

Emergency Plan for Laboratory Accidents

1. The objective of this Emergency Plan for Laboratory Accidents (henceforth referred to as the "Plan") is to prevent major safety accidents, improve the emergency management process, rapidly and effectively deal with possible accidents, effectively organize and conduct rescue operations, and minimize casualties, property losses and environmental hazards. With reference to the Work Safety Law of the People's Republic of China, the Regulations on the Safety Management of Hazardous Chemicals and Safety Management Practices in the Laboratory, the Plan has been formulated in light of the actual laboratory environment.

2. This Plan applies to the emergency responses and the preliminary disposal of accidents pertaining to laboratory safety.

3. In the event of a laboratory safety incident that fulfills any of the following criteria, the emergency response plan shall be activated without delay:

a. **Explosion or Fire Incident**

An explosion or combustion event occurs at significant hazardous waste sources or within the laboratory premises.

b. **Hazardous Chemical Leakage**

Toxic gases, flammable and explosive substances, or other hazardous chemicals have leaked, posing an imminent or potential severe threat to personnel or the environment.

c. **Biological Hazard Release**

Accidental release or exposure to biological agents classified as Bio-safety Level (BSL) 2 or higher, potentially endangering personnel.

d. **Radiation Exposure Incident**

Unintended exposure to radioactive materials or malfunction of radiation-emitting equipment, exceeding regulatory safety limits.

e. **Critical Equipment Failure**

Failure of essential safety systems (e.g., ventilation, fume hoods, gas detection systems) that compromises laboratory safety.

f. **Infrastructure Damage**

Damage to laboratory infrastructure (e.g., gas leaks, electrical failures, structural collapse) that creates hazardous conditions.

g. **Environmental Contamination**

Release of hazardous materials into the environment (air, water, or soil) that may cause ecological harm.

h. **Unauthorized Access or Misuse**

Unauthorized entry into restricted areas or handling of hazardous materials by untrained personnel, posing a significant safety risk.

i. **Other Safety Incidents**

Any other incidents occurring within the laboratory environment that pose a significant threat to personnel or property.

4. The principle of emergency rescue: personnel first, safety first, unified command and hierarchical responsibility; under the condition of ensuring the safety of personnel, mobilize all forces that can be mobilized to participate in accident rescue work.

5. **Organizational Structure and Responsibilities**

a. **Emergency Response Leadership Group**

The Emergency Response Leadership Group (ERLG) shall be established, consisting of a Team Leader, a Deputy Team Leader, and multiple members. The ERLG is responsible for overseeing the implementation of the emergency response plan (ERP) and ensuring effective coordination during incidents.

b. **Responsibilities of the Emergency Response Leadership Group**

(1) **Implementation of Safety Measures**

Develop and enforce policies related to laboratory safety, accident prevention, and emergency response.

(2) Training and Preparedness

Organize and conduct regular training sessions and simulation drills for the emergency response team and relevant personnel to ensure readiness for laboratory safety incidents.

(3) Education and Awareness

Promote knowledge of emergency response procedures, environmental protection, and laboratory safety among all staff and students.

(4) Preventive Measures and Preparedness

Identify potential risks, implement preventive measures, and ensure the availability of necessary resources (e.g., spill kits, PPE, medical supplies) for emergency response.

(5) Incident Investigation and Reporting

Conduct thorough investigations of laboratory safety incidents, analyze root causes, propose corrective actions, and submit detailed reports to regulatory authorities as required.

6. Roles and Responsibilities of ERLG Members

a. Team Leader

(1) Serve as the commander-in-chief during emergency response operations.

(2) Issue and cancel emergency response orders and signals.

(3) Oversee the entire response process, ensuring effective coordination and communication.

b. Deputy Team Leader

(1) Assist the Team Leader in directing emergency response operations.

(2) Assume command in the absence of the Team Leader, organizing rescue efforts and coordinating with external agencies (e.g., EMS, fire department).

(3) Lead post-incident investigations and compile lessons learned for continuous improvement.

c. Members

(1) Perform specialized roles in emergency response, such as hazard containment, medical assistance, or environmental monitoring.

(2) Follow the unified deployment of the Team Leader and Deputy Team Leader to ensure a coordinated and efficient response.

(3) Contribute to incident investigations and the implementation of corrective actions.

7. Accident Emergency Plan for Common Laboratory Safety Accidents

a. Emergency treatment plan for laboratory fire

(1) As soon as a fire is detected, on-site personnel shall take immediate action to control the fire and report it immediately to prevent the fire from spreading.

(2) Determine the location of the fire and determine the cause of the fire, such as compressed gas, liquefied gas, flammable liquid, flammable or spontaneously combustible goods, etc.

(3) Clarify the environment and assess whether there is a major hazard distribution and possible secondary disasters.

(4) Select appropriate fire-fighting equipment for extinguishing different types of fires. For fires involving solid combustibles, water cooling can be used. For chemical fires, use the appropriate foam extinguishing agent or dry chemical extinguishing agent. If a live device catches fire, the power supply must be disconnected before extinguishing the fire. In the case of combustible metal materials, special extinguishing agents are used.

(5) Confine the hazardous area according to the type and level of hazardous chemical accident that may occur, and isolate and direct the surrounding area of the accident site.

(6) In the event of a fire, call "119" for assistance and direct the fire engine to a prominent location.

b. Emergency treatment plan for laboratory explosion

(1) In the event of a laboratory explosion, the person in charge or the safety officer shall, as soon as it is deemed safe to do so, shut off the power supply and the pipe valves.

(2) All personnel shall follow the instructions of the temporary convener and immediately evacuate the scene of the explosion in an organized manner through safety exits or other means.

