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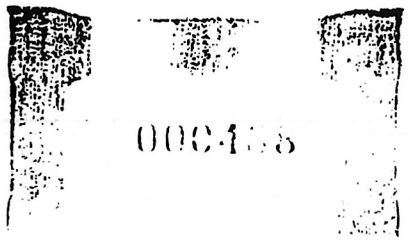
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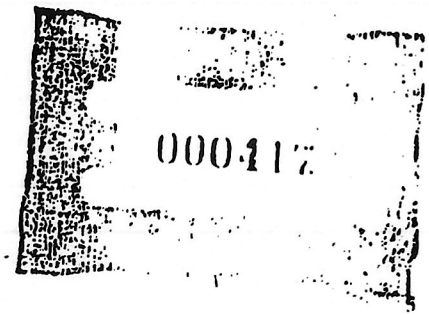
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DONALD J. VAUGHAN, Assistant Vice President, Engineering Department, Aetna Casualty and Surety Company, Hartford, Connecticut

DR. PRESTON A. WADE, Professor of Clinical Surgery, Cornell University Medical School, New York, New York

J. P. WARNER, Vice President and General Manager, Manufacturing Division, Humble Oil & Refining Company, Houston, Texas

MISS MARY M. WEEKS, Program Specialist, Health and Safety Education, Girl Scouts of the United States of America, New York, New York

MARK D. WENTZ, JR., Safety Director, Cit-Con Oil Corporation, Lake Charles, Louisiana

HUNTER P. WHARTON, General Secretary-Treasurer, International Union of Operating Engineers, Washington, D. C.

GEORGE M. WHEATLEY, M.D., Third Vice President and Medical Director, Metropolitan Life Insurance Company, New York, New York

REX M. WHITTON, Federal Highway Administrator, U. S. Department of Commerce, Washington, D. C.

T. H. WILKENSON, Director of Safety, Department of the Army, Washington, D. C.

ALLAN M. WILSON, Vice President, The Advertising Council, Inc., Washington, D. C.

ROBERT S. WILSON, Hudson, Ohio

W. B. WOOD, Director, Agricultural Extension Service, The Ohio State University, Columbus, Ohio

E. CLARK WOODWARD, Director of Safety, A. O. Smith Corporation, Milwaukee, Wisconsin

DR. J. C. WRIGHT, Secretary, Committee for Advancement of School Administration, American Association of School Administrators, Washington, D. C.

DR. WILLIAM P. YANT, Research Consultant to the President, Mine Safety Appliances Company, John T. Ryan Memorial Laboratory, Pittsburgh, Pennsylvania

DR. D. WILLARD ZAHN, Dean, School of Education, Temple University, Philadelphia, Pennsylvania

CARLTON L. ZINK, Product Research Department, Deere & Company, Moline, Illinois

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ANNUAL MEETING OF MEMBERS

INVOCATION

By THE REV. CHARLES M. CROWE, D.D.
Pastor—Wilmette Parish Methodist Church
President—Church Federation of Greater Chicago

ETERNAL GOD, Thou who are the creator of the race of men and in Whose care and keeping reside the destinies of nations, we acknowledge Thy lordship over life and the sovereignty of Thy divine laws in all human affairs. Grant, we pray Thee, the leadership of Thy wisdom in the deliberations of this important assembly. May the concerns here expressed for the safety and well-being of the people meet with Thy favor. And may they lead to a greater protection and preservation of the manpower of the nation. Renew among us a deep respect for the sacredness of personality and a genuine consideration for our fellow men. We would make common cause with all who seek to elevate and dignify and make secure the society of free men. Guide the leaders of the nation and the efforts of all responsible people to make peace with honor possible in our time. May all that is said and done during these days of conference be in the service of humankind and to Thy honor and glory.

MINUTES OF THE ANNUAL COUNCIL MEETING

The 1961 Annual Council Meeting of the National Safety Council was held in the Grand Ballroom of the Conrad Hilton Hotel, Chicago, on October 16, with Howard Pyle, President, presiding.

Following the singing of the national anthem, the Invocation was offered by the Rev. Charles M. Crowe, President of the Church Federation of Greater Chicago. Dr. Crowe's prayer is printed on a following page.

In welcoming the delegates, Mr. Pyle extended special greetings to those present from foreign countries, and to the large number of young people in attendance, who were participating in the youth sessions of the Congress. He then proceeded with the business of the meeting by announcing a quorum present, in person or by proxy.

