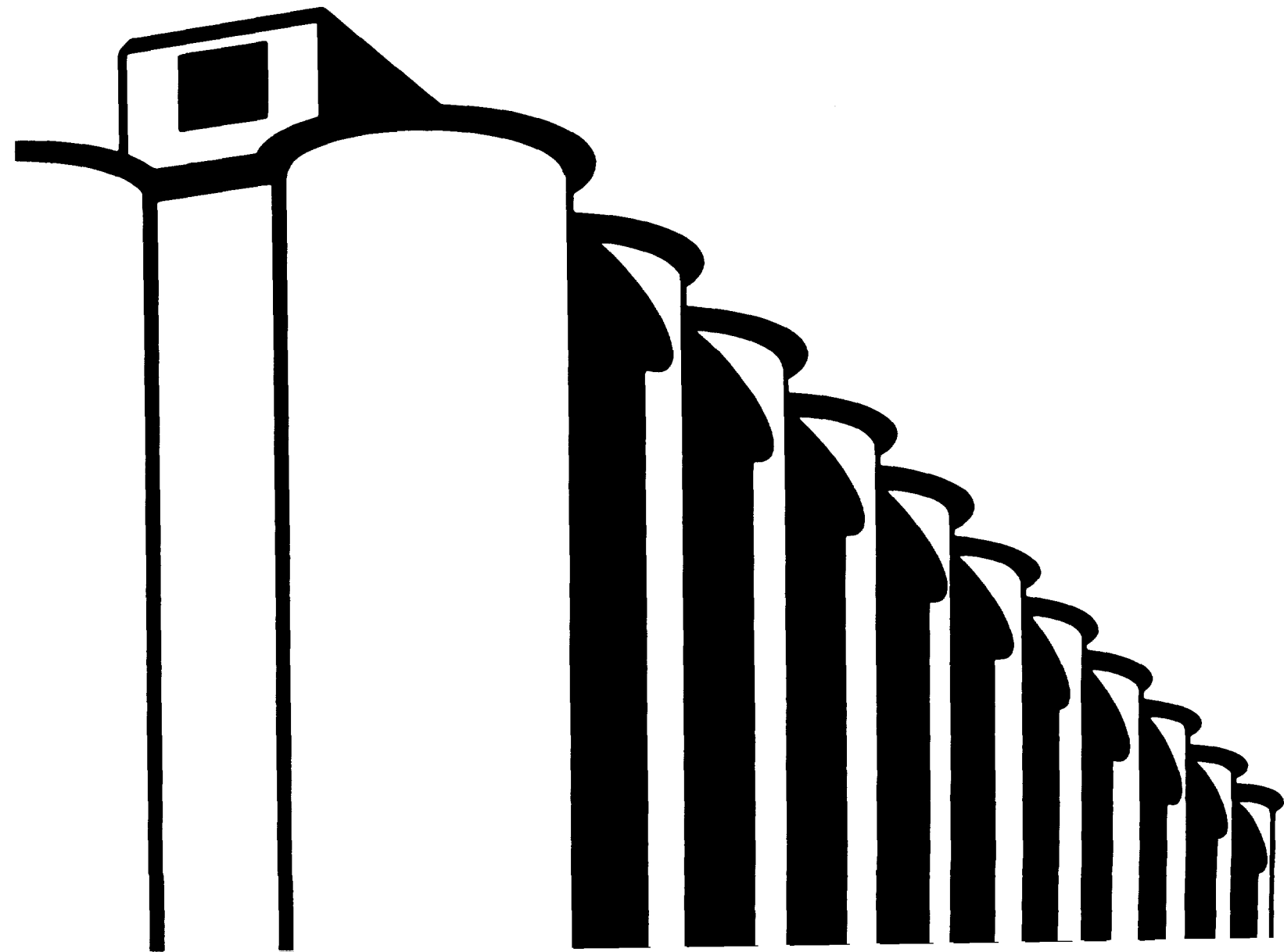


NIOSH

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control
National Institute for Occupational Safety and Health

Occupational Safety in Grain Elevators and Feed Mills



OCCUPATIONAL SAFETY IN
GRAIN ELEVATORS AND FEED MILLS

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control
National Institute for Occupational Safety and Health
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September 1983

