

# Table of Contents

## SECTION 1: HEALTH AND SAFETY IN THE RESEARCH LABORATORY

<u>Introduction</u> .....	1-1
<u>EH&amp;S Programs</u> .....	1-1
<u>Training Resources</u> .....	1-3

## SECTION 2: CHEMICAL HAZARDS - RECOGNITION, EVALUATION AND CONTROL

<u>Recognition of Chemical Hazards</u> .....	2-1
<u>Evaluation of Chemical Hazards</u> .....	2-1
<u>Material Safety Data Sheets (MSDS)</u> .....	2-1
<u>Health Effects of Chemicals</u> .....	2-2
<u>Threshold Limits Values</u> .....	2-3
<u>Dose-Response Relationship</u> .....	2-3
<u>Routes of Entry</u> .....	2-3
<u>Target Organ Effects</u> .....	2-3
<u>Control of Chemical Hazards</u> .....	2-4
<u>Designated Area</u> .....	2-4
<u>Engineering Control</u> .....	2-4
<u>Personal Protective Equipment (PPE)</u> .....	2-5
<u>Chemical Hygiene Plan (CHP)</u> .....	2-7
<u>Standard Operating Procedures (SOP)</u> .....	2-7
<u>Work Practice Controls</u> .....	2-7
<u>Chemical Storage</u> .....	2-9
<u>Chemical Waste</u> .....	2-11

## SECTION 3: PHYSICAL HAZARDS - RECOGNITION, EVALUATION AND CONTROLS

<u>Recognition of Physical Hazards</u> .....	3-1
<u>Evaluation of Physical Hazards</u> .....	3-1
<u>Compressed Gases</u> .....	3-1
<u>Vacuum Operations</u> .....	3-3
<u>Cryogenic Vials</u> .....	3-4
<u>Electrical Safety</u> .....	3-4
<u>Ergonomics</u> .....	3-6
<u>Machinery Equipment</u> .....	3-8
<u>Centrifuges</u> .....	3-8

<u>Autoclaves</u> .....	3-11
<u>Research Animals</u> .....	3-12
<u>Glassware Safety</u> .....	3-12
<u>Temperature Extremes</u> .....	3-13
<u>Oil &amp; Sand Baths</u> .....	3-13
<u>Pressure Vessels</u> .....	3-14
<u>Control Methods of Physical Hazards</u> .....	3-14

## SECTION 4: BIOLOGICAL HAZARDS - RECOGNITION, EVALUATION AND CONTROL

<u>Recognition of Biological Hazards</u> .....	4-1
<u>Biohazards</u> .....	4-1
<u>Evaluation of Biological Hazards</u> .....	4-1
<u>Biosafety Level</u> .....	4-1
<u>Waste</u> .....	4-3
<u>Control of Biological Hazards</u> .....	4-4
<u>Working with Biohazards</u> .....	4-4
<u>Biosafety Cabinets</u> .....	4-5
<u>Handling Waste</u> .....	4-7

## SECTION 5: RADIOACTIVE HAZARDS - RECOGNITION, EVALUATION AND CONTROL

<u>Ionizing Radiation</u> .....	5-1
<u>Recognition of Ionizing Radiation</u> .....	5-1
<u>Evaluation of Ionizing Radiation Hazards</u> .....	5-1
<u>Control Methods for Ionizing Radiation Hazards</u> ..	5-1
<u>Non-Ionizing Radiation</u> .....	5-3
<u>Recognition of Non-Ionizing Radiation Hazards</u> ..	5-3
<u>Evaluation of Non-Ionizing Radiation Hazards</u> ..	5-3
<u>Control Methods for Non-Ionizing Radiation Hazards</u> ..	5-4
<u>UV Radiation</u> .....	5-4
<u>IR Radiation</u> .....	5-4
<u>Radio-frequency (RF) &amp; Microwave (MW) Radiation</u> .....	5-4
<u>Laser Radiation</u> .....	5-4

Laboratory Safety Guidelines

Ten Most Common Causes of Laser-Produced  
Eye Injuries..... 5-6

## Laboratory Safety Guidelines

### **SECTION 6: EMERGENCIES**

<u>Fire Incidents</u> .....	6-1
Fire Safety .....	6-1
In the Event of a Fire.....	6-2
Using Fire Extinguishers .....	6-4
Fire Extinguisher Type.....	6-5
<u>Chemical Spills</u> .....	6-6
Respond to Chemical Spills.....	6-6
<u>Lab Injuries</u> .....	6-8
First Aid.....	6-8
<u>Basic First Aid For Chemical Exposure</u> .....	6-8
Eye Contact .....	6-8
Skin Contact .....	6-8
Inhalation.....	6-9
<u>Earthquake Safety</u> .....	6-10
<u>Campus Emergency Preparedness</u> .....	6-12

### **APPENDICES**

#### Appendix A

Responsibilities  
Safety on Site (SOS)

#### Appendix B

Injury and Illness Prevention

#### Appendix C

Chemical Hygiene Plan (CHP)

#### Appendix D

Standard Operating Procedure (SOP)

#### Appendix E

Classes of Hazardous Materials

#### Appendix F

Formaldehyde

#### Appendix G

Chemical Incompatibility Table

#### Appendix H

Target Organ Categorization

#### Appendix I

Personal Protective Equipment (PPE)

#### Appendix J

Gloves - Chemical Resistance and Selection

#### Appendix K

Spill Clean-Up

#### Appendix L

Labeling of Hazardous Materials

#### Appendix M

Chemical Compatibility & Storage of Hazardous Materials

#### Appendix N

Recommended Biosafety Levels

#### Appendix O

Biosafety Cabinets

#### Appendix P

Laboratory Fume Hoods

#### Appendix Q

Controlled Substances

#### Appendix R

Field Safety

#### Appendix S

Shipping of Dangerous Goods

#### Appendix T

Glossary

### **INDEX**

**Back Cover: INFORMATION & ASSISTANCE**