1 Introduction

This document offers a short and concise overview of step that each laboratory should include for emergency situations in its Laboratory Safety Plan. Understanding the following content is a crucial prerequisite in understanding basic safety fundamentals such as emergency response for working with chemicals in the laboratory.

2 Scope

The guideline applies to lab personnel, and it has been developed to assist them in the preparation of Laboratory Safety Plan.

3 Procedure

3.1 Emergency Management Plan

For any emergency, including fires, chemical spills, injuries, accidents, explosions, and medical emergencies, dial 911 from any KAUST landline, including blue-light phones located in common areas throughout the campus. If a KAUST landline is unavailable or inaccessible during an emergency, dial 012-808-0911 from a mobile phone. The 911 Dispatch Center will send appropriate responders (Fire, Security, and/or Medical) to your location.
Each laboratory should include its own protocol for emergency situations as part of its Laboratory Safety Plan.

3.2 911 notifications

- ✓ Dial 911 from KAUST landlines or 012-808-0911 from mobile phones for all emergencies.
- ✓ Give the location of the event as clearly as possible.
- ✓ Indicate if an ambulance is needed.
- ✓ Specify the location where ambulance attendants, fire fighters or security will be met by the caller.
- ✓ Do not hang up the phone until told to do so.

3.3 Chemical Spill

When a chemical spill occurs, it is necessary to take prompt and appropriate action. The type of response to a spill will depend on the quantity of the chemical spilled and the severity of the hazards associated with the chemical. The first action to take is to alert others in your lab or work area that a spill has occurred. Then you must determine if the spill can be safely cleaned up by laboratory staff without the help of outside responders.

Note: you should only attempt to clean up incidental chemical spills if you are trained, have the proper spill cleanup materials and personnel protective equipment available, and are comfortable doing so.

KAUST has fully trained emergency responders on call 24 hours a day, 7 days a week. Injured personnel are encouraged to use this service by calling 911 from a KAUST landline or 012-808-0911 from a mobile phone.

3.3.1 Incidental Chemical Spills

A spill is considered incidental (or, minor) if the criteria below are met:

- ✓ The spill is a small quantity of a known chemical.
- ✓ No gases or vapors are present that require respiratory protection.
- ✓ Spill clean-up materials and equipment are immediately available.
- ✓ Necessary proper personal protective (PPE) equipment is immediately available.
- ✓ You understand the hazards posed by the spilled chemical.
- ✓ You know how to clean up the spill.
- ✓ You feel comfortable cleaning up the spill.

3.3.2 Major Chemical Spills

A major spill is any chemical spill for which the researcher determines they need outside assistance to safely clean up the spill.

The KAUST fire department provides a 24/7 hazardous material response service. If there is any doubt about safely cleaning up a chemical spill, call 911 from a KAUST landline or 012-808-0911 from a mobile phone.

Actions to be taken when a major spill occurs:

- ➢ Alert people in the immediate area of the spill and evacuate the area.
- ➢ If an explosion hazard is present, do not unplug, or turn electrical equipment on or off – doing so can result in a spark and ignition source.
- ➢ Confine the hazard by closing doors while leaving the room.
- ➢ Use eyewash or safety showers as needed to rinse spilled chemicals off people or yourself.
- ➢ Evacuate any nearby rooms that may be affected. If the hazard will affect the entire building, then evacuate the entire building by pulling the fire alarm.
- ➢ Notify the Fire Department by calling 911 from a KAUST phone or 012-808-0911 from a mobile phone. Always call from a safe location.
- ➢ Make a Safety Data Sheet (SDS) for spilled material available to responders.

3.3.3 Chemical Spill Kits

Spill kits must be available in each laboratory where hazardous chemicals are used or kept. Spill clean-up kits suitable for responding to typical laboratory spills are available from the Chemical Warehouse. Alternatively, you may prepare your own spill kit.

A spill kit should contain the following items:

- ✓ Spill pillows/solvent absorbent
- ✓ Acid/base neutralizer
- ✓ 5 kg (10 lbs) of calcium carbonate or calcium bicarbonate for HF spills
- ✓ Dustpan
- ✓ Broom or brush
- ✓ Plastic bags

- ✓ Waste labels
- ✓ Rubber gloves (check chemical compatibility before use)
- ✓ Rubber boots or shoe covers
- ✓ Chemical splash goggles

The spill kit should be clearly labeled as "SPILL KIT", with a list of the contents posted on or in the kit.