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

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DHHS (NIOSH) Publication No. 83-126

PREFACE

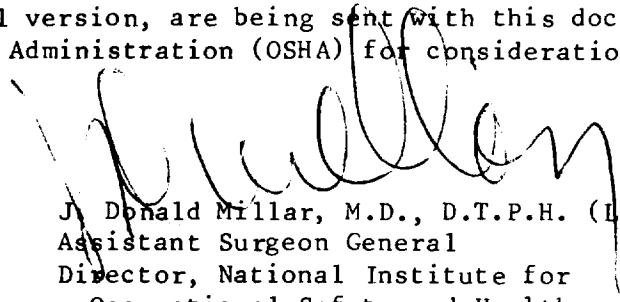
The Occupational Safety and Health Act of 1970 (Public Law 91-596), states that the purpose of Congress expressed in the Act is "to assure so far as possible every working man and woman in the Nation safe and healthful working conditions and to preserve our human resources...by," among other things, "providing for research in the field of occupational safety and health...and by developing innovative methods, techniques, and approaches for dealing with occupational safety and health problems." Later in the Act the National Institute for Occupational Safety and Health (Centers for Disease Control, Atlanta, Georgia) is charged with carrying out this policy. A principle means by which this information is communicated, is through the publication by NIOSH of Technical Guidelines.

Technical Guidelines are published for the purpose of disseminating comprehensive information about occupational hazards so that these hazards may be reduced in order to prevent injury and disease among workers. Technical Guidelines focus attention on occupational exposures which, though previously recognized, have never before been subjected to systematic and comprehensive analysis. Technical Guidelines present recommendations for reducing the hazards by a variety of means including compliance with any existing pertinent regulations. The Guidelines may also be used to support development of Federal safety and health standards.

Technical Guidelines are distributed to representatives of organized labor, industry, public health agencies, academic institutions, and public interest groups, as well as to those Federal agencies, such as the Department of Labor, which have responsibilities for protecting the safety and health of workers. It is our intention that anyone with the need to know should have ready access to the information contained in these documents; we welcome suggestions concerning the content, style, and distribution of them.

This document provides guidance for protecting workers in grain elevators and feed mills. It was prepared by the staff of the Division of Safety Research, NIOSH, (944 Chestnut Ridge Road, Morgantown, WV, 26505), in conjunction with the Division of Standards Development and Technology Transfer, NIOSH (Robert A. Taft Laboratories, 4676 Columbia Parkway, Cincinnati, OH, 45226). I am pleased to acknowledge the many contributions to this document made by consultants; reviewers selected by the National Grain and Feed Association (NFGA), the American Feed Manufacturers Association (AFMA), the Grain Elevator and Processing Society (GEAPS), the Rice Millers' Association (RMA), the American Federation of Grain Millers (AFGM); and the Allied Industrial Workers of America (AIWA); other reviewers; representatives of other Federal agencies; and, of course, the staff of the Institute (a list of consultants reviewing the document appears on v). However, responsibility for the conclusions reached and recommendations made belongs solely to the Institute. All comments by reviewers, whether or

not incorporated into the final version, are being sent with this document to the Occupational Safety and Health Administration (OSHA) for consideration in standard setting.

A handwritten signature in black ink, appearing to read "J. Donald Millar". The signature is written in a cursive style with a large, prominent "M" and "L".

J. Donald Millar, M.D., D.T.P.H. (Lond.)
Assistant Surgeon General
Director, National Institute for
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The views expressed, conclusions reached and recommendations presented in this report are those of the National Institute for Occupational Safety and Health. They are the result of careful review of available literature, site visits, review of existing industry guidelines and Federal safety standards, and consideration of comments from external reviews.

This report was developed by the Division of Safety Research (DSR), National Institute for Occupational Safety and Health. Mr. Ted A. Pettit and Mr. Peter M. Bochnak, Standards and Consultation Branch, DSR, served as Project Officer and Criteria Manager, respectively. Technical editing of this report was provided by Herbert Linn, DSR. Support was provided under Contract No. 210-79-0024 by Boeing Aerospace Company, Houston, Texas.