It was voted to dispense with the calling of the roll; also to dispense with the reading of the minutes of the previous annual meeting, as the minutes had been printed and circulated to the membership.

Mr. Pyle called for the report of the Nominating Committee, which consisted of the following members: Edward C. Myers, Chairman; Walter F. Carey, George A. Jacoby, Robert T. Ross, Walter K. Koch, Franklin M. Kreml, Herman J. Spoerer.

Mr. Spoerer reported in behalf of the Nominating Committee, pointing out that

SAFETY EXPOSITION EXHIBITORS—1961

Acme Protection Equipment Co., South Haven, Mich.
Industrial gas masks, chemicals and accessories.

Advance Glove Mfg. Co., Detroit, Mich.
Work gloves.

Aetna Casualty & Surety Co., Hartford, Conn.
Safety educational aids and services including Aetna Drivotrainer

Akron Brass Mfg. Co., Inc., Wooster, Ohio
Fire Hose Nozzles and accessories.

Alan Wood Steel Co., Conshohocken, Pa.
Abrasive rolled steel floor plate.

American Allsafe Co., Inc., Buffalo, N. Y.
Sweat Bands and Greenline emergency release.

American Biltrite Rubber Co., Chelsea, Mass.
Rubber, composition and neoprene safety soles.

American Chain & Cable Co., Inc., Bridgeport, Conn.
Sling chains and sling chain Assemblies, wire rope slings and assemble your own wire rope slings.

American Industrial Safety Equipment Co., Inc., Cleveland, Ohio
Face shields, goggles, gloves and mittens.

American LaFrance Corp., Elmira, N. Y.
Fire apparatus and fire fighting equipment.

American Optical Co., Southbridge, Mass.
Head, eye, respiratory protective devices; safety clothing, safety specialty products.

American Society of Safety Engineers, Chicago, Ill.
Society for the professional safety specialist.

Ampco Metal, Inc., Milwaukee, Wis.
Non-sparking, corrosion-resistant safety tools.

Ansul Chemical Co., Marinette, Wis.
Dry Chemical fire protective equipment.

Antrex Corp., Chicago, Ill.
Battery-powered public address megaphones, helmet radios, tape recorders.

Apex Safety Products, Detroit, Mich.
Safety hats, caps, face shields.

Atlas Safety Equipment Co., Inc., Brooklyn, N. Y.
Industrial Safety Belts, harnesses, and straps.

Auto-Crat Mfg. Co., Los Angeles, Calif.
Safety belts, interceptor harnesses, babi guard belts.

Bachrach Industrial Instrument Co., Pittsburgh, Pa.
Instruments for gas analysis and air measurement.

Bashlin, W. M. Co., Grove City, Pa.
Linemen's and industrial safety equipment.

Bauer Mfg. Co., Wooster, Ohio
Wood and aluminum safety ladders.

Bausch & Lomb Optical Co., Rochester, N. Y.
Safety glasses, ortho-raters and "Titan" safety frame.

Beam's Mfg. Co., Reading, Pa.
Auto safety belts.

Best's Safety Publication, New York, N. Y.
Publishers of "Safety Maintenance" magazine, "Best's Safety-Maintenance Directory" and "Your Safety News."

Bethlehem Steel Co., Bethlehem, Pa.
Wire Rope slings, standard and braided slings.

Brossard, Lester L. C., Chicago, Ill.
Traffic mirrors and traffic lane markers.

Browne, Stewart R. Mfg. Co., Inc., New York, N. Y.
Electrical safety equipment, explosion-proof and vapor-proof portable inspection lites, explosion-proof flashlites, grounding devices.

Buhrke, R. H. Co., Chicago, Ill.
Occupational safety equipment and products for construction and maintenance.

Bullard, E. D. Co., Sausalito, Calif.
Industrial safety equipment.

Bustin Steel Products, Inc., Dover, N. J.
Star tread material.

Campbell Chain Co., York, Pa.
Sling chains, welded and weldless chains.

Chance, A. B. Co., Centralia, Mo.
Hot line maintenance tools and line construction tools.

Charleston Rubber Co., Charleston, S. C.
Electrical worker's gloves, Bulldog wood safety clamps, red danger flags, plastic and fabric coated industrial aprons and sleeves.

Chemical Corp., The, Springfield, Mass.
Protective hand creams, cleaners and lotions.

Chicago Eye Shield Co., Chicago, Ill.
Head and eye protective equipment.

