

The Value of Proper Evaluation of New Products and Processes on Employee Health

Paul E. Caplan

One of the major objectives of the National Institute for Occupational Safety and Health generally, and, specifically, a major program of NIOSH's Division of Technical Services, is the value of proper evaluation of new products and new processes on employee health.

Toffler, in *Future Shock*, and others, tell us that not only change, but the rate of change is the most important phenomenon that modern man must cope with to survive, and Dr. Reuel Howe in *Survival Plus* tells us that change and growth are both our opportunities and our nightmares. Mr. Jack Schubert, in an article entitled, "A Program to Abolish Harmful Chemicals," states that each year about 250,000 chemicals are added to the 2,000,000 chemicals already registered, and about 500 new chemicals are used commercially. So the potential hazard presented by the introduction of new chemicals is not necessarily potential but may be actual.

Some of you present here today may remember a couple of foundries — one a brass foundry, the other a grey iron foundry, in a nearby city. New processes were being introduced to eliminate known health hazards. In the brass foundry, an entirely automated merry-go-round process was installed to eliminate exposures to toxic metallic and acid fumes. The end result, however, was an increase in noise levels from about 85 dB to over 100 dB. One hazard was replaced by another hazard because of poor engineering design. In the other foundry, an overhead air conduit ventilation system — of fair capability — was replaced by an on-the-floor rectangular duct, square cornered, system. The ductwork was very neat, and hidden, but was entirely useless. Over in Los Angeles County, the famous Air Pollution Rule 66 encouraged the substitution of photochemically inert carbon tetrachloride for photochemically active trichlorethylene and perchloroethylene for the reduction of photochemical smog. These solutions to problems are examples of the need for proper evaluation of new products and processes to insure the improvement of employee health.

Mr. Caplan is Deputy Director, Division of Technical Services, National Institute for Occupational Safety and Health, Health Services and Mental Health Administration, Department of Health, Education, and Welfare, Rockville, Maryland.

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Many of you are aware that proteolytic enzymes, which were once the final answer to the removal of soil in clothing, have now been phased out of almost all wash-day detergents — because the soap producers failed to pretest these materials properly, for both consumer and employee protection.

NIOSH was originally set up, under the 1970 Occupational Safety and Health Act, for the primary purpose of conducting research into the major unresolved causes and control methods involving industrial injury and illness. And so, a major program involves the development of background information necessary to prepare standards for exposure to toxic materials, and to produce manuals of good operating practices to reduce exposures to these toxic materials. We have also been advised, by many, that part of our responsibility is also to evaluate the toxicity of substitute materials, to replace toxic materials, and also to evaluate alternate work practices, to replace hazardous work practices. I will discuss these programs later in this presentation.

In order to carry out these research and development responsibilities, the Division of Technical Services has several programs to respond to requests for evaluation of new materials and new processes. But first I will briefly mention some of the programs of other NIOSH offices and divisions. The Office of Research and Standards Development prepares the Annual List of Toxic Substances. The 1972 list contains more than 12,000 chemicals. It also prepares criteria documents for recommended standards for occupational exposure to specific hazardous agents, such as noise, beryllium, lead, cotton dust, heat stress, and others. Most of these documents involve known hazardous materials, but much NIOSH research is directed toward unknown hazardous materials.

In Cincinnati, NIOSH has a second office, the Office of Extramural Activities, and Grants Administration. The major function of this office is to evaluate and fund training grants and research grants related to the evaluation and control of unknown toxic chemicals and conditions. Additionally, research grants are funded to conduct studies of psychological and motivational factors; and the relationships between occupational situations and mental health and job performance.

The area of Occupational Safety Research is under the responsibility of NIOSH's Assistant Director for Safety,

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continued

Mr. Al Blackman. A recent report prepared by the Arthur D. Little Company, entitled "The Present Status and Requirements for Occupational Safety Research," is now available from our publications office. A system was developed for ranking safety research projects on the basis of priority. For example, in one group of 12 projects, highest priorities were given to:

1. Relation of fatigue to safety and injury.
2. Systems for making wire rope slings and to identify and give safe working loads for these and other articles of hoisting gear.
3. Detection and identification of electrically unsafe conditions.
4. Statistical survey of electric accidents by specific causes, and
5. Evaluation of safety devices for material hoisting, including hoisting for concrete buckets, to control free fall and to annul descent.

Some of the programs of the Division of Technical Services are also directed toward the evaluation and control of new hazardous materials and processes. In fact, we are geared to respond to the initial awareness of NIOSH to new situations. One of the projects that our Industrial Hygiene Services Branch is developing, in cooperation with OSHA, is a Hazard Warning System. This system will include Material Safety Data Sheets and Warning Labels and Placards. The Act states that "...any standard shall prescribe the use of labels or other appropriate forms of warning as are necessary to insure that employees are apprised of all hazards to which they are exposed, relevant symptoms, and emergency treatment, and proper conditions and precautions of safe use or exposure." — (Sec. 6(b)(7)). This Section will require all employers to make available to their employees data necessary to insure safe and healthful working conditions.

