

NIOSH
criteria for a recommended standard
occupational exposure to
METHYL PARATHION

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service / Center for Disease Control
National Institute for Occupational Safety and Health

criteria for a recommended standard....

**OCCUPATIONAL EXPOSURE
TO
METHYL PARATHION**



U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Public Health Service

Center for Disease Control

National Institute for Occupational Safety and Health

SEPTEMBER 1976

For sale by the Superintendent of Documents, U.S. Government
Printing Office, Washington, D.C. 20402

DHEW (NIOSH) Publication No. 77-106

CRITERIA DOCUMENT:
RECOMMENDATIONS FOR AN OCCUPATIONAL
EXPOSURE STANDARD FOR METHYL PARATHION

Table of Contents

	<u>Page</u>
PREFACE	iii
NIOSH REVIEW COMMITTEE	vi
REVIEW CONSULTANTS	vii
I. RECOMMENDATIONS FOR A METHYL PARATHION STANDARD	1
Section 1 - Environmental (Workplace Air)	2
Section 2 - Medical	2
Section 3 - Labeling and Posting	7
Section 4 - Personal Protective Equipment and Clothing	10
Section 5 - Informing Employees of Hazards from Methyl Parathion	16
Section 6 - Work Practices	17
Section 7 - Sanitation	25
Section 8 - Monitoring and Recordkeeping	26
II . INTRODUCTION	28
III . BIOLOGIC EFFECTS OF EXPOSURE	31
Extent of Exposure	32
Historical Reports	33
Effects on Humans	35
Epidemiologic Studies	45
Animal Toxicity	45
Correlation of Exposure and Effect	64
IV . ENVIRONMENTAL DATA AND BIOLOGIC EVALUATION	69
Air Sampling	69
Analysis of Air Samples	70
Biologic Monitoring Methods	71
Plasma and Erythrocyte Cholinesterase Analyses	74
Environmental Levels	78
Control of Exposure	87

Table of Contents (Continued)

	<u>Page</u>
V. DEVELOPMENT OF STANDARD	89
Basis for Previous Standards	89
Basis for the Recommended Environmental Standard	92
VI. WORK PRACTICES	100
VII. RESEARCH NEEDS	103
VIII. REFERENCES	105
IX. APPENDIX I - Sampling Method for Methyl Parathion	119
X. APPENDIX II - Analytical Method for Methyl Parathion	124
XI. APPENDIX III - Diagnosis and Medical Management of Organophosphorus Intoxication	132
XII. APPENDIX IV - Method for Biochemical Determination of Cholinesterase Activity in Blood	138
XIII. APPENDIX V - Material Safety Data Sheet	145
XIV. APPENDIX VI - Summary of Activities of the State of California in Controlling Use of Pesticides, 1974	155
XV. APPENDIX VII - Summary of Activities of Various States Other Than California in Controlling Use of Pesticides	159
XVI. TABLES AND FIGURES	161

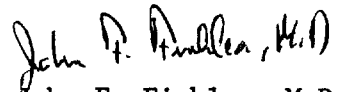
PREFACE

The Occupational Safety and Health Act of 1970 emphasizes the need for standards to protect the health and safety of workers exposed to an ever-increasing number of potential hazards at their workplace. The National Institute for Occupational Safety and Health has projected a formal system of research, with priorities determined on the basis of specified indices, to provide relevant data from which valid criteria for effective standards can be derived. Recommended standards for occupational exposure, which are the result of this work, are based on the health effects of exposure. The Secretary of Labor will weigh these recommendations along with other considerations such as feasibility and means of implementation in developing regulatory standards.

It is intended to present successive reports as research and epidemiologic studies are completed and as sampling and analytical methods are developed. Criteria and standards will be reviewed periodically to ensure continuing protection of the worker.

I am pleased to acknowledge the contributions to this report on methyl parathion by members of my staff and the valuable constructive comments by the Review Consultants on Methyl Parathion, by the ad hoc committee of the American Conference of Governmental Industrial Hygienists, and by Robert B. O'Connor, M.D., NIOSH consultant on occupational medicine. The NIOSH recommendations for standards are not necessarily a consensus of

all the consultants and professional societies that reviewed this criteria document on methyl parathion. Lists of the NIOSH Review Committee members and of the Review Consultants appear on the following pages.



John F. Finklea, M.D.
Director, National Institute for
Occupational Safety and Health

The Division of Criteria Documentation and Standards Development, National Institute for Occupational Safety and Health, had primary responsibility for development of the criteria and recommended standard for methyl parathion. The Division review staff for this document consisted of J. Henry Wills, Ph.D., Frank L. Mitchell, D.O., Herbert E. Christensen, D.Sc., and Richard Rhoden, Ph.D., with Charles C. Hassett, Ph.D., and Seymour D. Silver, Ph.D. (consultants).

Stanford Research Institute developed the basic information for consideration by NIOSH staff and consultants under contract No. CDC-99-74-31. Donald M. Valerino, Ph.D., had NIOSH program responsibility and served as criteria manager.

REVIEW COMMITTEE
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH

Paul A. Baron, Ph.D.
Division of Physical Sciences and Engineering

Paul E. Caplan, M.S.
Division of Criteria Documentation and
Standards Development

Robert H. Hill, Jr., Ph.D.
Division of Physical Sciences and Engineering

Donald Morano, M.S.
Western Area Laboratory for Occupational
Safety and Health

Robert A. Rostand, M.D.
Division of Surveillance, Hazard Evaluations,
and Field Studies

*Lester D. Scheel, Ph.D.
Division of Biomedical and Behavioral Sciences

Kenneth C. Weber, Ph.D.
Appalachian Laboratory for Occupational
Respiratory Diseases

Department of Labor Liaison:

Catherine Roman, M.H.S.
Office of Standards Development
Occupational Safety and Health Administration

* Deceased

REVIEW CONSULTANTS ON METHYL PARATHION

J. Blair Bailey, Ph.D.
Extension Entomologist
Department of Entomology
University of California
Riverside, California 92502

Clyde M. Berry, Ph.D.
Associate Director
Institute for Agricultural Medicine
University of Iowa at Oakdale
Oakdale, Iowa 52319

Dennis I. Chamot, Ph.D.
Assistant to the Executive Secretary
Council for Professional Employees, AFL-CIO
Washington, D.C. 20005

Keith T. Maddy, D.V.M.
Staff Toxicologist
Agricultural Chemicals and Feeds
California Department of Food and Agriculture
Sacramento, California 95814

Sheldon D. Murphy, Ph.D.
Associate Professor of Toxicology
Department of Physiology
Kresge Center for Environmental Health
School of Public Health
Harvard University
Boston, Massachusetts 02115

REVIEW CONSULTANTS ON METHYL PARATHION (CONTINUED)

Richard D. O'Brien, Ph.D.
Director
Division of Biological Sciences
Cornell University
Ithaca, New York 14850

George Roush, Jr., M.D.
Corporate Medical Director
Monsanto Company
St. Louis, Missouri 63166

C. Boyd Shaffer, Ph.D.
Director of Toxicology
American Cyanamid Company
Wayne, New Jersey 07470

Steven H. Wodka
Oil, Chemical and Atomic Workers
International Union, AFL-CIO
Washington, D.C. 20036

Geoffrey Woodard, Ph.D.
Pharmacologist
Woodard Research Corporation
Herndon, Virginia 22070