Chrysler Corp., Detroit, Mich.
Automobiles and trucks.

Clark, David Co., Inc., Worcester, Mass.
Safety Equipment, sound protector, space suits.

Clark, J. R. Co., Spring Park, Minn.
Industrial ladders.

Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Alloy steel sling chains.

Cornelius Co., Minneapolis, Minn.
Portable high pressure air compressors.

Davis Emergency Equipment Co., Inc., Newark, N. J.
Respiratory protection, combustible gas indicators, safety and first aid equipment.

Detex Watchclock Corp., Chicago, Ill.
Watchmen's clocks.

Dietz, R. E. Co., Syracuse, N. Y.
Automotive lighting and safety equipment.

Dockson Corp., Detroit, Mich.
Welding helmets, face shields, cup and spectacle type goggles, respirators and eye savers.

Dow Corning Corp., Midland, Mich.
Sight saver cleaning stations, shoe saver, safety shoes.

Draeger Oxygen Apparatus Corp., New York, N. Y.
Safety equipment.

Eagle Mfg. Co., Wellsburg, W. Va.
Safety cans, oilers, oil and gasoline containers.

Edmont Mfg. Co., Coshocton, Ohio
Coated fabric work gloves.

Electronic Specialties Co., Batavia, Ill.
Warning lights, barricades.

Elkhart Brass Mfg. Co., Inc., Elkhart, Ind.
Fire extinguishers, municipal and industrial brass goods.

Elliott Service Co., Inc., Mount Vernon, N. Y.
Accident prevention displays, safety conference programs, Supervisor's Weekly Bulletin, suggestion system, service.

Emerson, J. H. Co., Cambridge, Mass.
Resuscitators, inhalators and safety matting.

Encyclopedia Britannica, Inc., Chicago, Ill.
Technical reference service.

Falcon Alarm Co., Inc., Summit, N. J.
Automatic fire detectors and systems, audible safety signals.

Federal Sign & Signal Corp., Blue Island, Ill.
Sirens, warning lights, horns, bells and electronic sirens.

Fendall Co., Chicago, Ill.
Head and eye protection equipment.

Ferno Mfg. Co., Washington C. H., Ohio
Emergency folding stretchers and chairs.

Fibre-Metal Products Co., Chester, Pa.
Eye, Head, and face protection and welding accessories.

Fine Organics, Inc., Lodi, N. J.
High flash, low toxicity safety solvents.

Ford Motor Co., Dearborn, Mich.
Ford automobiles, featuring lifeguard steering wheels, sun visors, seat belts, instrument panel padding, and door latches.

Frommelt Industries, Dubuque, Iowa
Portable welding shields and protective heat cloth.

Fyrepel Products, Inc., Newark, Ohio
Aluminized glass cloth, heat protective clothing for industry and fire fighting.

Fyr-Fyter Div., Fyr-Fyter Co., Dayton, Ohio
Fire extinguishers, resuscitators and respirators.

General Fire Extinguisher Corp., Chicago, Ill.
Fire extinguishers and allied products.

Glendale Optical Co., Inc., Valley Stream, N. Y.
Chippers and welders goggles, face shields, safety spectacles.

The Globe Co., Products Division, Chicago, Ill.
Grip-Strut grating, stair tread materials.

Globe Safety Products, Inc., Dayton, Ohio
Resuscitation and breathing equipment.

Goodrich, B. F. Footwear & Flooring Co., Hood Rubber Co., Watertown, Mass.
Waterproof industrial footwear, hood waterproof industrial footwear, Hood industrial coated and unsupported gloves.

Granet Corp., The, Framingham, Mass.
Coated Fabric work gloves.

Grinnell Co., Inc., Providence, R. I.
Fixed pipe fire protection systems.

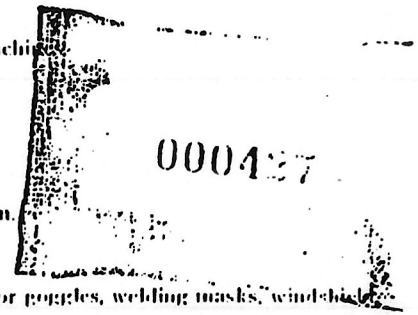
Gro-Cord Rubber Co., Lima, Ohio
Neoprene, rubber, composition soles and heels for safety footwear.

Halperin, A. E. Co., Inc., Boston, Mass.
First aid kits, safety equipment, burn quel.

Haus of Krause Safety Shoes, Rockford, Mich.
Men's safety shoes for distributors serving industry.

