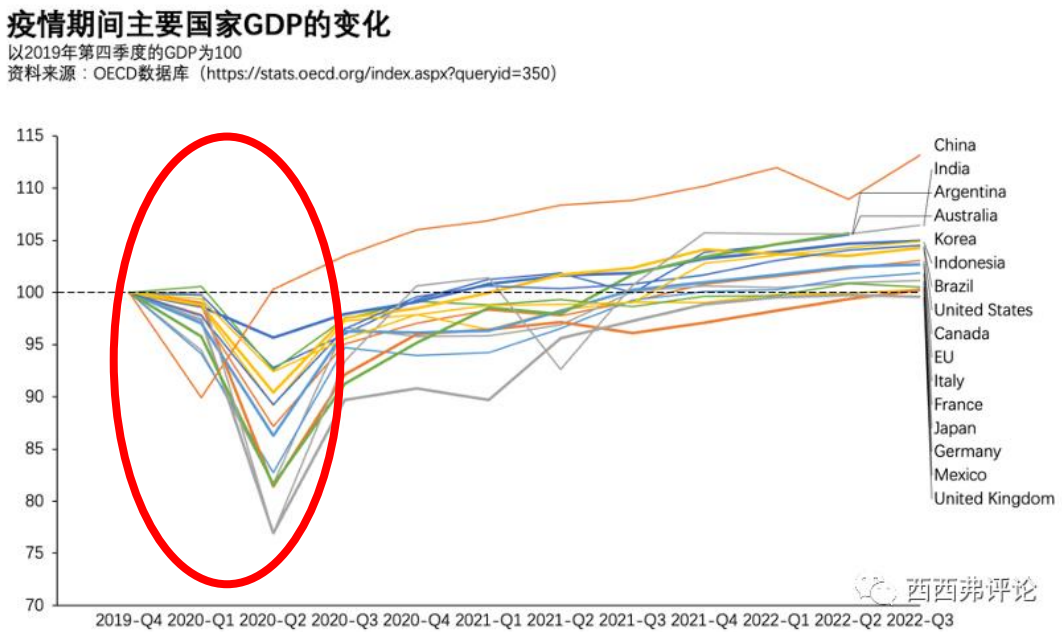
01 Preface

Preface

Why focus on bio-safety?

Preface

Changes in GDP of major countries during the epidemic



Preface

Focusing on biosafety is a key initiative to ensure the safety of **lab members** and the public, to prevent the spread of disease, to protect the environment, to preserve the sustainability of scientific research, to comply with regulations, to promote international cooperation, and to maintain the trust of society.

02 Overview of Biosafety Regulations

Overview of Biosafety Regulations

Role and scope of regulations:

Explain the role and scope of biosafety regulations, emphasizing possible differences in regulations in different countries and regions.

Major laws, regulations and standards

- **Law of the People's Republic of China on Biosafety:** This is a law that comprehensively regulates biosafety practices and is a comprehensive and fundamental law in the field of biosafety.
- **Regulations on the Administration of Biosafety in Pathogenic Microorganism Laboratories:** These regulations govern the establishment, operation, supervision and management of pathogenic microorganism laboratories.
- **General Requirements for Laboratory Biosafety (GB19489-2004):** this is a mandatory national standard that stipulates the requirements for laboratory biosafety levels, facilities, equipment, personnel management and other aspects.

Overview of Biosafety Regulations

Major laws, regulations and standards

- **Technical Code for the Construction of Biosafety Laboratories (GB50346-2004):** This code stipulates the requirements for the design, construction, acceptance and operation of biosafety laboratories.
- **List of Pathogenic Microorganisms Infectious to Human:** The list stipulates the classification of different pathogenic microorganisms, identification standards, testing methods and requirements for experimental activities, providing a basis for laboratories to carry out experimental activities on pathogenic microorganisms.
- **Provisions on the Management of Transportation of Highly Pathogenic Microbial Species (Toxins) or Samples Infectious to Humans:** The provisions stipulate the management of transportation of highly pathogenic microbial species (toxins) or samples infectious to humans.

03 Biological Material Management

Biological Material Management

Regulated Biological Material Management:

Regulates the procurement, storage, use and disposal of biological materials to ensure compliance with biosafety regulations and biological material management standards.

