

The Agency for Toxic Substances and Disease Registry (ATSDR) has produced a three-volume series entitled **Managing Hazardous Materials Incidents**. The series is designed to assist emergency response and health care professionals plan for and respond to hazardous material emergencies.

Volume I Emergency Medical Systems: A Planning Guide for the Management of Contaminated Patients.

Volume II Hospital Emergency Departments: A Planning Guide for the Management of Contaminated Patients.

Volume III Medical Management Guidelines for Acute Chemical Exposures.

Volumes I and II are planning guides to assist first responders and hospital emergency department personnel in planning for incidents that involve hazardous materials.

Volume III is a guide for health care professionals who treat persons who have been exposed to hazardous materials.

Agency for Toxic Substances and Disease Registry

Agency for Toxic Substances and Disease Registry	William L. Roper, M.D., Administrator Barry L. Johnson, Ph.D., Assistant Administrator
Division of Health Assessment and Consultation	Robert C. Williams, P.E., Director Juan J. Reyes, Acting Deputy Director
Emergency Response and Consultation Branch	C. Harold Emmett, P.E., Chief

Additional copies of this report are available from:

Emergency Response and Consultation Branch (E57)
Division of Health Assessment and Consultation
Agency for Toxic Substances and Disease Registry
1600 Clifton Road, N E
Atlanta, Georgia 30333
(404) 639-6360

Use of trade names is for identification only and does not constitute endorsement by the Public Health Service or the U.S. Department of Health and Human Services.

This document is printed on recycled paper

Acknowledgements

To facilitate the usefulness of this guidance document, the Agency for Toxic Substances and Disease Registry (ATSDR) convened a panel of experts to guide the project in identifying and ranking the important actions and requirements involved in the safe management of chemically contaminated patients. The panel members brought to the project their different emergency medical perspectives, as well as their life experiences, to ensure that their colleagues would find this guidance document both realistic and useful.

ATSDR thanks the panel members for their contributions:

- Phillip L. Currance, EMT-P
 - Emedia, Inc.
 - 3300 East First Avenue
 - Suite 330
 - Denver, Colorado 80206
 - (303) 377-9100
- Ralph B. “Monty” Leonard, Ph.D., M.D., F.A.C.E.P.
 - Department of Emergency Medicine
 - Bowman Gray School of Medicine
 - Medical Center Boulevard
 - Winston-Salem, North Carolina
 - (919) 748-4625
- Chief Mary Beth Michos, R.N.
 - Training Officer, Montgomery County, Maryland Department of Fire-Rescue Services
 - EMS Specialist, Montgomery County, Maryland Hazardous Incidents Response Team
 - Department of Fire and Rescue Services
 - 101 Monroe Street, 12th Floor
 - Rockville, Maryland 20850
 - (301) 217-2099
- Eric K. Noji, M.D., M.P.H, F.A.C.E.P.
 - Assistant to the Branch Chief for Emergency Response
 - Health Studies Branch (Mail Stop F28)
 - Division of Environmental Hazards and Health Effects
 - National Center for Environmental Health and Injury Control
 - Centers for Disease Control
 - Atlanta, Georgia 30333
 - (404) 639-4682

- Martin J. O'Neill
 - Industrial Hygienist
 - Roy F. Weston, Inc.
 - Raritan Plaza One
 - 4th Floor Raritan Center
 - Edison, New Jersey 08837
 - (908) 225-3990
- Paul R. Seidlitz, R.N.
 - Seidlitz and Associates
 - 457 Altgeld
 - Glendale Heights, Illinois 60139
 - (708) 469-9552

The project was directed by Scott V. Wright, Environmental Health Scientist, Program Operations Section, Emergency Response and Consultation Branch (ERCB), Division of Health Assessment and Consultation (DHAC), ATSDR. Contributors were Frank Mitchell, D.O., Chief Medical Officer, ATSDR; Michael Straight, M.D., Division of Health Studies, ATSDR; and Edwin Kent Gray, Chief, Emergency Response Coordination Group, National Center for Environmental Health and Injury Control, CDC. Consultants to the project were Rosalind Brannigan, Gary Turner, Shelli Rossman, Ron Brown, Eugenia Davis, and B.J. Boyd of Technical Resources, Inc.