Haws Drinking Faucet Co., Berkeley, Calif.
Emergency eyewash fountains, emergency showers and goggle wash fountains.

Hild Floor Machine Co., Inc., Chicago, Ill.
Explosion-proof vacuum cleaners and floor machi



Hopfeld Industrial Mfg. Co., San Rafael, Calif.
Fiber glass ladders, structural members.

Horizon Industries, Minneapolis, Minn.
Pre-measured toilet bowl cleaner in tablet form.

Hygiene Research, Inc., New York, N. Y.
Protective ointments and mistproofing cloth for goggles, welding masks, windshields.

Hy-Test Safety Shoe Div., International Shoe Co., St. Louis, Mo.
Safey footwear; also conductive and special types of atomic usage.

Industrial Acoustics Co., Inc., New York, N. Y.
Audiometric examination room, technical publications and industrial hearing conservation programs.

Industrial Gloves Co., Danville, Ill.
Leather, asbestos, duck, wool, Woven-Card, Permaproof, and aluminized duck and asbestos finger guards.

Institute of Industrial Launderers, Washington, D. C.
Industrial Launderers and cleaners.

Insto-Gas Corp., Detroit, Mich
Torches and furnaces.

International Film Bureau, Inc., Chicago, Ill.
Safety films and film library supplies.

Interstate Rubber Products Corp., Los Angeles, Calif.
Safety trafficones for traffic control.

Iron Age Safety Shoe Div., H. Childs & Co., Inc., Pittsburgh, Pa.
Linemen's and women's leather and rubber industrial safety footwear.

Jackson Products Air Reduction Sales Co., Div. of Air Reduction Co., Inc., Warren, Mich.
Insulated electrode holders, cable connectors, face shields and goggles.

Jamieson Laboratories, Inc., Van Nuys, Calif.
Air filtration device for use in industry.

D. Jay Products, Inc., Newark, N. J.
Safety marking rope.

Jomac, Inc., Philadelphia, Pa.
Industrial clothing.

Jones & Co., Providence, R. I.
Full vision visor goggles.

Junkin Safety Appliance Co., Inc., Louisville, Ky.
Power press guards, grinding wheel shields, stretcher equipment.

Justrite Mfg. Co., Chicago, Ill.
Safety cans, oily waste cans, safety electric lanterns, flashlights and fire extinguishers.

Karel First Aid Supply Co., Chicago, Ill.
Industrial hospital equipment and medical supplies.

Keystone View Co., Meadville, Pa.
Occupational and driver vision test, lantern slide projectors.

Kidde, Walter & Co., Inc., Belleville, N. J.
Fire detecting and extinguishing equipment, ultrasonic burglar alarm.

Kimball Safety Products Co., Cleveland, Ohio
Personal protective devices for industrial workers.

Klein, Mathias & Sons, Chicago, Ill.
Linemen's safety equipment and tools.

Knapp Brothers Shoe Mfg. Corp., Brockton, Mass.
Safety Shoes.

Kunz, J. Glove Co., Chicago, Ill.
Linemen's, bridgemen's and welder's quality gloves.

Lawter Chemicals, Inc., Chicago, Ill.
Fluorescent safety colors.

Legge, Walter G. Co., Inc., Chicago, Ill.
Safety floor maintenance materials, conductive coating, static eliminators.

Lehigh Safety Shoe Co., Emmaus, Pa.
Leather and rubber safety footwear.

Liberty Mutual Ins. Co. of Boston
New survival car 11.

Logan Emergency Showers, Inc., Glendale, Cal.
Emergency showers and decontamination showers.

Lynrus Finishing Co., Inc., Poughkeepsie, N. Y.
Flame-retardant fabrics.

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McAu, Thom Safety Shoe Div., New York, N. Y.
Safety Shoes.

McDermott, Julian A. Corp., Ridgewood, N. Y.
Warning and safety lighting for municipal, industrial, utility and aviation use.

McKay Co., Pittsburgh, Pa.
Industrial chain, tire chains, arc welding electrodes, stainless and alloy wire.

Maico Electronics, Inc., Minneapolis, Minn.
Audiometers for industrial hearing testing.

Marsh & McLennan, Inc., Chicago, Ill.
Insurance broker and agencies.

Martindale Electric Co., Cleveland, Ohio
Protective dust masks, eye protectors, face shields, safety electric test instruments

Medical Supply Co., Rockford, Ill.
Flexible unit aid, snake bite first aid, burn first aid.