List of Pathogenic Microorganisms Infectious to Human :

The catalog specifies the classification of different pathogenic microorganisms, identification criteria, testing methods and requirements for experimental activities, etc., and provides a basis for laboratories to carry out experimental activities on pathogenic microorganisms.

Biological Material Management

The overall structure of the Catalog remains unchanged from the List, and still consists of three parts: viruses, bacteriophages, and fungi.

表 1. 病毒分类名录

序号	病毒名称			危害程度分类	实验活动所需生物安全实验室级别					运输包装分类 [f]		备注
	英文名	中文名	分类学地位		病毒培养 [a]	动物感染实验 [b]	未经培养的感染材料的操作 [c]	灭活材料的操作 [d]	无感染性材料的操作 [e]	A/B	UN 编号	
1	*Alastrim virus*	类天花病毒	痘病毒科	第一类	BSL-4	ABSL-4	BSL-3	BSL-2	BSL-1	A	UN2814	
2	*Crimean-Congo hemorrhagic fever virus（Xinjiang hemorrhagic fever virus）*	克里米亚—刚果出血热病毒（新疆出血热病毒）	布尼亚病毒科	第一类	BSL-3	ABSL-3	BSL-3	BSL-2	BSL-1	A	UN2814	
3	*Eastern equine encephalitis virus*	东方马脑炎病毒	披膜病毒科	第一类	BSL-3	ABSL-3	BSL-3	BSL-2	BSL-1	A	UN2814	仅培养物 A 类
4	*Ebola virus*	埃博拉病毒	丝状病毒科	第一类	BSL-4	ABSL-4	BSL-3	BSL-2	BSL-1	A	UN2814	

04 Laboratory Levels and Classification

Laboratory Levels and Classification

Figure 1: Biosafety Levels

Biosafety Level (BSL)	Characteristics	Pathogens/Disease
BSL-4	Infectious aerosol transmission that may cause serious or lethal infections with no treatment available	Ebola virus, Variola virus (smallpox), Marburg virus
BSL-3	Infectious aerosol transmission that may cause serious or lethal infections	Coronavirus, Mycobacterium tuberculosis, Yersinia pestis (plague), malaria
BSL-2	Infectious agents of moderate risk with ingestion or mucous membrane transmission	Influenza, Lyme disease, salmonella, measles, mumps
BSL-1	Low-risk agents that are not known to cause human disease	E. coli

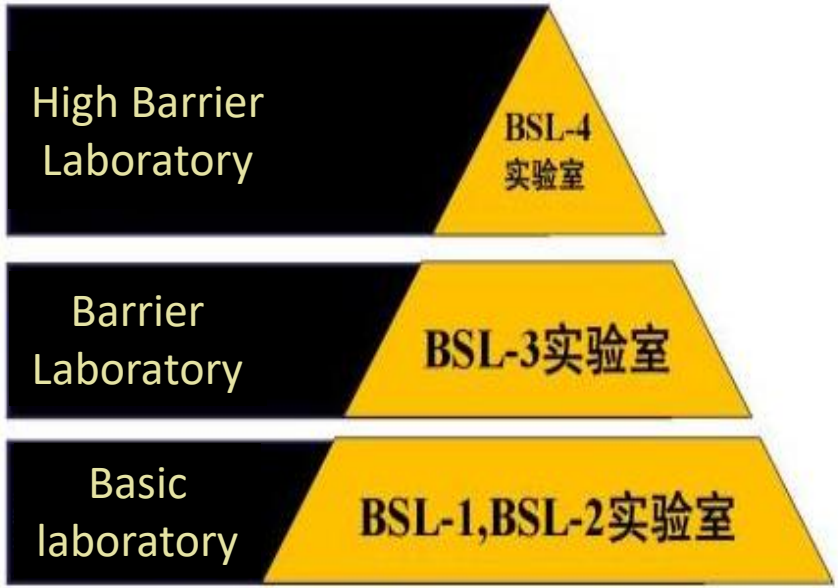
Risk

Source: Adapted from the United States Center for Disease Control and Prevention.