This document is the result of an intensive process of comment and review by the panel members, the aforementioned project directors and consultants, and other appropriate federal, state, and private agencies. These include:

- Ben Blankeshire, NREMT-A, NAEMT, Secretary, Board of Directors, Board of Governors
Emergency Management Committee
National Association of Emergency Medical Technicians
9140 Ward Parkway
Kansas City, Missouri 64114
(816) 444-3500
- Kenneth Bouvier, NREMT-I, Chairman
Emergency Management Committee
National Association of Emergency Medical Technicians
9140 Ward Parkway
Kansas City, Missouri 64114
(816) 444-3500
- MacNeil Cross, NREMT-P, Co-Chairman, Mass Casualty Incidents

- Emergency Management Committee
National Association of Emergency Medical Technicians
9140 Ward Parkway
Kansas City, Missouri 64114
(816) 444-3500
- Robert Daughdril, NREMT-P, NAEMT Board of Governors
Emergency Management Committee
National Association of Emergency Medical Technicians
9140 Ward Parkway
Kansas City, Missouri 64114
(816) 444-3500
 - Craig Deatley, EMT-P, PA-C, Advisory Committee Member
Emergency Management Committee
National Association of Emergency Medical Technicians
9140 Ward Parkway
Kansas City, Missouri 64114
(816) 444-3500
 - Eileen Faries, NREMT-P, Advisory Committee Member
Emergency Management Committee
National Association of Emergency Medical Technicians
9140 Ward Parkway
Kansas City, Missouri 64114
(816) 444-3500
 - Steve Finefrock, Education Specialist
Technological Programs Division
Emergency Management Institute
Federal Emergency Management Agency
Building “N”
NETC Campus
Emmitsburg, Maryland 21727
(301) 447-1282
 - John Friery, NREMT-A
Emergency Management Committee
National Association of Emergency Medical Technicians
9140 Ward Parkway
Kansas City, Missouri 64114
(816) 444-3500
 - Niel Holtz, NREMT-P

- Emergency Management Committee
National Association of Emergency Medical Technicians
9140 Ward Parkway
Kansas City, Missouri 64114
(816) 444-3500
- Winston E. Jones, R.N. NREMT-P, NAEMT Board of Directors
Emergency Management Committee
National Association of Emergency Medical Technicians
9140 Ward Parkway
Kansas City, Missouri 64114
(816) 444-3500
 - William J. Keffer, Senior Engineering Advisor
Environmental Services Division
U.S. Environmental Protection Agency, Region VII
25 Funston Road
Kansas City, Kansas 66115
(913) 551-5009
 - Gus A. Koehler, Ph.D.
Disaster Medical Response Planner
California Emergency Medical Services Authority
1930 9th Street, Suite 100
Sacramento, California 95814
(916) 322-2300
 - Kenneth Kuntz
Fire Data Specialist
Office of Fire Data and Analysis
U.S. Fire Administration
16825 South Seton Ave.
Emmitsburg, Maryland 21727
(301) 447-1272
 - Paul Manascalo, NREMT-P, NAEMT Vice President
Emergency Management Committee
National Association of Emergency Medical Technicians
9140 Ward Parkway
Kansas City, Missouri 64114
(816) 444-3500
 - Kent R. Olson, M.D., F.A.C.E.P., Medical Director

San Francisco Area Regional Poison Control Center
San Francisco General Hospital
1001 Potrero Avenue
San Francisco, California 94110
(415) 821-5526

- Chappell D. Pierce, Director
Office of Fire Protection Engineering and Systems Safety Standards
U.S. Department of Labor
Occupational Safety and Health Administration
200 Constitution, N.W. — Room North 3609
Washington, D.C. 20210
(202) 523-7216
- Alonzo Smith, NREMT-P
Emergency Management Committee
National Association of Emergency Medical Technicians
9140 Ward Parkway
Kansas City, Missouri 64114
(816) 444-3500
- Clark Staten, NREMT-P, Co-Chairman Hazardous Materials
Emergency Management Committee
National Association of Emergency Medical Technicians
9140 Ward Parkway
Kansas City, Missouri 64114
(816) 444-3500
- Dave Tauber, NREMT-P
Emergency Management Committee
National Association of Emergency Medical Technicians
9140 Ward Parkway
Kansas City, Missouri 64114
(816) 444-3500
- Joe E. Taylor, R.N., Ph.D.
Emergency Nurses Association
16 Chickasaw Drive
Laurel, Mississippi 39440
(601) 425-6809 (pager)
(601) 426-4720 (office)
- Sandra L. Tirey, Associate Director

Health, Safety, and Chemical Regulations
Chemical Manufacturers Association
2501 M Street, N.W.
Washington, D.C. 20037
(202) 887-1274

- Wallace Weaver
Emergency Management Specialist
U.S. Department of Energy
EM-50.1
12800 Middlebrook Road
Germantown, Maryland 20585
(301) 353-7669
- Steve White, NREMT-P, NAEMT Board of Directors
Emergency Management Committee
National Association of Emergency Medical Technicians
9140 Ward Parkway
Kansas City, Missouri 64114
(816) 444-3500