Metropolitan Life Insurance Co., New York, N. Y.
Useful materials for use in community health and safety programs.

Meyer Machine, Inc., Red Wing, Minn.
Safety clamps.

Micro Switch, Div. of Minneapolis-Honeywell Regulator Co., Freeport, Ill.
Safety interlock switches and electric controls for power machines.

Milburn Co., Detroit 7, Mich.
Ply skin protective creams, ply garb safety and protective clothing, plygloves plastic coated work gloves, ply waterless hand cleaner.

Miller Equipment Co., Inc., Franklin, Pa.
Linemen's safety belts, strap accessories and industrial safety belts.

Mine Safety Appliances Co., Pittsburgh, Pa.
Safety equipment for every industry.

Minnesota Mining & Mfg. Co., St. Paul, Minn.
Heat reflective "Scotchshield" brand chemical fabric used in protective clothing for fire fighters and industries with heat problems.

Mobile Classroom Rental, Inc., Chicago, Ill.
Mobile classroom equipped with Drivo-trainers.

National Chemsearch Co., Chicago, Ill.
Safety solvents and other safety chemicals.

National Medical Supply Co., Chicago, Ill.
Industrial first aid supplies equipment and instruments.

Newco Mfg. Co., Inc., Kansas City, Mo.
Wire rope fittings, safety hooks, load protectors.

Notifier Corp., Lincoln, Neb.
Fire detection, sprinkler supervisory, watchman tour, municipal alarm systems.

Occupational Hazards, Cleveland, Ohio
Publishers.

Ohio Chemical & Surgical Equip. Co., Div. of Air Reduction Co., Inc., Madison, Wis.
Complete array of modified E & J life-saving resuscitative equipment.

Onox, Inc., San Francisco, Calif.
Onox, skin toughener and footmats for athlete's foot.

Osborn Mfg. Corp., Warsaw, Ind.
Safety pliers and tongs for feeding punch presses.

Oxygen Equipment & Service Co., Chicago, Ill.
Respiratory equipment.

Oxy-Gear, Inc., Chicago, Ill.
Portable emergency oxygen inhalator kits, controlled flow pure oxygen.

Pac-Kit Co., Greenwich, Conn.
Unit type first aid equipment.

Packwood, G. H. Mfg. Co., St. Louis, Mo.
Safety industrial skin cleaners and dispensers.

Patent Scaffolding Co., Inc., Chicago, Ill.
Wood, aluminum and magnesium safety ladders, suspended sectional steel tubular steel and aluminum scaffolding, sidewalk protection canopies, steel grandstands and fold-a-way scaffold.

Peck's Products Co., St. Louis, Mo.
Solvents, hand soaps.

Pioneer Rubber Co., Willard, Ohio
Gloves; all kinds, liquid proof.

Portable Light Co., Inc., New York, N. Y.
Vehicular and emergency searchlights, general alarm sirens.

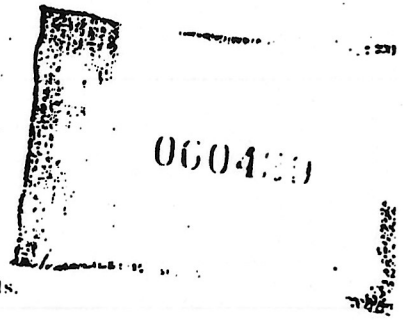
Porto-Clinic Instruments, Inc., New York, N. Y.
Driver testing and training equipment and visual aids for driver and traffic safety.

Positive Safety Mfg. Co., Cleveland, Ohio
Power press guards.

Prairie State Products Co., Chicago, Ill.
Metal and electrical safety and directional signs.

Progress Industries, Inc., Warwick, R. I.
Safety goggles.

Protectoseal Co., Chicago, Ill.
Fire prevention equipment for flammable solvents.



Pulmosan Safety Equipment Corp., Brooklyn, N. Y.
Respirators, eye protection, helmets, protective clothing, asbestos and leather gloves.

Racine Glove Co., Inc., Rio, Wis.
Gloves, apparel, protective equipment—leather, asbestos, and steel reinforced.

Radiator Specialty Co., Charlotte, N. C.
Safe-T-Cone rubber traffic guides.

Rhett Woodworking Safety Guards, Wilmington, N. C.
Jointer and shaper guards.

Rockwood Sprinkler Co., Worcester, Mass.
Automatic Fire protection systems; sprinklers, waterfog, fogfoam and foam.

