

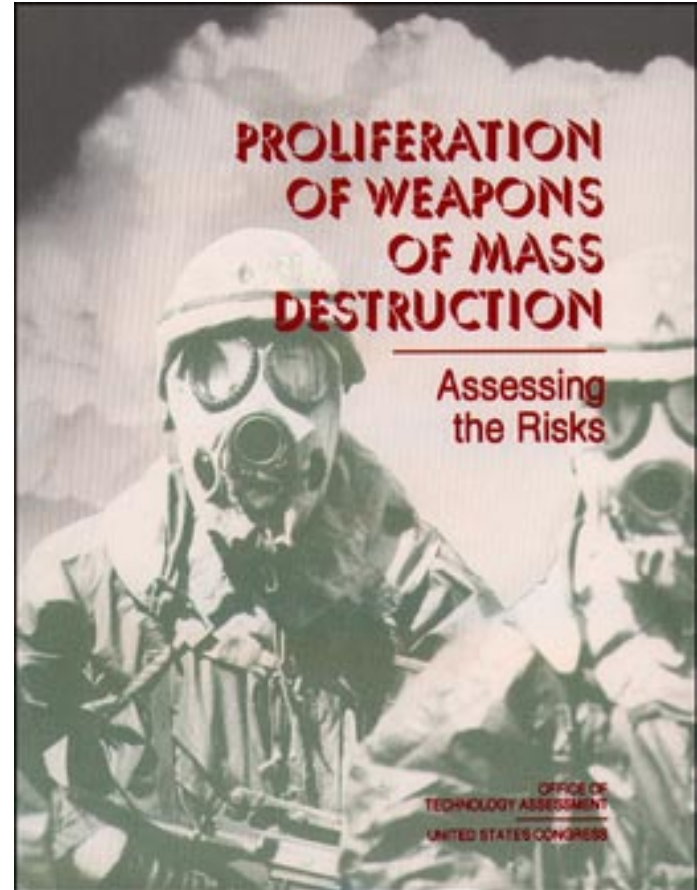
*Proliferation of Weapons of Mass
Destruction: Assessing the Risks*

August 1993

OTA-ISC-559

NTIS order #PB94-107612

GPO stock #052-003-01335-5



Recommended Citation:

U.S. Congress, Office of **Technology** Assessment, *Proliferation of Weapons of Mass Destruction: Assessing the **Risks***, **OTA-ISC-559** (Washington, DC: U.S. Government Printing Office, August 1993).

Foreword

Throughout history, human beings have been able to annihilate each other without weapons of mass destruction. However, the development of such weapons has greatly reduced the time and effort needed to kill, giving small nations and even subnational groups the ability to destroy lives on a scale that few nations could otherwise manage. Such mass killing does not require state-of-the-art technology; the basic technologies underlying chemical, biological, and nuclear weapons date back to World Wars I and II. Now, modern technologies—and the ever-increasing flow of goods, information, and people across national borders—can place these deadly capabilities in many more hands.

Occasionally, the United States may directly influence another state's decision to pursue weapons of mass destruction. More often, nonproliferation efforts of the United States—together with other countries and international institutions such as the United Nations and the International Atomic Energy Agency—must operate indirectly. By establishing a system of obstacles, disincentives, rewards, and international norms or rules of behavior, nonproliferation measures are intended to lessen the desire for and increase the costs of acquiring these weapons. The challenge is to accomplish this objective in a world where states still threaten one another, and where military power is still viewed as the ultimate guarantor of national survival. Even so, several recent international trends offer us hope that proliferation might be slowed or even reversed.

OTA has been asked by the Senate Foreign Relations Committee and the Senate Committee on Governmental Affairs, with the endorsement of the House Committee on Foreign Affairs, the House Permanent Select Committee on Intelligence, and the Senate Committee on Banking, Housing, and Urban Affairs, to assist Congress in its efforts to strengthen and broaden U.S. policies to control the proliferation of weapons of mass destruction. This report describes what nuclear, chemical, and biological weapons can do, analyzes the consequences of their spread for the United States and the world, and summarizes technical aspects of monitoring and controlling their production. (A separate background paper analyzes the technologies underlying nuclear, chemical, and biological weapons and delivery systems in greater depth.) This report also explains the array of policy tools that can be used to combat proliferation, identifying tradeoffs and choices that confront policymakers. A forthcoming report will analyze specific sets of nonproliferation policy options in detail.