A second program of the Division of Technical Services is our Hazard Evaluation Program, jointly carried out by staff of our Hazard Evaluation Services Branch and our Medical Services Branch. Section 20(a)(6) of the Act requires that "NIOSH shall determine, following a written request by any employer or authorized representative of employees, whether any substance normally found in the place of employment has potentially toxic effects in such concentrations as used or found." This program is directed both at hazardous agents with well established hygienic standards and at agents with little or no known toxicological standards. In this program, we hope to detect and evaluate problems before they become major sources of industrial disease or injury.

For new and untested materials and processes, we have established a Review Committee for Toxicity Determinations, consisting of NIOSH experts in medicine, toxicology, chemistry, industrial hygiene, engineering, and human factors engineering. Inputs from Vernon Rose's National Surveillance Network Program are also evaluated by this committee to determine how

large a potential exposure population may exist to a given hazard. This Program is carried out both by central staff in Cincinnati and also by Regional industrial hygienists, such as Mel O'kawa in San Francisco.

As a result of some of our requests for health hazard evaluations, new toxicology studies have been initiated in NIOSH on carcinogenic properties of coal tar pitch volatiles, benzo(a) pyrene, bis-chloromethyl ether, and other polynuclear aromatic hydrocarbons; and some trade named materials as Polytek, plastic coated foundry sands, cesium and rubidium compounds used in photography, and various sulfonide compounds.

Another area of research involves the development of biological indicators of exposures to toxic materials to detect reversible effects and absorption, before irreversible effects occur. These are being conducted by Dr. Herbert Stokinger's toxicology group under Drs. Les Scheel and Trent Lewis.

Our activities are also directed toward the reduction of hazards to employees by new industrial processes and operations. Some of you in Northern California, may be familiar with studies being conducted on the control of bis-chloromethyl ether. This is a very carcinogenic bi-product of an anion exchange resin manufacturing process.

Another interesting study was jointly conducted by our staff with representatives of a major electronics parts manufacturer, to evaluate a new method of controlling solvent vapors in degreasing. A new control device called a "Cold Trap," employs a free board refrigeration system. This company estimated that a potential savings of 80% of degreasing solvent was feasible, involving millions of pounds of solvent per year, by use of this simplified emission control device to replace exhaust systems, improvements in degreasing techniques, and substitution of one solvent for another.

One additional research project that NIOSH is sponsoring will illustrate our activity in new methods of hazard control. For two years, NIOSH has funded an experiment of coal dust suppression in coal mining, by the use of high expansion foam systems. It appears to be engineeringly feasible to reduce dust levels from more than 8 mg/m³ to the working standard of 2 mg/m³ by means of foams. The cost of such dust suppression has been estimated to be reduced from about \$10.00 per ton to approximately 10 to 15¢ per ton, an economically feasible level.

These are examples of types of research NIOSH is conducting to reduce hazards in industry. There still remains major problems, however, in the conduct of our program. One of these involves the responsibility for developing toxicological data on the more than 500 new chemicals introduced into the industrial community each year. Many feel that such evaluations should be a legitimate cost of production, rather than the responsibility of government, similar to the situation with new drugs and food additives. This type of data may be required in the preparation of our Material Safety Data

Sheets, or by the Hazardous Substances Act of EPA, or additional legislation.

A second major problem is the requirement of NIOSH and OSHA to maintain the confidentiality of proprietary information obtained in hazard evaluation studies. Many companies develop new, safe compounds for example, substitutes for asbestos in insulating materials, substitutes for talc in painting compounds, new less hazardous chemical accelerators (to replace TDI), or new processes to reduce exposures to hazardous agents. But these manufacturers are reluctant to divulge this information to competitors. This problem still needs a philosophical solution, involving an enlightened industry, who realize that it has responsibilities not only for the health and welfare of its own employees, but also the general industrial community.

Government also must recognize that it has a responsibility to assist industry in the development of less hazardous materials and processes, when it determines that materials are toxic. For this reason,

NIOSH subsidizes research on the toxicity of asbestos substitutes, methods of rendering cotton dust to be physiologically inert, and development of good practices manuals in the hazardous operations of battery manufacturing, coke oven operations, foundry operations, metal degreasing, and others.

Another large area of unknown and needed data involves the evaluation of effects of several combined stresses on workers' health. The combinations of stresses are almost unlimited, and priorities must be set to evaluate the more significant combinations. NIOSH has set up a Project Review Committee which attempts to set valid priorities on the several hundred projects proposed for funding by contract or in-house activity. This is a continuing process and one that needs continual updating and improvement, but hopefully, the results of these research projects will bring about the primary aim of NIOSH and OSHA, and to all of us present today, a more healthful and productive work force in America.

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