Table of Contents

	Page
Acknowledgements	i
Introduction	ix
I. Emergency Department Response to Hazardous Material Incidents	1
— Hazard Recognition	1
— Principles of Toxicology for Emergency Medical Personnel	8
— Personnel Protection and Safety Principles	14
— Respiratory Protection	20
— Emergency Department Personnel Decontamination	23
— Communications	27
II. Patient Management	31
— Patient Arrival	35
— Decontamination of Patient	36
— Considerations for Patient Treatment.....	36
— Critique	38
— Patient Management Under Mass Casualty Conditions Involving Hazardous Chemicals	38
III. Systems Approach to Planning	41
— The Role of the Hospitals in a Systems Approach to Planning	41
— The Spectrum of Hazardous Materials Incidents	42

Table of Contents (Continued)

III.	Systems Approach to Planning (Cont.)	
—	Joint Commission on Accreditation of Healthcare Organizations (JCAHO)	43
—	Superfund Amendments and Reauthorization Act (SARA) Title III.....	48
—	The State Emergency Medical Services (EMS) Agency	49
—	Federal Emergency Response Activities	50
—	Hazard Analysis	53
Appendix A	Hazardous Materials Classification Systems.....	57
Appendix B	Types of Respiratory Protection	69
Appendix C	Levels of Protection	73

Introduction

The presence of hazardous materials or toxic chemicals at an incident location or other emergency situation adds a new dimension of risk to those handling and treating casualties. The fundamental difference between a hazardous materials incident and other emergencies is the potential for acute risk from contamination to both patient and responder. In some cases, traditional practices must be altered to avoid compounding a critical situation.

Hospital emergency departments must protect their personnel and other people within the hospital, while providing the best care for the chemically contaminated patient. **This guide is intended to help hospital emergency departments plan for incidents that involve hazardous materials and improve their ability to respond to these incidents appropriately.**

To ensure appropriate and timely patient care, as well as optimal worker protection, emergency personnel must have an understanding of decontamination procedures and personal protective equipment that they do not generally receive in the course of their routine professional training. They should also be aware of community resources that could be called upon to assist in emergency response.

Current training curricula for emergency physicians, nurses, and emergency medical technicians (EMTs) often do not adequately prepare these professionals to either manage the contaminated individual or decontaminate patients exposed to toxic substances. High-quality, specific, and concise guidance is needed to describe appropriate procedures to be followed by emergency medical personnel to safely care for a patient, as well as to protect equipment, hospital personnel, and others from risk of exposure. In response to this need, the Agency for Toxic Substances and Disease Registry (ATSDR) has contracted for the production of two documents: (i) Emergency Medical Services: A Planning Guide for the Management of Contaminated Patients and (ii) Hospital Emergency Departments: A Planning Guide for Management of Contaminated Patients. The first document is designed for use by emergency medical technicians and other prehospital care providers to minimize their risks of exposure during the prehospital treatment and to provide for the safe and effective treatment of chemically contaminated patients.

This guide for emergency department personnel is designed to familiarize readers with the concepts, terminology, and key considerations that affect the management of incidents of chemical contamination. It has been developed not only to present uniform guidance for emergency care of chemically contaminated patients, but also to provide basic information critical to advance planning and implementation of emergency medical services' (EMS) strategies. It is intended to illustrate the characteristics

of hazardous materials incidents that mandate modifications to traditional emergency response and the preparatory actions that should be taken to respond effectively to hazardous materials incidents.

All hospital and community emergency response systems may not be prepared to respond to a hazardous chemical incident to the same degree. This document may be used to assess capabilities with respect to potential community hazards and to develop response plans using national and community-specific resources. Worker safety and training are also key factors in effective management of medical emergencies. This document is intended to provide source material for developing local training and safety protocols.

Section I, *Emergency Department Response to Hazardous Materials Incidents*, outlines general principles for hazard recognition, chemical exposure, and personal protective equipment. In addition, the hazard recognition section presents generalized guidance for determining whether a given situation constitutes a hazardous materials incident and details various hazardous materials classification systems. Basic toxicological and chemical terminology that emergency personnel need to understand to effectively conduct patient assessments is presented, as well as an outline of personal protective equipment such as respiratory devices and protective clothing.

Section II, *Patient Management*, includes guidelines for emergency department preparation and response to a potential hazardous materials incident. In addition, this chapter discusses patient assessment and decontamination guidelines.

Lastly, Section III, *Systems Approach to Planning*, details the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) guidelines for emergency preparedness and hazardous materials and waste programs. Government and private planning activities are also outlined, such as those established under the Superfund Amendments and Reauthorization Act (SARA) Title III, the National Response Team, the Community Awareness Emergency Response (CAER) program, and the Chemical Emergency Preparedness Program (CEPP). This chapter discusses the need for hazard identification and risk analysis pertaining to hazardous materials located in the community or transported through the community.

Although this guidance document has been developed to provide for the safety of responders, as well as the needs of patients, it is not all-encompassing. Supplemental material that is vital to successful response to hazardous materials contamination is cited within the document. These supplementary materials should be reviewed before preparing any strategic plans or before conducting training exercises on this topic. This document cannot be regarded as a substitute for comprehensive instruction and training for hazardous materials incidents.