3.3.4 Mercury Spill Kits

All labs that use mercury must have a mercury spill kit. Mercury spill kits can be obtained at the Chemical Warehouse. These kits can include mercury absorbent sponges and powders, vapor absorbent powders, small pumps and shovels, and bags or jars to contain any spills. All spills of mercury must be cleaned up immediately. During such incidents the area should be evacuated and ventilated, if possible. After cleaning up the mercury spill, contact HSE so the area can be monitored for any mercury contamination.

3.3.5 Spill Kit Training

Laboratory personnel should be properly trained on:

- ✓ How to determine if they can or should clean up the spill, or if they should call 911 from a KAUST phone or 012-808-0911 from a mobile phone.
- ✓ Where the spill kit will be kept within the laboratory.
- ✓ How to use the items in the kit properly.
- ✓ How to clean up the different types of chemical spills.
- ✓ How to dispose of spill cleanup material.

HSE can provide assistance in assembling spill kits for laboratories and can provide training on cleaning up small chemical spills.

3.4 Chemical Exposures

Always preplan your experiments and what you will do in case of an emergency. Always identify the locations of the nearest emergency shower and eyewash before working with hazardous chemicals.
The first 10 to 15 seconds after exposure to a hazardous substance, especially to corrosive substances, is critical. Delaying treatment, even for a few seconds, may cause serious injury.

For small chemical splashes to the skin, remove any contaminated gloves, lab coats, etc., and wash the affected area with soap and water for at least 15 minutes. Seek medical attention afterward, especially if symptoms persist.
For large chemical splashes to the body, it is important to get to an emergency shower and start flushing for at least 15 minutes. Once under the shower, and after the shower has been activated, it is equally important to remove any contaminated clothing. Failure to remove contaminated clothing can result in the chemical being held against the skin and causing further chemical exposure and damage. After flushing for a minimum of 15 minutes, seek medical attention immediately.

Always report any accidents or injuries using the online report system.

3.4.1 Using an Eyewash

1. Remove any contact lenses immediately if a chemical or other substance gets into your eye.
2. Immediately go to the nearest eyewash and push the activation handle all the way on.
3. Put your eyes or other exposed area in the stream of water and begin flushing.

4. Forcibly hold your eyelids open and place them over the spray heads on the eyewash station. Roll your eyeballs around to get maximum irrigation of the eyes. This is probably the hardest thing to do but also the most important.
5. Continue to hold your eyes open and have someone else turn the water on. Stations are designed to deliver continuous flushing under gentle pressure to ensure that the substance is flushed from your eye. If you splash hydrofluoric acid in your eyes, follow the special hydrofluoric acid precautions.
6. Have one of your co-workers call the emergency response unit while you continue to irrigate your eyes. Irrigation should last for at least 15 minutes, even after the emergency crews arrive.
7. If you are alone, call 911 from a campus phone or 012-808-0911 from a mobile phone - after you have finished flushing your eyes for at least 15 minutes.
8. After seeking medical attention, submit an accident report using the online report system.

3.4.2 Using an Emergency Shower

1. Immediately go to the nearest emergency shower and pull the activation handle.
2. Once under the stream of water, begin removing your clothing to wash off all chemicals.
3. Keep flushing for at least 15 minutes or until help arrives. The importance of flushing for at least 15 minutes cannot be overstated! If you spill hydrofluoric acid on yourself, follow the special hydrofluoric acid precautions.
4. If you are alone, call 911 from a campus phone or 012-808-0911 from a mobile phone - after you have finished flushing for at least 15 minutes.
5. Seek medical attention.
6. After seeking medical attention, submit an accident report using the online report system.

If someone else in the lab needs to use an emergency shower (and it is safe for you to do so), assist them to the emergency shower, activate the shower for them, and help them get started flushing using the procedures above and then call 911 from a campus phone or 012-808-0911 from a mobile phone. After calling 911, go back to assist the person using the shower and continue flushing for 15 minutes or until help arrives and have the person seek medical attention.

NOTE: Although an emergency is no time for modesty, if a person is too modest and reluctant to use the emergency shower, you can assist them by using a lab coat or other piece of clothing or barrier to help ease their mind while they undress under the shower. If you are assisting someone else, you should wear gloves to avoid contaminating yourself. When using an emergency shower, do not be concerned about the damage from flooding. The important thing to remember is to keep flushing for 15 minutes.

3.4.3 Hydrofluoric Acid (HF)

Hydrofluoric acid (HF) is corrosive and highly toxic. HF burns can be severe and extremely painful, causing extensive damage to the skin and eyes, and to the mucous membranes if breathed or swallowed. HF is absorbed quickly and can cause widespread damage to the body and even death. Any person contaminated with HF must have immediate first aid, followed by medical treatment from a physician as soon as possible.