P1~P4實驗室各操作什麼生物？

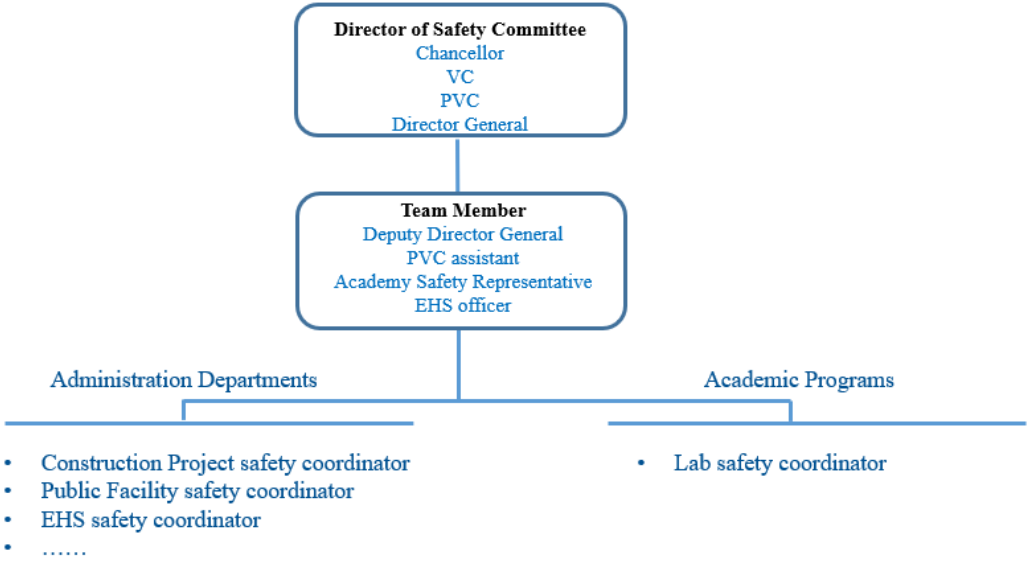
安全等級	BSL-1	BSL-2	BSL-3	BSL-4
可操作的感染性生物材料	不會造成人類疾病，如大腸桿菌K12型	會造成人類疾病（金黃色葡萄球菌、登革病毒）	造成人類嚴重或潛在致命疾病（結核分枝桿菌、新冠病毒）	造成人類嚴重疾病且無疫苗或治療法（伊波拉病毒、天花病毒）

Laboratory Levels and Classification



Laboratory Levels and Classification

Any experimental activity involving pathogenic microorganisms documented in the **List of Pathogenic Microorganisms Infectious to Human** must be submitted to our Biosafety Committee for approval。



All related laboratory/experimental activities are to be declared to the competent Authority and the application is to be completed before it is carried out.

05 Personal Protective Equipment （PPE）

Personal Protective Equipment (PPE)

Select and wear the correct level and type of personal protective equipment.

06 Lab Operating Procedures

Laboratory Operating Procedures

Detailed protocols:

