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# Chemical Safety and Security Officer Training for Laboratory Settings

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## **INTERNATIONAL CHEMICAL THREAT REDUCTION DEPARTMENT**

Sandia National Laboratories' International Chemical Threat Reduction Program (ICTR), in association with the U.S. Department of State's Chemical Security Engagement Program (CSP), is pleased to offer a five-day training course in chemical laboratory safety and security.

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## INTRODUCTION

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As countries become more economically competitive and strive to increase chemistry activity, they face many challenges in improving laboratory safety and security. The Chemical Security Engagement Program (CSP) seeks to develop and facilitate cooperative international activities that promote best practices in chemical security and safe management of hazardous chemicals. This course fulfills the CSP objectives which include:

- Providing technical expertise and training to improve best practices in security and safety among chemical professionals and industry;
- Providing opportunities for collaboration with the international professional chemical community.

**Description:** This training covers a broad range of chemical laboratory safety and security topics. Each training session provides a comprehensive overview of the many considerations in developing best practices and in establishing a chemical laboratory safety and security management program. Chemical Safety and Security Officer training (CSSO) is designed to provide information and tools that support professionals to train others and to establish chemical safety and security programs at their home institutions.

Please see the curriculum and agenda that follows this section.

**Audience:** This training is designed for academic chemists and chemical engineers responsible for the operation of teaching and research laboratories and for training students. This course is also for chemical scientists who are responsible for institutional research and/or analysis in chemical laboratory facilities in government or industry. This may include administrators, professors, lab managers/supervisors, and lab safety personnel. The goal of this course is to prepare chemical scientists for training others (professors, students, laboratory managers and chemists) in best practices in chemical safety and security.

**Venue:** Training will be conducted at various locations around the world. Workshop locations are based on available facilities and are selected to simplify travel for regional attendees. Field visits and practical exercises will be conducted at a laboratory convenient to the training location.

## CHEMICAL SAFETY & SECURITY WORKSHOP CURRICULUM

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### *Day 1:*

Introduction to a Chemical Safety and Security Program: Training as a chemical safety and security officer, or establishing a chemical safety and security plan requires extensive knowledge of best safety practices and administrative approaches to safety. This module provides information on the basic principles of chemical health, safety and security in the laboratory setting, as well as the organization of a chemical safety and security program and the responsibilities of the safety and security officer. Aspects of a chemical safety and security plan are reviewed. A homework exercise prepares participants for the next day.

### *Day 2:*

Lab Design, Ventilation and Hoods, Chemical Management, Hazards: The laboratory is a facility to support the primary functions of the users in a safe and efficient manner. It also serves to protect the community and environment from exposure to hazardous materials. This is best accomplished through proper design and use of engineered controls. This module covers the fundamentals of laboratory design and engineered ventilation systems, in addition to the proper management and storage of chemicals, and awareness of non-chemical hazards in the chemical laboratory. The homework exercise from Day 1 provides for open topical discussion for all participants, while a second assignment is provided to prepare for Day 3.

### *Day 3:*

Lab Visit, Fire Prevention, Transportation, and GHS/REACH: Participants visit a chemical laboratory in the area to serve as an example of both good safety practices and in how things can be improved. Aspects of earlier learning modules are reinforced, with testing of a laboratory hood and spill cleanups being demonstrated. A walk through to represent a safety and security inspection is performed in the lab as well. The afternoon module will review the current international requirements for chemical transport and guidelines for chemical management as proposed by the United Nations Global Harmonized System (GHS) program and the European Union's Registration, Evaluation, Authorization of Chemicals (REACH) regulations. The homework exercise from Day 2 is reviewed and discussed among all participants, while a third exercise is provided to prepare for Day 4.

#### *Day 4:*

Chemical Toxicology and Exposures, Emergency Planning and Response, PPE: Accidental releases from chemical processes pose a serious threat both to workers, facilities, and the surrounding community. How do you keep laboratory users and the community safe? Preventing worker injury and illness may be controlled through implementing controls such as operating procedures, hazard-specific training, safety equipment, engineering controls, and personal protective equipment. Preventing accidents and incidents is essential for institutional sustainability, and planning for emergency response can minimize the consequence of an accident. Accident investigation and reporting are covered as methods for learning from past incidents and implementing continuous safety improvement. The homework exercise is discussed, and case studies are distributed for participants to prepare for tomorrow.