Rose Mfg. Co., Denver 4, Colo.
Industrial safety equipment.

Safeguard Mfg. Co., Woodbury, Conn.
Modern press guards.

Safety Box Toe Co., Boston, Mass.
Safety steel toes.

Safety Clothing & Equipment Co., Cleveland, Ohio
Safety clothing and equipment for every type of industrial worker.

Safety First Products Co., Elmsford, N. Y.
Fire extinguishers.

Safety First Shoe Co., Inc., Holliston, Mass.
Safety steel toe shoes for men.

Safety Tower Ladder Div.; Air Space Device, Inc., Burbank, Calif.
Safety equipment for fixed ladders and scaffolds.

Salisbury, W. H. & Co., Chicago, Ill.
Linemen's rubber protective equipment.

Sarole, Inc., Linden, N. J.
Non-traumatic carrier.

Sawyer-Tower, Inc., Watertown, Mass.
All types of protective and safety clothing.

Scott Aviation Corp., Lancaster, N. Y.
Scott air-pak demand inhalator, demand respirator, hydro-pak.

Searjeant Metal Products, Inc., Mendon, N. J.
Punch press safety guards, controls and accessories.

Seiberling Latex Products, New Bremen, Ohio
Rubber and neoprene industrial gloves.

Sellstrom Mfg. Co., Palatine, Ill.
Face and eye protection equipment.

Servus Rubber Co., Rock Island, Ill.
Rubber footwear of all types.

Speakman Company, Wilmington, Del.
Industrial emergency showers, eye-wash fountains.

Standard Safety Equipment Co., Palatine, Ill.
Industrial safety equipment.

Standard Signs, Inc., Cleveland, Ohio
Signs for industrial accident prevention.

Stephenson Corp., Red Bank, N. J.
Automatic resuscitation equipment and chemical breath test for intoxication

Stonehouse Signs, Inc., Denver, Colo.
Industrial accident prevention signs.

Stop-Fire, Inc., Monmouth Junction, N. J.
Fire extinguishers.

Surety Rubber Co., Carrollton, Ohio
Personal protective equipment for industrial and electrical workers.

Switzer Brothers, Inc., Cleveland 3, Ohio
Fluorescent safety paint for high-visibility marking of hazards.

Swivelier Co., Inc., New York, N. Y.
Universally adjustable lighting equipment.

Taylor, S. G. Chain Co., Inc., Hammond, Ind.
Alloy steel sling chains and allied products including alloy steel drop forged hooks.

Tect, Inc., Northvale, N. J.
Vythene and other tecsolve safety solvents.

Titmus Optical Co., Inc., Petersburg, Va.
Safety eyewear, ophthalic instruments, lenses, frames and sun wear.

U-C-Lite Mfg. Co., Chicago, Ill.
Explosion-proof portable electric hand lamps and emergency lights.

Union Wire Rope Corp., Kansas City, Mo.
Wire rope slings, towlines.

United States Rubber Co., New York, N. Y.
Industrial safety clothing, safety footwear.

United States Safety Service Co., Kansas City, Mo.
Modern industrial eyewear, sold direct to user.

Wagner Sign Service, Inc., Chicago, Ill.
Wagner changeable copy displays.

Wamsutta/Pacific Industrial Fabrics, New York, N. Y.
"Safetex" flame retardant fabrics—durable to laundering—for safety clothing. Protective fabrics for industrial uses, made of various fibres.

Watchemoket Optical Co., Inc., Providence, R. I.
Plastic eye protection and safety signs.

Welsh Mfg. Co., Providence, R. I.
Safety goggles, lens, face shields and helmets.

West Side Iron Works, Inc., Grand Rapids, Mich.
Barricades, warning lights, safety vests.

Wheeler Protective Apparel, Inc., Chicago 10, Ill.
Industrial safety clothing for heat and abrasive hazards.

Williams Jewelry & Mfg. Co., Chicago, Ill.
Safety awards, badges and trophies.

Willson Products Div., Ray-O-Vac Co., Reading, Pa.
Industrial goggles, gas masks, helmets and respirators, and allied safety devices

Wilson Rubber Co., Div. of Becton, Dickinson & Co., Canton, Ohio
Rubber and synthetic industrial gloves for every use.

Woolrich Woolen Mills, Woolrich, Pa.
Acid resistant industrial safety clothing.