ABSTRACT

This report presents the results of an investigation of worker safety in grain elevators and feed mills. The investigation was conducted in order to develop safe work practices and engineering controls which could be used to reduce the number of accidents and injuries in the workplace and to train workers in the identification and awareness of hazards and their controls.

A description of grain elevators and feed mills is included along with statistical data correlating accidents with the population at risk. Specific hazards associated with combustible dust are addressed, as well as other safety hazards which may be encountered in the industry.

Guidelines are included for training, use of personal protective equipment, control of combustible dust, control of ignition sources, emergency planning, bin entry, isolation and lockouts, machine guarding, safe use of equipment and tools, and other work practices which could reduce worker exposure to occupational safety hazards.

Existing national and international standards are reviewed and compared with the developed guidelines. Recommendations for research are provided.

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I. INTRODUCTION AND SCOPE

This report contains safe work practices and engineering controls which were developed to reduce worker exposure to safety hazards in grain elevators and feed mills. Workers may be exposed to hazards as the result of lack of knowledge of the potential problems, inadequate training, or lack of implementation of hazard controls. Workers are exposed to safety hazards associated with fires and dust explosions, as well as other general safety hazards associated with the daily handling, storage, and processing of grain. Workers may also be subjected to health hazards as the result of exposures to grain dust and pesticides. Primarily, this report addresses safety hazards. Health hazards are discussed only to acknowledge their existence and the need for their control.

After evaluation of available data, guidelines have been developed to provide for the safety of workers. The data base consists of information obtained from literature searches, facility visits, and consultation with knowledgeable individuals from industry, labor, government, and the academic community.

The guidelines are intended to cover all facilities classified as grain elevators or feed mills. Although it is recognized that some grain facilities, such as rice mills, are less susceptible to dust explosions, no attempt has been made to correlate the recommended guidelines with the relative hazard of the commodity being handled. In general, all commodities should be considered hazardous unless it can be demonstrated otherwise through scientific means or statistically. The majority of grain elevators and feed mills are included in Standard Industrial Classification (SIC) Codes 5153 and 2048; however, they may be coded otherwise in multibased establishments. The guidelines are intended primarily to reduce the number of accidents and injuries in existing facilities. The recommendations are broad-based, to accommodate variations between facilities and the wide range of operations and processes encountered, and are performance oriented wherever possible. Many of the recommendations, such as those addressing the use of protective equipment and ladders, are consistent with the OSHA General Industry Standards contained in 29 CFR 1910. Other recommendations, such as those concerning dust control and confined space entry, are addressed only generally in OSHA standards or not at all. The recommendations are not intended to inhibit flexibility or to restrict development of safer procedures or techniques. Instead, they should enable management and labor to develop better work practices and more appropriate training programs that will result in safer work environments. Simply complying with the recommended guidelines should not be the final goal.

In spite of current efforts by government, industry, and labor, awareness of hazardous conditions in grain-handling and grain-processing facilities is far from universal. This report should be of value to both management and workers as an aid in identifying hazardous conditions, implementing hazard controls, and developing effective training programs.

Supporting information on the prevention of grain elevator and feed mill explosions can be obtained from the National Academy of Sciences (NAS) report, "Prevention of Grain Elevator and Mill Explosions," NMAB 367-2, which was jointly funded by the National Institute for Occupational Safety and Health (NIOSH), the Occupational Safety and Health Administration (OSHA), and the U.S. Department of Agriculture (USDA). The systems approach was used in the

NAS report to identify grain elevator explosion hazards and develop recommendations for preventive actions. Additional construction and design techniques that should be considered when building new facilities or renovating existing facilities are contained in National Fire Protection Association (NFPA) Standards 61B-1980, "Standard for the Prevention of Fires and Explosions in Grain Elevators and Facilities Handling Bulk Raw Agricultural Commodities," and 61C-1973, "Standard for the Prevention of Fire and Dust Explosions in Feed Mills."

Safety precautions related to the use of fumigants in grain-handling facilities are included in NFPA 61B-1980, "Standard for the Prevention of Fires and Explosions in Grain Elevators and Facilities Handling Bulk Raw Agricultural Commodities."

This report also identifies areas, such as dust control, bucket elevators, explosion venting, and fire extinguishing methods, where additional research is necessary and provides recommendations for this research.