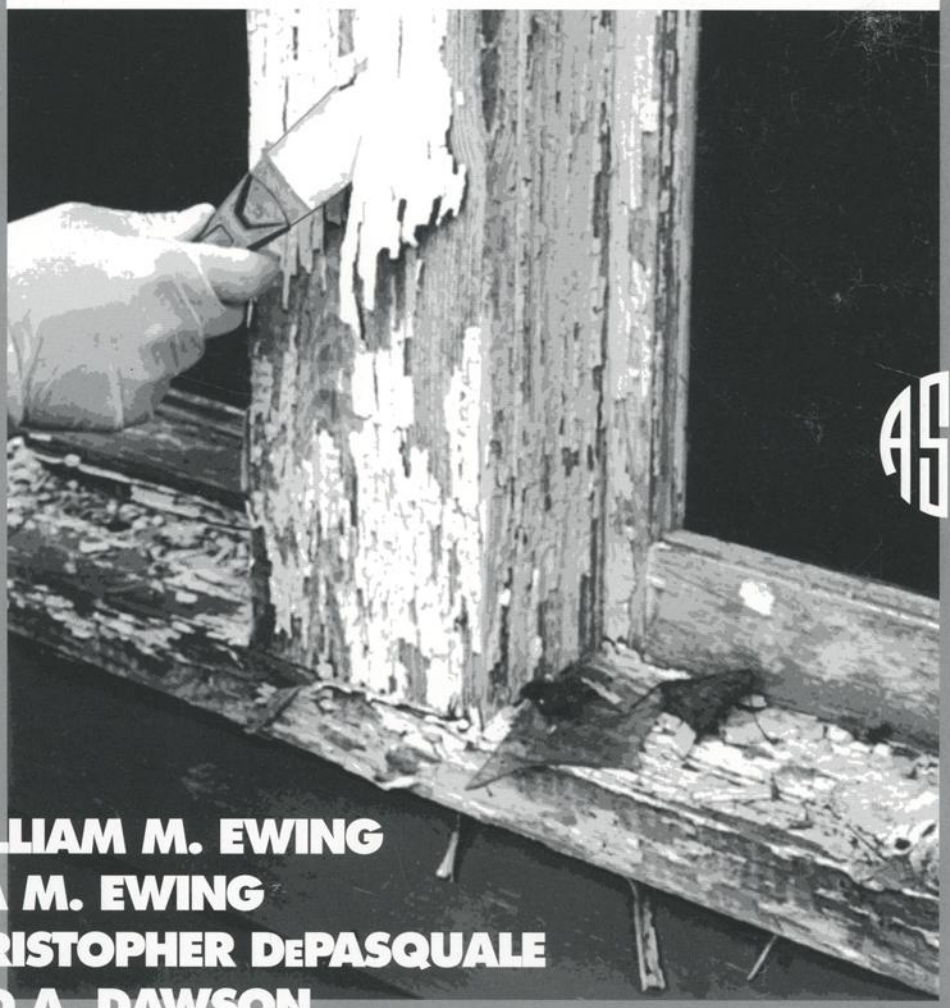
LEAD HAZARD

EVALUATION AND CONTROL IN BUILDINGS



WILLIAM M. EWING
EVA M. EWING
CHRISTOPHER DEPASQUALE
TOD A. DAWSON

ASTM

Lead Hazard Evaluation and Control in Buildings

William M. Ewing, Eva M. Ewing, Christopher DePasquale, and Tod A. Dawson, Authors

ASTM Stock Number: MNL38

ASTM
100 Barr Harbor Drive
West Conshohocken, PA 19428-2959

Printed in the U.S.A.

ISBN: 0-8031-2086-9

NOTE: This manual does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this manual to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

Printed in Philadelphia, PA
March 2000

Preface

THE SUBJECT OF lead hazard control and mitigation continues to receive significant attention. The focus of the attention is the potential hazard that lead poses to the developmental capabilities and health of young children and the health of construction workers. Federal and local regulations have been promulgated in response to legislation to reduce the human-health hazards from lead. Standards play an important role in lead-hazard regulations, programs, and activities.

ASTM Subcommittee E06.23 was formed in response to a request from the United States Department of Housing and Urban Development (HUD) in 1991 to provide to the public a comprehensive set of consensus standards that describe procedures for assessing, abating or mitigating, and monitoring lead hazards in buildings. Liaisons were formed with other ASTM committees, including D01 on paints and related materials, D18 on soil and rock, D22 on sampling and analysis of atmospheres, and E50 and E51 on environmental assessments. E06.23 has also coordinated its efforts with HUD, the Centers for Disease Control (CDC), the U.S. Environmental Protection Agency (EPA), the National Institute for Occupational Safety and Health (NIOSH), the National Institute for Standards and Technology (NIST), the Consumer Product Safety Commission (CPSC), the Department of Defense (DOD), the Occupational Safety and Health Administration (OSHA), and other federal state agencies to assist the subcommittee in meeting this goal.