Zenith Radio Corp., Hearing Aid Div., Chicago, Ill.
Diagnostic audiometers that also can be used for individual and group screening

EDUCATIONAL EXHIBITORS

Chicago Police Dept., Education Section, Traffic Div.
Traffic safety display.

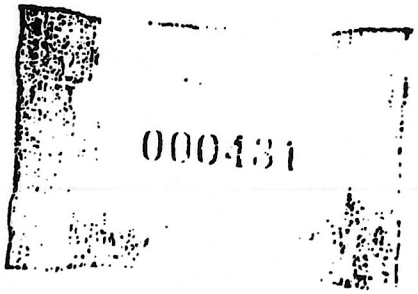
Inter-American Safety Council, Inc., New York, N. Y.
"The Safety Council serving Latin America."

National Society for the Prevention of Blindness, New York, N. Y.
Educational material on conservation of eyesight in industry.

Division of Accident Prevention, Public Health Service, Washington, D. C.
Accident prevention program & materials.

Recreation Shooting Safety Committee, National Safety Council, Chicago, Ill.
Recreational shooting safety program materials.

U. S. Forest Service, Washington, D. C.
Smokey Bear—Forest Fire Prevention, and Forest Service Safety Materials.



OFFICERS OF THE

CEMENT, QUARRY AND MINERAL AGGREGATES SECTION

NATIONAL SAFETY COUNCIL 1961-62

Chairman—Howard F. Johnston, Supv., Ind. Relations, Funkhouser Mills Div., Ruberoid Co., Hagerstown, Md

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Second Vice Chairman—Arvid Thesson, Safety Dir., Material Service Corp., Lyons, Ill.

Secretary—J. R. Treadaway Safety, Dir., Vulcan Materials Co., Birmingham, Ala.

Newsletter Editor—Lyman E. Cunningham, Safety Dir., The Georgia Marble Co., Tate, Ga.

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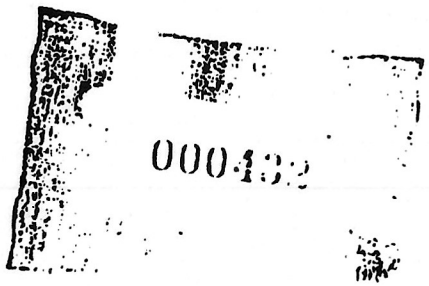
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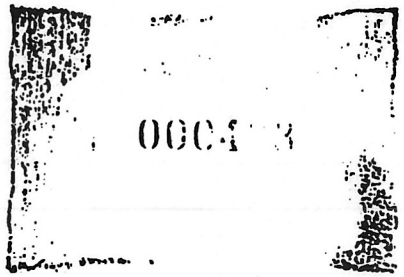
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DUST STUDY PROGRAM, PENNSYLVANIA DEPARTMENT OF MINES AND MINERAL INDUSTRIES

By W. ROY CUNNINGHAM
Deputy Secretary

At the time of this presentation, our active participation in this program is one year old. While we are too new at this work to offer definite conclusions, we are hopeful that through this discussion we will be able to give you some helpful information.

We in Pennsylvania, as well as you from other coal-producing states, have long been concerned with the explosion hazard of bituminous coal dust. Through intelligent research we have learned how to guard against coal dust explosions. The same consideration has not been given health hazards from coal dust in all areas. This could be due to the fact that medical authorities are not in unanimous agreement that the breathing of bituminous coal dust is harmful. Be that as it may, the growing lists of those suffering from silicosis among our bituminous coal mining people are reason enough for those of us having to do with the health and safety of persons employed in our mines to study the problem and attempt to offer corrective solutions.

There have been limited studies made in the bituminous area of Pennsylvania by various agencies and some by individual companies, but it has not been done on a large enough scale to be sufficiently valuable to health authorities in enabling them to evaluate the harmful effects of breathing such dust. In the anthracite area, more concentrated studies of coal dust conditions have been made. It is recognized that the breathing of quantities of anthracite coal dust is harmful, but even in this area, these studies were not comprehensive enough to offer any definite conclusions.

In the bituminous area, we do know that various processes of mining aggravate and increase the silica content of the suspended dust. Medical authorities are in unanimous agreement that silica dust is harmful when breathed over an extended period.