NOTE: all laboratories using hydrofluoric acid must have calcium gluconate gel readily available. Calcium gluconate can be obtained at the Chemical Warehouse. All persons must be familiar with hydrofluoric

first aid procedures. See **HSE-RST-Chem004G_working with Corrosives_Hydrofluoric Acid** guideline for more information.

3.4.3.1 Skin exposure (HF)

- Move the victim immediately under an emergency shower or other water source and flush the affected area with large amounts of cool running water. Immediately washing off the acid of primary importance.
- Remove all contaminated clothing while flushing with water.
- While the victim is being rinsed with water, arrange for immediate emergency medical assistance by calling 911 from a campus phone or 012-808-0911 from a mobile phone.
- 4.Immediately after flushing with water, begin massaging the calcium gluconate gel into the burn site. Apply the gel every 15 minutes and massage until pain/redness resolve or until medical care is available. Wear gloves when applying the gel to prevent transfer of HF and secondary burns.

3.4.3.2 Eye exposure (HF)

- Immediately flush eyes for at least 15 minutes with copious amounts of cool flowing water.
- If only one eye is affected, be careful not to flush contaminated water into the other eye.
- Call 911 immediately and apply ice water compresses during transport.

3.5 Medical emergencies

In the event of injury or illness where medical assistance is needed, contact 911 from a KAUST landline or 012-808-0911 from a mobile phone. KAUST Emergency Medical Services will provide ambulance transport, if necessary. Follow these tips:

- Protect the victim from further injury or harm by removing any persistent threat to the victim or by removing the victim to a safe place if needed. However, do not move the victim unnecessarily (as this may cause further injury). Do not delay in obtaining trained medical assistance if it is safe to do so;
- Provide first aid until help arrives if you have appropriate training and equipment, and it is safe to do so;
- Send someone outside to escort emergency responders to the appropriate location, if possible.
- KAUST has fully trained emergency responders on call 24 hours a day, 7 days a week. Injured personnel are encouraged to use this service by calling 911 from a KAUST landline or 012-808-0911 from a mobile phone.

3.5.1 First Aid Kits

First aid kits should be available to all laboratory personnel. First aid kits can be obtained at the Chemical Warehouse. It is the responsibility of each center or laboratory to have the appropriate first aid kit for the likely risks occurring in that work area. A responsible person should be should be designated to maintain the kit and properly trained individuals should be available to administer first aid, if necessary. First aid training classes may be arranged through the HSE Department.
First aid kits maintained by university laboratories and offices must:

- ✓ Be kept in sanitary condition.
- ✓ Include the following personal protective equipment:
    - At least one pair of large size examination or laboratory gloves;
    - An airway resuscitator, such as the "pocket mask", for use in mouth-to-mouth resuscitation;
    - A spill kit containing an appropriate disinfectant and other cleanup and disposal materials for handling spills of blood or other body fluids.

3.6 Fire Precautions

All KAUST premises are under fire sensor alarm linked with the Fire Department. Its primary role is to respond to and take command of all incidents requiring emergency attendance. The FD responds also to high-level gas alarms coming from the TGM systems and reports from 911.

- KAUST policy is such that individuals are not supposed to fight fires; but that those who choose to do so may fight small, incipient stage fires (no bigger than a wastepaper basket) as long as they have been trained in the proper use of fire extinguishers.
- If you have been trained in the use of a fire extinguisher, fight the fire from a position where you can escape, and only if you are confident that you will be successful in extinguishing the fire.

If You Discover a Fire or Smell Smoke

- Sound the alarm by pulling the nearest fire alarm pull station or warn others by verbal means.
- Call 911 from KAUST landlines or 012-808-0911 from mobile phones.
- Evacuate the building using the nearest exit and report to the designated assembly point.
- Close doors behind you.
- Do not re-enter the building until you have been told it is safe to do so.

On Hearing a Fire Alarm

- Leave the building immediately by the nearest available exit.
- Close all doors behind you.
- Report to the designated assembly point.
- Do not re-enter until you have been told it is safe to do so.

4 References

- OSHA 3404-11R (2011) – Laboratory Safety Guidance
- KAUST Laboratory Safety Manual
- HSE-RST-Chem001M – Chemical Safety Program
- KAUST Emergency Management Plan

5 Help

Questions about this guideline? Contact: hse@kaust.edu.sa