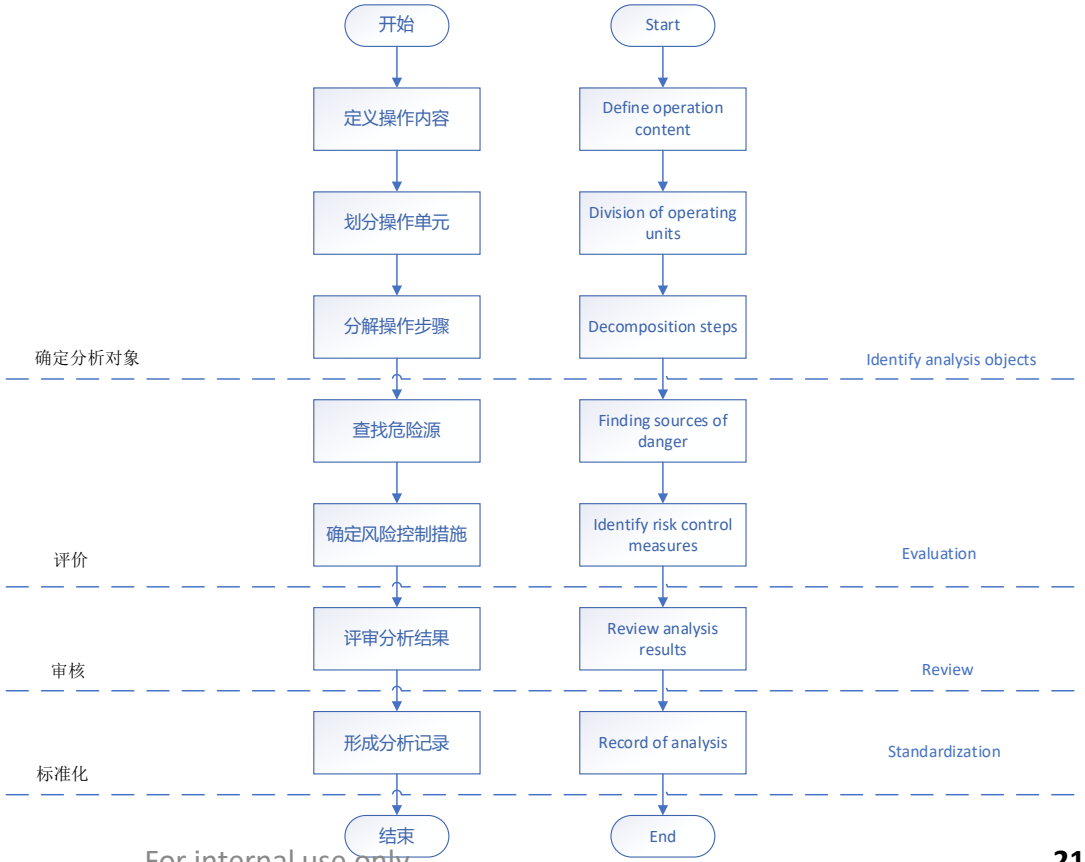
Develop detailed laboratory protocols, including rules for handling biological materials, laboratory cleanup, and equipment operation.

BL2 实验室操作规程

1. 保持实验室门关闭.
2. 作为感染性病原使用及保存的设备必须贴有生物危害通用标志.
3. 无关人员不得进入BL2实验室.
4. 除用于BL2实验的动物以外,其他动物不得进入BL2实验区域.
5. BL2实验区域内严禁吸烟,饮食,饮水或存放食物.
6. 适当的时候要穿着实验工作服.
7. 严禁用嘴移液.应使用机械装置移液.
8. 所有操作规程应尽可能减少浮质或气雾的产生.
9. 避免使用皮下注射器.
10. 使用生物安全柜存放可产生浮质或气雾的装置.
11. 实验结束后和离开实验室前都必须洗手.
12. 每日进行实验台消毒,特别是在发生溅出后应立刻进行消毒.
13. 所有生物废弃物在废弃之前,均应进行消毒灭菌.其他受到污染的实验材料在洗涤,再利用,或废弃之前也均应进行消毒灭菌.
14. 需要转移到其他实验室进行消毒灭菌的实验材料应置于封闭,耐用,防漏的容器内进行运输.
15. 控制昆虫和啮齿动物孳生.
16. 保持实验场所干净整洁.

Experimental Hazard Analysis （EHA）

It is a **preventive** tool that analyze the potential risks behind experiment and develop relevant control measures to eliminate or mitigate the potential hazard to the level we can accept.



