

An Evaluation of Railroad Safety

May 1978

NTIS order #PB-281169

An Evaluation of
RAILROAD SAFETY



OTA CONGRESS OF
THE UNITED STATES
Office of Technology Assessment
WASHINGTON, D. C. 20540

Library of Congress Catalog Card Number 78-600051

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

TECHNOLOGY ASSESSMENT BOARD

EDWARD M. KENNEDY, MASS., CHAIRMAN
LARRY WINN, JR., KANS., VICE CHAIRMAN

ERNEST F. HOLLINGS, S.C. OLIN E. TEAGUE, TEX.
ADLAI E. STEVENSON, ILL. MORRIS K. UDALL, ARIZ.
CLIFFORD P. CASE, N.J. GEORGE E. BROWN, JR., CALIF.
TED STEVENS, ALASKA CLARENCE E. MILLER, OHIO
ORRIN G. HATCH, UTAH JOHN W. WYDLER, N.Y.

RUSSELL W. PETERSON

Congress of the United States

OFFICE OF TECHNOLOGY ASSESSMENT DANIEL DESIMONE
WASHINGTON, D.C. 20510 DEPUTY DIRECTOR

RUSSELL W. Peterson
DIRECTOR

May 8, 1978

Honorable Howard W. Cannon
Chairman, Committee on Commerce,
Science and Transportation
United States Senate
Washington, D. C. 20510

Honorable Harley O. Staggers
Chairman, Committee on Interstate
and Foreign Commerce
U. S. House of Representatives
Washington, D.C. 20515

Gentlemen:

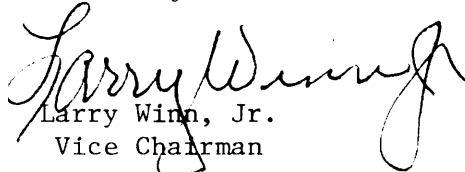
On behalf of the Board of the Office of Technology Assessment, we are pleased to forward the results of the evaluation of railroad safety requested by your committees in the Federal Railroad Safety Authorization Act of 1976.

We believe this evaluation will aid congressional deliberation over proposed railroad safety legislation and hope it will add a constructive dimension to Government treatment of transportation safety policy and programs.

S &v

Edward M. Kennedy
Chairman

Sincerely,


Larry Winn, Jr.
Vice Chairman

FOREWORD

The Federal Railroad Safety Authorization Act of 1976, P.L. 94-348, required the Office of Technology Assessment to evaluate the effectiveness of Federal efforts to improve the safety of our Nation's railroads. This report provides Congress with a comprehensive and systematic review of railroad safety. It should assist in current and future legislative deliberations on railroad safety.

The following pages include: an examination of current accident and cost trends; a review and evaluation of railroad safety laws, regulations, and inspection programs; and an overview of current research, development, and voluntary safety programs. Also included is a discussion of the relationship of safety and economics in the railroad industry and other issues pertinent to today's safety problems.

This report is one of several OTA assessments related to railroad problems and perspectives which have been provided to Congress.

RUSSELL W. PETERSON
Director
Office of Technology Assessment

OTA Railroad Safety Advisory Panel

Donald Bennett*

Associate Administrator for Safety
Federal Railroad Administration

Elmer Garner

Chief, Railroad Branch
National Transportation Safety Board

James Hagen

*Senior Vice President for Marketing
and Sales*
Conrail Corporation

William Harris

*Vice President, Research & Test
Department*
Association of American Railroads

John H. Mackinnon

Office of Safety Affairs
Office of the Secretary
Department of Transportation

James Martin

*Vice President for Operations and
Maintenance*
Association of American Railroads

Ed McCulloch

Vice President
Brotherhood of Locomotive Engineers

Robert Parsons

Associate Administrator for R&D
Federal Railroad Administration

James Snyder

National Legislative Director
United Transportation Union

*Resigned–November 1977.

OTA Railroad Safety Project Staff

Robert L. Maxwell, *Transportation Program Manager*

Lemoine V. Dickinson, Jr., *Project Director*

Lucia Turnbull

Contractors

Peat, Marwick, Mitchell and Company

R. L. Banks and Associates Thomas K. Dyer, Inc. Gibbs and Hill, Inc.

Alper, Schoene, Horkan and Mann Newman and Hermanson' Co.

OTA Publishing Staff

John C. Holmes, *Publishing Officer*

Kathie S. Boss Joanne Heming

INTRODUCTION

The Federal Railroad Safety Authorization Act, Public Law 94-348 enacted on July 8, 1976, requested an assessment of railroad safety by the Office of Technology Assessment (OTA). The study objective was to evaluate the effectiveness of the Federal Railroad Safety Act of 1970 and related laws in improving the safety of the Nation's railroads. Eight specific provisions, in addition to those OTA considered important, were to be examined. These provisions included:

1. A cost-benefit analysis of the railroad safety research and development activities under the Federal Railroad Safety Act and related Federal laws;
2. An evaluation of trends with respect to railroad employee injuries and casualties, injuries and casualties to other persons, accidents by type and cause, and such other data as OTA considers necessary to determine any significant statistical relationship between safety laws and regulations, and accident rates;
3. A statistical comparison of railroad accidents reported by each railroad for the 10-year period preceding the date of enactment of this Act;
4. The cost-benefit and effectiveness of accident prevention resulting from the methodology used and practices employed by Federal and State railroad safety inspections under Federal railroad safety laws and regulations;
5. An evaluation of safety inspection activities conducted by the railroad industry;
6. An evaluation and analysis of industry research and development relating to railroad safety and accident prevention;
7. A cost-benefit analysis of the various Federal laws and regulations relating to railroad safety; and
8. The need for additional Federal expenditures for improvements in railroad safety.