OTA gratefully acknowledges the contributions of many individuals, firms, and government agencies who assisted its research and writing for this report.



Roger C. Herdman, Director

Advisory Panel

James E. Goodby, chair¹
Distinguished Service Professor
Carnegie-Mellon University

James F. Leonard, chair²
Executive Director
Washington Council on
Non-Proliferation

George Anzelon
Associate Division Leader
Lawrence Livermore National
Laboratory

Will D. Carpenter
chemical Industry Consultant

Lewis A. Dunn
Assistant Vice President
Science Applications
International Corp.

Randall Forsberg
Executive Director
Institute for Defense and
Disarmament Studies

Thomas R. Fox
Director
Office of National Security
Technology
Pacific Northwest Laboratories

Alan R. Goldhammer
Director of Technical Affairs
Industrial Biotechnology
Association

John M. Googin
Senior Staff Consultant
Martin Marietta Energy
Systems, Inc.

Robert G. Gough
Senior Member, Technical Staff
Sandia National Laboratories

Elisa D. Harris³
Senior Research Analyst
The Brookings Institution

Geoffrey Kemp
Senior Associate
Carnegie Endowment for
International Peace

Joshua Lederberg⁴
Rockefeller University

John W. Lewis
Center for International
Security and Arms Control
Stanford University

Lee W. Mercer
Corporate Export Manager
Digital Equipment Corp.

Matthew S. Meselson
Department of Biochemistry
and Molecular Biology
Harvard University

Stephen M. Meyer
Center for International Studies
Massachusetts Institute of
Technology

Gary Milhollin
Director
Wisconsin Project on Nuclear
Arms Control

Marvin M. Miller
Senior Research Scientist
Department of Nuclear Engineering
Massachusetts Institute of Technology

Janne E. Nolan
Senior Fellow in Foreign Policy
The Brookings Institution

William C. Potter
Director
Center for Russian and Soviet Studies
Monterey Institute of
International Studies

Barbara Hatch Rosenberg
Division of Natural Sciences
State University of
New York at Purchase

Lawrence Scheinman
Associate Director
Peace Studies Program
Cornell University

Leonard S. Spector
Senior Associate
Carnegie Endowment for
International Peace

Sergio C. Trindade
President
SE²T International, Ltd.

¹ Resigned Max. 22, 1993.

² Panel member until June 1, 1993;

Panel chair after June 1, 1993.

³ Resigned Jan. 29, 1993.

⁴ Ex-officio; Member of Technology

Assessment Advisory Council.

NOTE: OTA appreciates and is grateful for the valuable assistance and thoughtful critiques provided by the advisory panel members. The panel does not, however, necessarily approve, disapprove, or endorse this report. OTA assumes full responsibility for the report and the accuracy of its contents. --

Project Staff

Peter Blair

Assistant Director, OTA
Energy, Materials, and International
Security Division

Alan Shaw

Program Manager
International Security and
Commerce Program

Gerald L. Epstein

Project Director

Thomas H. Karas**Jonathan B. Tucker****CONTRACTORS****Dan Fenstermacher****ADMINISTRATIVE STAFF****Jacqueline Robinson Boykin**

Office Administrator

Louise Staley

Administrative Secretary

Additional Reviewers

Steve Fetter

University of Maryland
College Park, MD

Thomas W. Graham

International Security program,
Rockefeller Foundation
New York, NY

Joseph Pilat

Center for National Security
Studies
Los Alamos National Laboratory
Los Alamos, NM

Lawrence Sequist

Office of the Secretary of Defense
Washington, DC

John Steinbruner

Director, Foreign Policy Studies
Program
The Brookings Institution
Washington, DC

Victor A. Utgoff

Deputy Director-Strategy, Forces,
and Resources Division
Institute for Defense Analyses
Alexandria, VA

NOTE: OTA appreciates and is grateful for the valuable assistance and thoughtful critiques provided by the reviewers. The panel does not, however, necessarily approve, disapprove, or endorse this report. OTA assumes full responsibility for the report and the accuracy of its contents.