A safety and security oversight committee should have representatives from all affected sectors and at all levels. A CSSO oversees the safety and security management program. Use the CSSD, as needed, as time permits, and make the necessary arrangements to fulfill all responsibilities.

2. Develop a safety and security policy statement. Setting a formal policy is a means to define, document, and enforce a chemical safety and security management system. A formal policy statement establishes expectations and communicates the institutional intent to all laboratory personnel.

3. Establish institutional expectations. A formal expectation of individuals, rules and procedures for safe and secure practices and establish the responsibility of all involved. These expectations should include general safety rules, laboratory training requirements, manuals for use of materials and equipment, and other documents to communicate rules and expectations to all laboratory personnel.

4. Identify and address particular hazardous materials. Identifying hazardous materials is important to establish a system for training and mentoring all laboratory personnel. Every laboratory should be responsible for safe and secure practices and establish the responsibilities of individuals involved. These controls should include general safety rules, laboratory training requirements, manuals for use of materials and equipment, and other documents to communicate rules and expectations to all laboratory personnel.

5. Evaluate local and address weakness. Safety and security must be considered when designing and maintaining a laboratory and its workstations. A laboratory should be designed to facilitate experimental work as well as reduce accidents.

6. Establish procedures for chemical management. Chemical management is a critical component of a laboratory safety program and includes defined procedures for buying and handling chemicals, including adequate ventilation, appropriate use of personal protective equipment, and institutional rules and procedures to address spills and emergencies, stored chemicals, inventory tracking of chemicals, transport and disposal of chemical waste.

7. Establish a training and proficiency program. Training and proficiency program are essential for a robust safety management system, as well as help prioritize efforts to improve safety and security. The steps in developing an emergency plan include: assessing what types of incidents might occur and taking measures to prevent them, creating a plan for the types of emergencies identified in the first step; and training staff in the procedures outlined in the plan.

8. Establish procedures for chemical management. Organizational rule and procedures for safe and secure practices and establish the responsibility of all involved. These controls should include general safety rules, laboratory training requirements, manuals for use of materials and equipment, and other documents to communicate rules and expectations to all laboratory personnel.

9. Identify and address barriers to following safety and security best practices. It is often challenging to change behaviors and foster a culture of best practices. The institution must identify barriers and set priorities; creating a plan for the types of emergencies identified in the first step; and training staff in the procedures outlined in the plan.

10. Train, communicate, and mentor. Good safety and security practices involve having people consistently follow rules and procedures. However, it is often challenging to change behaviors and foster a culture of best practices. The institution must identify barriers and set priorities; creating a plan for the types of emergencies identified in the first step; and training staff in the procedures outlined in the plan.

Executive Summary

One of the most important pieces of a successful chemical safety and security management system is the establishment of a chemical safety and security management system. Leadership must take the first steps in creating a plan and beginning to plan for the implementation of this plan.

**MANAGEMENT SYSTEM**

**TEN STEPS TO ESTABLISH A SAFETY AND SECURITY MANAGEMENT SYSTEM**

1. Create an Institutional Safety and Security Oversight Committee and Appoint a Chemical Safety and Security Oversight Officer (CSSO). A safety and security oversight committee should have representatives from all sectors and at all levels. A CSSO oversees the safety and security management program. Use the CSSO, as needed, as time permits, and make the necessary arrangements to fulfill all responsibilities.

2. Develop a safety and security policy statement. Setting a formal policy is a means to define, document, and enforce a chemical safety and security management system. A formal policy statement establishes expectations and communicates the institutional intent to all laboratory personnel.

3. Establish institutional expectations. A formal expectation of individuals, rules and procedures for safe and secure practices and establish the responsibility of all involved. These expectations should include general safety rules, laboratory training requirements, manuals for use of materials and equipment, and other documents to communicate rules and expectations to all laboratory personnel.

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**AUTHORING COMMITTEE CREDITS**

This brochure is based on the book, Chemical Laboratory Safety and Security: A Guide to Prudent Chemical Management, which is available for free on the internet at www.nas.edu/bcst.
Institutions must be aware of the potential for the accidental misuse of chemicals, as well as their intentional misuse.