#### *Day 5:*

Lab Inspection, Chemical Safety Calculations, and Chemical Waste: Participants get to practice their skills and continue learning by a series of activities. These include another visit to the lab to conduct a mock lab inspection as well as liquid and solid spill cleanups. Case studies that highlight previous incidents in chemical laboratories are reviewed and discussed, and some basic calculations for chemical safety are performed. This last training module also will also cover the final stage of chemical life cycle including waste disposal and recycling, best practices, and approaches for treating and disposing of waste. Participants take a short exam that is reviewed by the class to reinforce the training. Time is allotted for discussion, next steps, and participant feedback.

## CHEMICAL SAFETY & SECURITY WORKSHOP AGENDA

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### *Day 1: Introduction to a Chemical Safety and Security Program*

<b>Time</b>	<b>Topic</b>
0800	Welcome, Purpose, Goal, and Overview of Workshop
0815	Introductions of Staff, and Participants
0845	Chemical Safety and Security Overview
0915	Chemical Safety History: Persons, Events and US Regulation
0945	Tea Break
1000	Principles of Chemical Health and Safety
1100	Aspects of Chemical Security
1200	Lunch
1300	Organization of a Chemical Safety and Security Program
1400	Chemical Safety and Security Officer Training and Responsibilities
1500	Tea Break
1515	Chemical Safety and Security Plan
1630	Questions and Answers, Homework
1700	Group Dinner

### *Day 2: Lab Design, Ventilation and Hoods, Chemical Management, Hazards*

<b>Time</b>	<b>Topic</b>
0800	Discuss Homework Assignment
0830	Principles and Concepts of Laboratory Design
0930	Tea Break
0945	Principles and Concepts of Laboratory Ventilation
1030	Laboratory Chemical Hoods
1130	Questions and Answers
1200	Lunch
1300	Chemical Management, Storage and Use
1430	Tea Break
1445	Other Hazards in the Chemical Laboratory
1600	Questions and Answers, Homework
1700	Adjourn

### *Day 3: Lab Visit, Fire Prevention, Transportation, and GHS/REACH*

<b>Time</b>	<b>Topic</b>
0800	Lab Visit: Safety/Security Design Issues in a Chemistry Lab
1130	Discuss Homework Assignment
1200	Lunch
1300	Fire Prevention and Protection in Laboratories
1430	Tea Break
1445	Safe/Secure Transport of Chemicals
1515	GHS/REACH
1545	Questions and Answers, Homework
1630	Adjourn

**Day 4: Chemical Toxicology and Exposures, Emergency Planning and Response, PPE**

<b>Time</b>	<b>Topic</b>
0800	Discuss Homework Assignment
0830	Principles of Chemical Toxicology
0945	Tea Break
1000	Occupational Exposure Limits
1045	Emergency/Security Planning and Management
1200	Lunch
1300	Chemical Spill Response and Cleanup
1345	Accident/Incident Investigation
1445	Tea Break
1500	Personal Protective and Safety Equipment
1630	Questions and Answers, Homework
1700	Adjourn

**Day 5: Lab Inspection, Chemical Safety Calculations, and Chemical Waste**

<b>Time</b>	<b>Topic</b>
0800	Group one: Lab Visit - Practice Lab Inspection and Spill Cleanup Group two: Case Studies and Chemical Safety Calculations
0945	Tea Break and switch groups
1000	Group one: Case Studies and Chemical Safety Calculations Group two: Lab Visit - Practice Lab Inspection and Spill Cleanup
1200	Lunch
1300	Pesticide Management
1330	Waste Management and Disposal
1415	On-site Recycling and Waste Treatment
1500	Tea Break
1515	Questions and Answers, Open Discussion
1630	Exam – 30 multiple choice questions
1700	Feedback Form
1900	Group Dinner and Certificate Presentation