07 Laboratory Access Control

Laboratory Access Control

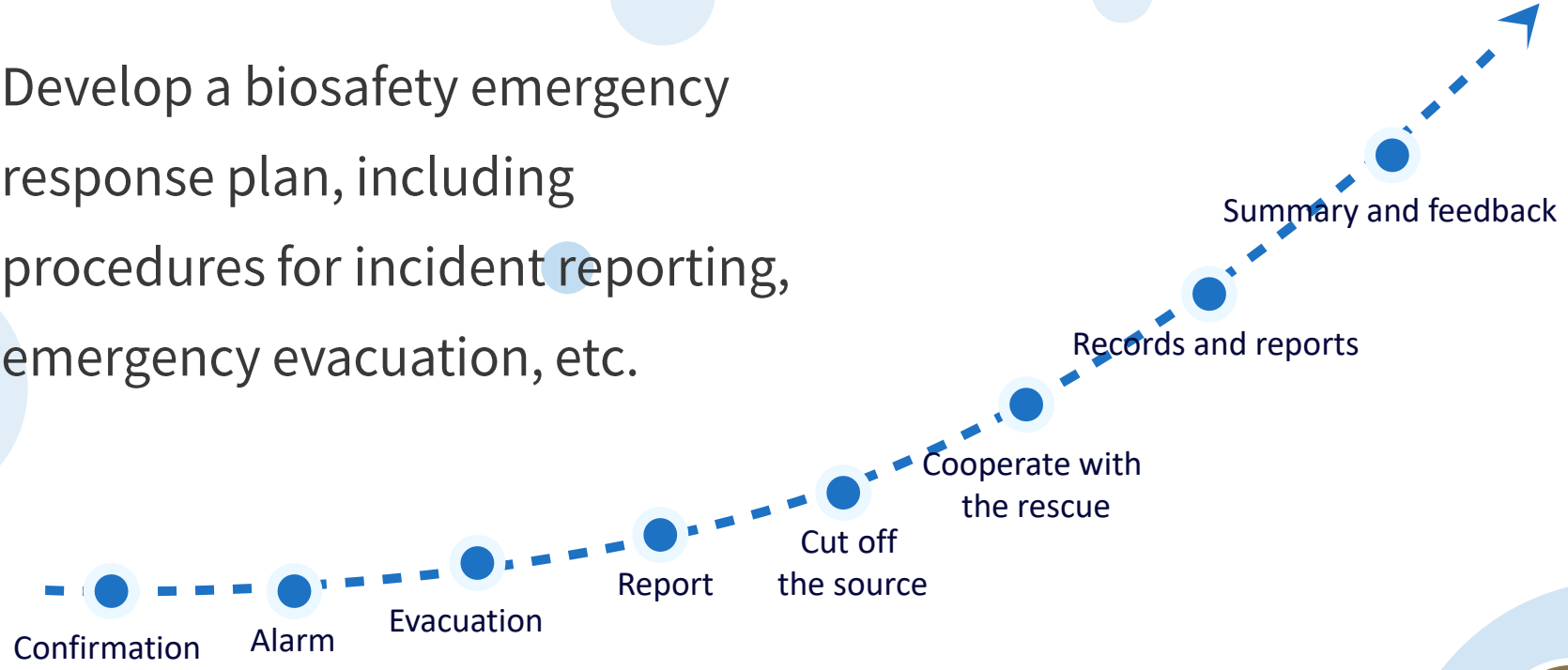
Effective access control measures: Effective laboratory access control measures are in place to record and monitor laboratory visits to ensure that only authorized personnel have access.

For laboratory PI/Managers, it is recommended that the laboratory access list be updated with OPS (yuan.xiao@gtiit.edu.cn) on a regular basis or as any updates become available.

08 Emergency Response Plan

Emergency Response Plan

Develop a biosafety emergency response plan, including procedures for incident reporting, emergency evacuation, etc.



Report

Respond to emergencies in the order of emergency response and rescue operations.

A. Emergency response, 5 steps:

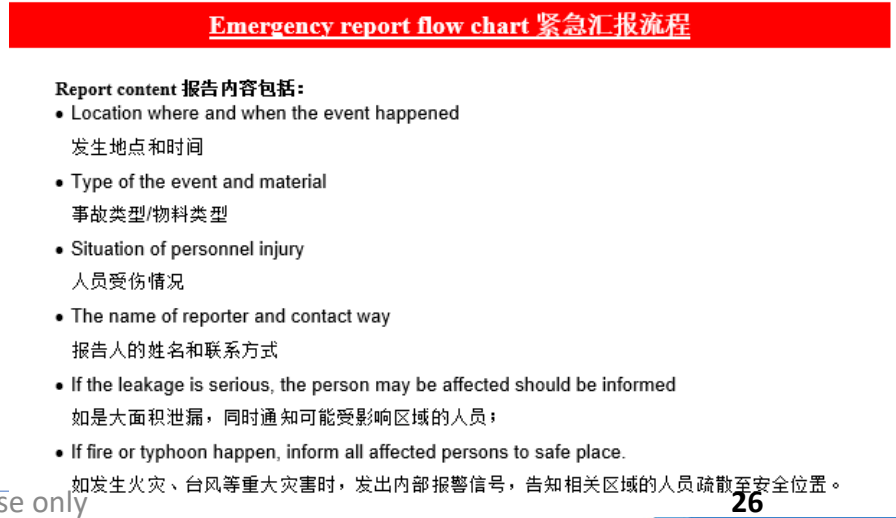
① Keep a safe distance away from the site.