WHAT ARE THE TYPES OF HAZARDS AND RISKS?
Laboratories have a variety of risks, from both inside and outside the facility. Some risks may affect only the laboratory itself, but others could affect the larger institution and even the public if handled improperly.

Large-Scale Emergencies and Sensitivities
Any type of large-scale event can affect the health and safety of laboratory operations. Some of the most common large-scale emergencies and sensitivities include fire, flooding, and chemical spills. Power outages due to natural events such as storms, tornadoes, or earthquakes can also impact laboratory operations.

Security Breaches
Intentional or unintentional security breaches in the laboratory by either personal or outside agents pose a serious risk to the institution. These breaches may include theft or diversion of high-value equipment or dual-use chemicals that may be utilized for illegal activities; accidental or intentional interference or exposure of hazardous waste; and unauthorized laboratory experiments.

Toxic Chemical Exposure
Over the last 50 years, most hazardous in a laboratory is the toxicity of various chemicals. A substance is entirely safe, and a chemical is not necessarily safe. It's important to ensure that all laboratory employees are aware of the potential hazards associated with chemicals in the laboratory, such as exposure to toxic chemicals, surfactants, or acidic or basic environments.

Flammable, Explosive, and Reactive Chemicals
Some chemicals are extremely dangerous and can cause severe injury or death. Flammable and explosive chemicals include a variety of substances that can cause severe injury or death. Reactive chemicals are substances that are incompatible with each other, and can cause severe injury or death.

Biohazards
In laboratories, control of biohazards is critical to prevent exposure to potentially dangerous pathogens. This includes the organism being manipulated, any alterations made to the organism, and the activities that will be performed with the organism. Laboratories must implement policies and procedures to minimize the risk of exposure to biohazards.

Hazardous Waste
Virtually every laboratory experiment generates some waste. Materials that are discarded or are generated during laboratory experiments include biological waste, chemical waste, and electronic waste. Laboratory safety and security require mandatory rules and programs, as well as a commitment from everyone in the laboratory to follow safety and security protocols.

Understand Barriers to Following Safety and Security Procedures
There are many organizations to contact for information, training, and funding. Suggestions include the following:

- American Chemical Society—Division of Chemical Health and Safety
- Organization for the Prohibition of Chemical Weapons
- International Union of Pure and Applied Chemistry—Safety Training Program
- The U.S. Chemical Security Engagement Program
- www.inchem.org/
- www.iupac.org/standing/coci/safety-program.html
- www.who.int/ipcs/en/

WHAT CAN YOU DO TO IMPROVE CHEMICAL SAFETY AND SECURITY?

Institutions have a variety of risks, from both inside and outside the facility. Some risks may affect only the laboratory itself, but others could affect the larger institution and even the public if handled improperly.

Promote a Culture of Chemical Safety and Security
A laboratory's safety and security policies should be well publicized and enforced. Laboratory managers and supervisors are responsible for ensuring that employees are aware of the safety and security policies and procedures. They should also be responsible for ensuring that employees are trained in the proper use of laboratory equipment and procedures.

Assign Responsibility and Accountability for Laboratory Safety and Security
Laboratory safety and security require mandatory rules and programs, as well as a commitment from everyone in the laboratory to follow safety and security protocols. Laboratory safety and security policies and procedures must be well publicized and enforced.

Enforce Laboratory Safety and Security
Laboratory safety and security require mandatory rules and programs, as well as a commitment from everyone in the laboratory to follow safety and security protocols. Laboratory safety and security policies and procedures must be well publicized and enforced.

End User Fundamentals
There are many organizations to contact for information, training, and funding. Suggestions include the following:

- National Institute for Occupational Safety and Health
- American Chemical Society—Division of Chemical Health and Safety
- The International Program on Chemical Safety/WHCHEM
- www.inchem.org/
- www.iupac.org/standing/coci/safety-program.html
- www.who.int/ipcs/en/

WHERE CAN YOU GET HELP?
There are many organizations to contact for information, training, and funding. Suggestions include the following:

- National Institute for Occupational Safety and Health
- American Chemical Society—Division of Chemical Health and Safety
- The International Program on Chemical Safety/WHCHEM
- www.inchem.org/
- whcchem.org/