This report responds to the eight specific items requested for study in the following manner. Government and industry research and development activities (items 1 and 6) are evaluated in chapter IX. The analysis of accidents and injury trends (item 2) is contained in chapter V; and the evaluation of Federal, State, and industry inspection programs (items 4 and 5) is described in chapter VIII. Chapter VII of the report examines existing railroad safety laws and regulations (item 7). A separate report entitled "Analysis of Federal Railroad Laws Administered by the Department of Transportation and Related Laws" is published as Volume II and is available through the National Technical Information Service (NTIS). The statistical comparison of individual railroads' accident data (item 3) was conducted as background to the study. Due to the voluminous amount of data, this information is not included in this document. And finally, the need for additional Federal action (item 8) is discussed in the congressional options section contained under each of the issues discussed in chapter II.

This document contains the results of the OTA study effort. It provides Congress with an overview of the railroad safety problems and current efforts to improve railroad safety. In addition, this document summarizes significant railroad safety issues and policy alternatives open to Government and concerned parties for improving safety. Suggestions for more detailed research are also identified.

In conducting this study, OTA did not perform a detailed cost-benefit analysis of various railroad safety activities due to a number of data gathering difficulties. For example, it was not possible to identify the total cost of railroad safety programs from the Interstate Commerce Commission Uniform System of Accounts. This accounting system was designed for the purpose of economic rate regulation of railroads, and does not contain detailed safety expenditures. Also, some railroads have internal accounting systems that identify safety costs. However, these systems are not comparable from railroad to railroad. Further, a large portion of safety prevention costs are common costs, and as such cannot be specifically identified. However, even though cost-benefit analyses were not performed, an evaluation of various programs, including research and development, and inspections, as well as laws and regulations, was conducted,

The assistance and expertise of an advisory panel comprised of representatives from Government agencies, railroad management, and railroad labor was extensively utilized by OTA in the formulation, conduct, and review of the study. The contributions of these individuals and members of their respective organizations were significant and extremely important to the outcome of the study. In addition to the advisory panel, numerous other persons associated with the railroad industry, Government agencies, and railroad labor organizations provided valuable information for the study effort.

Techniques used throughout the study included a review and analysis of pertinent safety and railroad literature and interviews with Government, industry, suppliers, and labor officials. A detailed list of the persons interviewed is included in appendix A. In addition, statistical, computer, and economic analyses were conducted when possible. However, study efforts which utilized existing data and analyses were sometimes limited by the inadequacy of information, diffusion of data sources, and numerous changes in the data over time.

The information provided by the contractors, and the advisory panel, and the research and interviews conducted by OTA staff, formed the basis for the final report.

Special thanks and appreciation are extended to the Railroad Safety Advisory Panel, and to Lawrence M. Mann, R. Lawrence McCaffrey, Jr., Judith A. Hermanson, and Constance B. Newman for their outstanding support and assistance to OTA throughout the study effort.

SUMMARY

The major findings of the OTA evaluation of railroad safety activities are presented in this section. The specific findings of the study effort are included in subsequent sections of this summary.

1. For the 9-year period (1966-74), track-caused train accidents per ton-mile increased 106 percent. In 1975, the basis for reporting accidents was changed but the trend of increasing track-caused train accidents continued in 1975 and 1976.
2. The combination of deferred maintenance and increased axle loadings (a factor designed to increase efficiency) appear to relate to the increases in property losses resulting from train accidents. A change in track-related accidents is unlikely to occur until there are positive economic changes in the industry.
3. Total railroad accident costs accounted for 3.5 percent of total industry operating revenues, or \$575 million, in 1975. Casualty claims accounted for approximately 45 percent of total safety-related losses, and property and lading damage and loss resulting primarily from train accidents also accounted for approximately 45 percent of safety-related losses in 1975. Clearing wrecks and damage to livestock accounted for the remaining 10 percent of safety-related losses.
4. Over the 10-year period (1966-75), accident costs increased by 38 percent (when adjusted for inflation). Casualty claims increased by 46 percent during the 10-year period, and property and lading losses resulting primarily from train accidents increased by 21 percent.
5. The current railroad safety statutory framework is adequate for addressing safety problems. However, Federal efforts to reduce casualties and property losses have been impaired by the following types of factors:
 - Accident data have not been adequately used in determining the nature, extent or reasons for specific safety problems
 - and in setting priorities for addressing problems prior to the initiation of Federal activity;
 - Measures of effectiveness have not been designed into current regulatory, inspection, and R&D programs;
 - Alternative approaches to the regulatory process, such as incentive programs, have not been systematically considered; and
 - In certain areas, such as rail-highway grade crossings, divided jurisdiction among Federal agencies, and among Federal and State agencies, and railroads have impaired administration of safety efforts.
6. A review of Federal regulatory, inspection and research and development activities has indicated the following:
 - In certain cases, a clear rationale has been provided relating standards or rules to the specific hazard they are intended to address;
 - The inspection programs resulting from the 1970 Safety Act do not have had no affect on the accident rate. Because inspection implementation is based on existing regulation, current inspection programs and strategies have not effectively dealt with the safety problems they are perceived to address; and
 - A majority of effort (Government and industry) has been directed at the accident problem resulting primarily in property losses. Less emphasis has been placed on the casualty problem and no strategy has been adopted which has been directed toward the causes of the casualty problems.
7. Increased cooperation in addressing railroad safety problems among all concerned parties and Government agencies should provide substantially greater opportunity for sizable reduction in property losses and in casualty losses. There is a positive trend in cooperative efforts on the

casualty problem as demonstrated in recent R&D efforts. Because of the complex nature of the railroad system, continued

cooperation among concerned parties is essential if further efforts to reduce safety losses are to occur.