The Subcommittee developed the "Standard Guide for Evaluation, Management, and Control of Lead Hazards in Facilities" (designated ASTM Standard E 2052). This standard provides guidance to facility owners and property managers in developing and implementing a lead hazard management program. This handbook was developed to provide further guidance in establishing a successful program.

Mary E. McKnight
Chairperson, ASTM E06.23

Disclaimer

USERS OF THIS MANUAL are advised that federal, state, and local regulations affecting lead hazards in facilities change frequently. It is the user's responsibility to comply with all applicable regulations and remain informed of changes to standard methods and practices.

This manual does not purport to address all of the environmental, safety, and health concerns, if any, associated with its use. It is the responsibility of the user of this manual to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

The American Society for Testing and Materials takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this manual. Users of this manual are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.

Acknowledgments

THIS DOCUMENT WAS PREPARED by Compass Environmental, Inc. of Kennesaw, Georgia. The authors were William M. Ewing, CIH, Eva M. Ewing, CIH, Christopher DePasquale, MPH, and Tod A. Dawson. The authors appreciate the technical input provided by Mr. Ron Short of New Port Richey, Florida. The authors welcome any comments. For contact information see www.compassenv.com.

The authors are indebted to the Editorial Board established for this project, and the external peer reviewers. Each of these individuals are experts in the field of lead hazard control in their own right. Together, they provided an unsurpassed base of knowledge which the authors could draw upon. Of particular note are Mr. Geoff Braybrooke and Dr. Warren Friedman, who volunteered many weeks of effort on the original ASTM standard and this interpretive guidance manual.

The authors express their sincere appreciation to Ms. Kathy Dernoga and her staff at ASTM headquarters. Their guidance and expertise in shepherding this project through to completion was a significant accomplishment.

Lastly, this project would not have been possible without the hard work of the ASTM Subcommittee E06.23 volunteers. Under the leadership of Dr. Mary McKnight this subcommittee has produced 22 full consensus standards addressing lead hazard identification, evaluation, and control.

EDITORIAL BOARD

TABLE OF CONTENTS

CHAPTER 12: PERFORMING LEAD HAZARD CONTROL PROJECTS

Abbreviations

kg	kilograms
mg/cm^2	milligrams per square centimeter
µg/dl	micrograms per deciliter
µg/ft^2	micrograms per square foot
µg/L	micrograms per liter
µg/m^3	micrograms per cubic meter
ABIH	American Board of Industrial Hygiene
AIHA	American Industrial Hygiene Association
ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
BCSP	Board of Certified Safety Professionals
CDC	Center for Disease Control and Prevention
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
CoE	The Corps of Engineers
CPSC	Consumer Product Safety Commission
CSP	Certified Safety Professional
DOT	Department of Transportation
EBL	Elevated blood lead level
EIBLL	Environmental intervention blood lead level
EPA	Environmental Protection Agency
FAAS	Flame atomic absorption spectrometry
GFAAS	Graphite furnace atomic absorption spectrometry
GFI	Ground fault interrupter
HEPA	High efficiency particulate air
HUD	Department of Housing and Urban Development
ICP-AES	Inductively coupled plasma / Atomic emission spectrometry
IQ	Intelligence quotient
ISO	International Standards Organization
LBP	Lead-based paint
LOD	Limit of detection
LHMP	Lead hazard management program
NIBS	National Institute of Building Sciences
NIOSH	National Institute for Occupational Safety and Health
NLLAP	National Lead Laboratory Accreditation Program
O&M	Operations & maintenance
OSHA	Occupational Safety and Health Administration
PEL	Permissible exposure limit
Pb	Chemical symbol for lead
RCRA	Resource Conservation and Recovery Act
SOP	Standard operating procedure
SSPC	Steel Structures Painting Council
TBA	Tenant-based assistance
TC	Toxicity characteristic
TCLP	Toxicity characteristic leaching procedure
TSCA	Toxic Substances Control Act
USDA	United States Department of Agriculture
XRF	X-ray fluorescence

THE AUTHORS

ALL AUTHORS are employed by Compass Environmental Inc., an industrial hygiene consulting company based in Marietta, Georgia. Compass provides industrial hygiene, lead, asbestos, and indoor air quality consulting services to commercial and governmental clients.