② Report the incident to lab staff on-duty immediately.

③ Inform emergency response team (ERT).

④ Isolate the affected area.

⑤ Identify hazardous chemicals involved.



Emergency report flow chart 紧急汇报流程

Report content 报告内容包括：

- Location where and when the event happened
  发生地点和时间
- Type of the event and material
  事故类型/物料类型
- Situation of personnel injury
  人员受伤情况
- The name of reporter and contact way
  报告人的姓名和联系方式
- If the leakage is serious, the person may be affected should be informed
  如是大面积泄漏，同时通知可能受影响区域的人员；
- If fire or typhoon happen, inform all affected persons to safe place.
  如发生火灾、台风等重大灾害时，发出内部报警信号，告知相关区域的人员疏散至安全位置。

Emergency response

B. Rescue actions, 7 steps:

① Assess the risks

② Select PPE & rescue tools/supplies

③ Stop the source

④ Confine the spill

⑤ Evaluate the risk and implement cleanup

⑥ Decontaminate

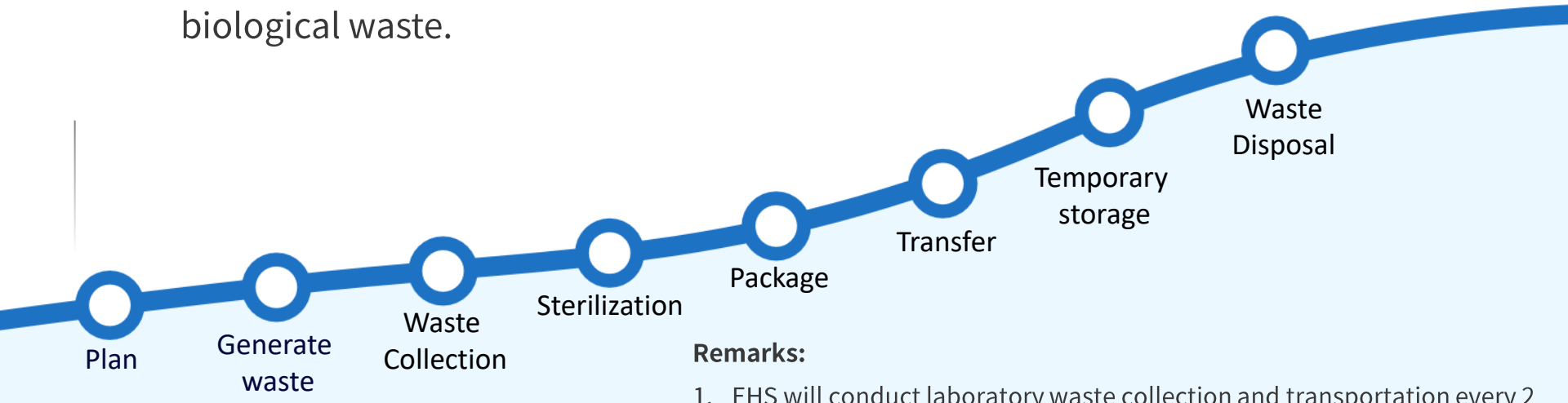
⑦ Site restoration

09 Waste management

Waste management

Waste Handling:

Ensure that waste is segregated, encapsulated and labeled in accordance with regulations, emphasizing the importance of proper handling and disposal of biological waste.



Remarks:

1. EHS will conduct laboratory waste collection and transportation every 2 weeks, please clean up the laboratory waste in time.
2. Biological waste needs to be sterilized as required before disposal as hazardous waste.

Autoclave-related precautions

Purchasing of Autoclaves:

Common Autoclaves belong to **special equipment**, Using license should be applied for according to the requirements, and can only be put into use after obtaining the use registration certificate.

Please purchase the equipment from a qualified supplier that meets the relevant requirements.