(3) The lead group of the emergency plan is responsible for arranging rescue operations and the deployment of personnel.

c. Emergency treatment plan for laboratory electric shock

(1) The principle of electric shock first aid is to take active measures to protect the lives of the injured at the scene.

(2) The person who is electrocuted needs to be disconnected from the power supply as soon as possible, and the injured person should not be directly touched before the disconnection. You can disconnect the person from the power source by cutting off the power switch, picking up the wiring or equipment on the person who has been electrocuted, and wrapping their hands in dry clothes.

(3) After the electrocuted person is separated, it is necessary to closely observe his mental state and make corresponding rescue preparations. People who are awake need to lie flat on their feet and refrain from standing or moving around for a while. People who are unconscious need to lie flat on their back and make sure they are breathing.

d. Emergency treatment plan for laboratory poisoning

(1) During the experiment, if there are symptoms such as burning throat, discoloration or cyanosis of the lips, stomach cramps, nausea and vomiting, it may be caused by poisoning. After taking the following first aid measure according to the cause of poisoning, immediately send them to the hospital for treatment without delay.

(2) First, move the poisoned person to a safe place, unbuckle the collar to ensure unobstructed breathing, and let him breathe fresh air.

(3) For those who are poisoned by accidental ingestion, vomiting, gastric lavage and catharsis should be induced immediately. If the person is awake and cooperative, drink plenty of water to induce vomiting, or drugs may be used to induce vomiting. Patients who do not respond well or who are comatose should be immediately sent to the hospital for gastric tube gastric lavage.

(4) Patients with heavy metal salt poisoning can seek medical attention immediately after drinking a glass of aqueous solution containing a few grams of $MgSO_4$. Never take vomiting medications to avoid danger or complicate the situation. For people who are poisoned by arsenic and mercury compounds, urgent medical attention is necessary.

(5) Personnel poisoned by irritating gas inhalation should be quickly transferred away from the scene, and given 2%-5% sodium bicarbonate solution for aerosol inhalation and oxygen support. If tracheal spasm is present, nebulized inhalation of antispasmodic drugs may be considered.

e. Emergency treatment plan for laboratory chemical burns

(1) Strong acids, strong alkalis and some other chemicals have strong irritating and corrosive effects, in the occurrence of these chemical burns, a large amount of flowing water should be used for rinsing, and respectively use low concentration (2%~5%) weak alkali (caused by strong acid) or weak acid (caused by strong alkali) for neutralization. After processing, the next step will be done according to the situation.

(2) If it splashes into the eyes, the eyes should be thoroughly rinsed immediately with plenty of water or saline on site. Each laboratory floor is equipped with a dedicated eye cleaner. When rinsing, look upwards for at least 15 minutes and do not close your eyes because of pain. After treatment, they will be sent to the hospital for treatment.

f. Emergency treatment plan for laboratory bio-safety hazards

(1) Punctures, cuts or abrasions. The injured person should immediately take off the protective clothing, wash the hands and the injured area, disinfect with appropriate skin disinfectant and do temporary medical treatment; Those who are seriously injured should go to a nearby hospital for treatment as soon as possible. After treatment, the cause of the injury and the microorganisms that may be infected are documented, and a complete medical record is kept.

(2) Animal bites. After being bitten by an animal, the wound should be rinsed with plenty of water, and then the wound should be cleaned and disinfected with soap or iodine and other temporary treatments, and should not be sucked by mouth. Go to the health and disease control department as soon as possible for further local wound treatment, and if necessary, inject epidemic hemorrhagic fever vaccine, rabies vaccine, etc.

(4) Accidental ingestion of potentially dangerous substances. The person's protective clothing should be removed and the person should be sent to the hospital for medical treatment. Doctors should be informed of the substance ingested and the details of the accident, and complete medical records should be kept.

(4) The release of potentially hazardous aerosols (other than bio-safety cabinets). All personnel must immediately evacuate the relevant area, and at the same time immediately notify the person in charge of the laboratory, and set up a temporary cordon to prohibit unrelated personnel from entering.

(5) Infectious substances spill due to container breakage Sturdy gloves should be worn immediately, and after wearing gloves, use a cloth or paper towel to cover the contaminated broken items, and then collect and disinfect them. After collection, disinfectant should be used to wipe the contaminated area, and cloths, tissues, and rags used for cleaning should also be placed in containers containing polluting waste.

(6) The centrifuge tube containing the potentially infectious material is ruptured. Centrifuge tube rupture may occur while the centrifuge is running, and when a centrifuge tube rupture is suspected, the centrifuge should be turned off immediately. If the centrifuge tube is found to be broken after the centrifuge has been stopped, the centrifuge should be closed immediately and the laboratory manager should be notified.

8. Post-Incident Procedures

a. Incident Investigation

Conduct a root cause analysis (RCA) to identify the origin and contributing factors of the incident. Utilize forensic sampling and hazard analysis tools to evaluate the event. Collaborate with occupational health specialists and safety engineers to assess compliance with regulatory standards.

b. Documentation and Reporting

Prepare a comprehensive incident report detailing the etiology, response actions, and outcomes of the event. Include photographic evidence, witness statements, and analytical data. Submit the report to regulatory authorities and institutional review boards (IRBs) as required.

c. Plan Review and Improvement

Revise the emergency response plan (ERP) based on lessons learned and post-incident evaluations. Incorporate corrective actions and preventive measures to mitigate future risks. Conduct simulation drills and training sessions to enhance response efficacy.

9. The emergency support shall be led by the ERLG, and all relevant departments shall be responsible for the division of labor, and in accordance with the provisions of the plan, comprehensively do a good job in all aspects of the guarantee and preparation for the response to laboratory safety accidents, and improve the rapid response and processing capabilities of emergency response .

10. The laboratory department is responsible for the interpretation of these rules.