WILLIAM M. EWING, CIH is the Technical Director of Compass and certified in the Comprehensive Practice of Industrial Hygiene by the ABIH. His experience includes 15 years in consulting and 5 years with the Georgia Tech Research Institute. He has conducted numerous industrial hygiene studies, indoor air quality investigations, and asbestos and lead evaluation and control projects. He has published over 20 articles on related subjects and frequently serves as a peer reviewer for EPA, NIOSH, ASTM, and other organizations.

Mr. Ewing has conducted a variety of lead-related projects. One of his early projects was a study to correlate blood lead values with airborne lead exposures and hygiene practices among brass/bronze foundry and smelter workers. He has directed or participated in many projects involving lead-based paint. Mr. Ewing is also familiar with lead-based paint, dust and soil sampling and analytical techniques. He has conducted such sampling repeatedly and demonstrated proficiency in lead analyses of air, soil and blood samples by atomic absorption, with flame ionization and graphite furnace.

Mr. Ewing is a member of ASTM committees E-6 and D-22. He has served as an instructor in several ASTM-sponsored training courses, and served as the Program Chair for the 1996 ASTM Indoor Air Quality Conference held in Johnson, Vermont.

Mr. Ewing served on the project committees of the National Institute of Building Sciences (NIBS) for the development of the *Guide Specifications for Reducing Lead-Based Paint Hazards*, and the *Lead-Based Paint Operations & Maintenance Work Practices Manual for Homes and Buildings* published in 1995. Mr. Ewing co-authored a series of booklets sponsored by the EPA and the Federal Emergency Management Agency (FEMA) providing guidance for dealing with lead-based paint, asbestos and PCBs in flood damaged buildings.

EVA M. EWING, CIH is a Senior Industrial Hygienist certified by the American Board of Industrial Hygiene (ABIH). She holds bachelor's and master's degrees in the field of Environmental Sciences. Her 20 year's experience includes technical consulting, training and research. She was formerly with the Georgia Tech Research Institute and was Director of The Environmental Institute.

Ms. Ewing has technical expertise in conducting sampling, assessment and abatement of lead in commercial, industrial and residential buildings. She has participated in lead-in-soil sampling and remediation projects. She recently completed a two-year evaluation of lead and arsenic dust in selected single family homes in south Georgia. She is the author of the lead-based paint operations and maintenance program for a large multi-national corporation. This program addresses sampling, analysis, assessment, work practices, training, abatement methods, monitoring and recordkeeping. She also directed the survey and prepared the lead-based paint management program in use aboard the USS *Lexington* aircraft carrier.

Ms. Ewing has directed or participated in numerous projects with the objective being a guidance document, training manual, or handbook. She was a chapter author for each of the four EPA Model Accreditation Training programs for asbestos and the project director for the EPA Model Asbestos Abatement Designers Course notebook. She was presented the EPA Outstanding Achievement Award in recognition of her asbestos contributions. Ms. Ewing routinely publishes articles in peer-reviewed journals and has received twice the Environmental Information Association's Outstanding Publication Award. She has also served on numerous peer review groups for the EPA and other government agencies including one for the EPA "Green Book," *Managing Asbestos in Place: A Building Owner's Guide to Operations and Maintenance Programs for Asbestos-Containing Materials.*

CHRISTOPHER DEPASQUALE, MPH is an Environmental Scientist with Compass Environmental. He holds a bachelor's degree in Biology and a master's degree in Public Health concentrating in Environmental Health and Toxicology, both from the State University of New York in Albany. His professional experience includes technical consulting, training and research.

Mr. DePasquale has been involved in a variety of lead-related projects. He has technical expertise in conducting sampling and assessment of lead in commercial, industrial, and residential buildings, and in soils. He is certified in the state of Georgia as a Lead Inspector and Risk Assessor.

TOD A. DAWSON, ASP holds a degree in Industrial Safety and is an environmental consultant with over 10 years of consulting experience. This includes industrial hygiene surveys, safety audits, and environmental site assessments. His lead-related work has included residential, commercial, governmental, and industrial facilities. He has conducted sampling surveys for paints, dust and soil; developed specifications and contract documents for lead-based paint abatement; and provided oversight of lead-based paint abatement projects.

In one recent project Mr. Dawson evaluated various lead-based paint abatement techniques for steel structures at an Air Force base. This evaluation included personal and area air sampling to determine lead exposures, and one surface sampling to measure the efficacy of cleaning techniques. Mr. Dawson completed a project involving the historic restoration of a county government building. The restoration called for complete renovation of the building impacting virtually all floors, ceilings, walls and architectural components.

Mr. Dawson recently participated in the evaluation of selected south Georgia residences for lead and arsenic dust with Ms. Ewing. This project included dust sampling using both wipe sampling and vacuum sampling to evaluate the dust concentration (mass), and characterized the dust by electron microscopy. He also participated in the lead-based paint evaluation of the USS *Lexington.*

ISBN 0-8031-2086-9