特种设备使用登记证

Certificate of Special Equipment Service Registration

编号：粤17粤DOC

按照《中华人民共和国特种设备安全法》的规定，依据特种设备安全技术规范要求，予以使用登记。

使用单位名称：广东以色列理工学院

设备使用地点：

设备种类：压力容器　　设备类别：固定式压力容器

设备品种：第一类压力容器　　单位内编号

设备代码：2170　　产品编号：

登记机关：

发证日期：

依据安全技术规范的要求，应当在定期检验确定的有效期和技术参数范围内使用。

Autoclave-related precautions

Sterilization personnel :

Special equipment operators and managers need to attend the relevant training and test.

A license is required to carry out the appropriate sterilization pot activities.

Autoclave-related precautions

Using certificate:

The use of the Autoclave should be recorded accordingly.

e.g.

生物废弃物灭菌记录表

Bio-waste sterilization record sheet

实验室 Lab：			管理员 Manager：		
灭菌日期 Date	灭菌时间 Time	灭菌操作人 Operator	主要物质 Main contained	灭菌效果 Result	备注 Remake
e.g. 2022-09-28	9：30-10：30	杜某坤	GT 食堂食物残渣		

Autoclave-related precautions

Daily management of autoclave

1. Safety accessories need to be sent for periodic inspection.

（Pressure gauges per half year. Safety valves once a year.）

2. Regular sterilization tests .

10 Training and Education

Training and Education

A. GT level:

- Prior to beginning the lab, you must participate in and pass the online exam prescribed by the school.
- From time to time, EHS will provide thematic offline training and exercises, please participate actively.

B. Program and lab level:

- Program need to hold regular bio-safety seminars/training sessions.
- Lab PI or relevant managers are required to conduct regular training for members.

Training and Education

- Every person who needs to enter the laboratory must pass the training of the corresponding category (biological/chemical) **before entering the laboratory.**
- All laboratory personnel are required to attend and pass **'General-Lab-Safety Courseware**'.
- Whenever there is a significant change in content or the training period **exceeds one year**, a new training and certification is required.

11 Testing and Monitoring

培训和教育

《 Biosafety Approval Regulations for Laboratories and Experimental Activities of Human Transmissible Highly Pathogenic Microorganisms》

Article 24: Laboratories of highly pathogenic pathogenic microorganisms shall conduct regular annual staff training and health monitoring of laboratory staff

Laboratories - General requirements for biosafety
GB 19489-2008

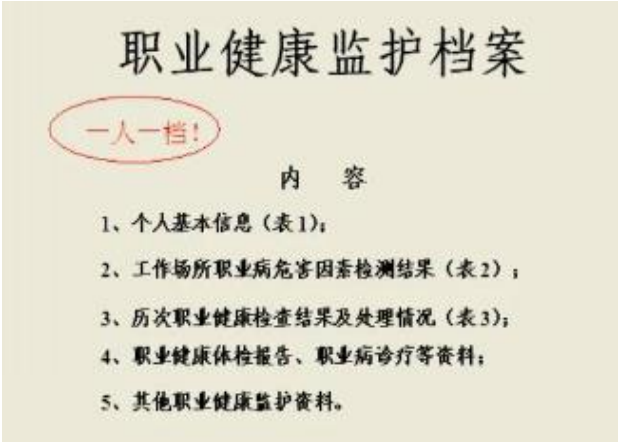
7.14.12
Personnel files should include health screening

7.14.12 实验室或其所在机构应维持每个员工的人事资料，可靠保存并保护隐私权。人事档案应包括（不限于）：

a) 员工的岗位职责说明；
b) 岗位风险说明及员工的知情同意证明；
c) 教育背景和专业资格证明；
d) 培训记录，应有员工与培训者的签字及日期；
e) 员工的免疫、健康检查、职业禁忌症等资料；
f) 内部和外部的继续教育记录及成绩；
g) 与工作安全相关的意外事件、事故报告；
h) 有关确认员工能力的证据，应有能力评价的日期和承认该员工能力的日期或期限；
i) 员工表现评价。

Testing and Monitoring

- **Bio-safety monitoring**:
  Regular laboratory self-inspection, biosafety monitoring and testing, including gas testing, equipment inspections, etc.
- **Personnel monitoring**：
  Annual medical examination to provide appropriate medical assessment for staff working with highly pathogenic micro-organisms。



12 Summary

Summary

Biosafety Top Priority:

Emphasizes that biosafety is the top priority of laboratory work and encourages faculty and students to work together to ensure the overall biosafety of the laboratory.

THANKS