In 1933 the Governor of Pennsylvania requested the United States Public Health Service to make a study of certain phases of the people associated with occupational disease possibilities in the anthracite region of Pennsylvania. It was hoped that such a study would offer some criterion that would enable the establishment of safe limits of dust concentration. This study was made and a report submitted to the Governor of the Commonwealth. Among other conclusions, the report contained the following:

"Analysis of the data for the purpose of determining safe limits of dust exposure indicated that employment in an atmosphere containing less than 50 million dust particles per cubic foot would produce a negligible sum of cases of anthraco-silicosis when the quartz contents of the dust was less than 5 per cent. In the gangways where the silica content of the dust was about 13 per cent, a safe limit appeared to be 10 to 15 million particles per cubic foot. The limit of toleration for rock workers was set tentatively at 5 to 10 million dust particles per cubic foot of air."

The above listed allowable limits apparently were the basis for threshold limit values adopted by the American Conference of Governmental Industrial Hygienists. These threshold limit values were first adopted about 25 years ago and were reaffirmed at the meeting of this organization in New York, April 23 to 26, 1960. They are as follows:

1. Below 5 per cent free silica, 50 MPPCF*.
2. From 5 to 50 per cent free silica, 20 MPPCF*.
3. Above 50 per cent free silica, 5 MPPCF*.

*Million particles per cubic foot.

I have not had the opportunity to become fully acquainted with occupational disease laws of the various coal mining states. That part of Pennsylvania's occupational disease law pertaining to lung disorders is contained in Pamphlet Law 520, Act of June 21, 1939, as amended in 1957:

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"The employer liable for the compensation provided by this article shall be the employer in whose employment the employee was last exposed to the hazard of the occupational disease claimed regardless of the length of time of such last exposure, provided that when a claimant alleges that disability or death was due to silicosis, anthraco-silicosis, asbestosis, or any other occupational disease which developed to the point of disablement only after an exposure of 5 or more years, the only employer liable shall be the last employer in whose employment the employee was last exposed to the hazard of such occupational disease during a period of six months or more and providing further that in those cases where disability or death is not conclusively proven to be the result of such last exposure, all compensation shall be paid by the Commonwealth."

A greater part of the bill for occupational disease falls on the taxpayers of Pennsylvania. This is due to the fact that because of the very economic conditions of the coal industry, miners are forced to change employment from one mine to the other frequently. During the last biennium ending June 1, 1961, the total occupational disease bill to the taxpayers of Pennsylvania was upwards of $27 million. Approximately 90 per cent of this was paid to miners for lung disorders. In my opinion, the authors of our present legislation are to be commended for their humane effort in alleviating suffering and financial distress among our mining people because of health disorders that originated during their work in various mines. My purpose in describing a part of our law is to point this out to further explain why the Pennsylvania Department of Health and the Department of Mines and Mineral Industries started and will continue this study. You can readily understand that a compensation bill to the state of this magnitude excited public opinion to the point that the reasons therefor were demanded.

Some years ago the Pennsylvania Department of Health started a study wherein chest X-rays were taken of individuals working in our mines both in the anthracite and bituminous regions. This X-ray study is continuing and will continue throughout both areas of Pennsylvania. Because of the Department of Health's findings through their study of the various X-rays, they felt that they would be in a better position to offer intelligent solutions to this problem if they would likewise study the dust conditions in our mines. An Attorney General's decision gave the Department of Health personnel the right of entry into the mines for the purpose of making this dust study.

The Department of Health personnel were most proficient in dust sampling techniques. However, they were not familiar with the various mining practices in the anthracite and bituminous divisions. The Secretary of the Department of Health at that time realized that his people would need assistance from trained mining personnel, and requested the Secretary of Mines and Mineral Industries to have a mine inspector accompany the survey team and be responsible for their safe conduct during the study. In Pennsylvania as in other states, mine inspectors are charged with certain mandated duties. One provision of our mine law requires mine inspections at regular intervals. Time taken from legally required duties for the purpose of conducting dust study survey teams into the mines necessarily interrupted regular mine inspections.

Our department felt that the mine inspectors could not continue this additional work and still comply with the mine inspection laws. A meeting was arranged and attended by representatives from mine management, United Mine Workers of America, the Secretary of the Department of Health, and the Secretary of the Department of Mines and Mineral Industries. At this meeting coal operators justly objected to having personnel unfamiliar with coal mines unaccompanied by representatives of some state agency who would be responsible for their safety. They felt that the Department of Mines and Mineral Industries should be charged with taking dust samples underground in the coal mines.

The Secretary of the Department of Health and the Secretary of the Department of Mines and Mineral Industries were both cognizant of the fact that to be of any value, a dust study would have to be a continuing function of one of the departments. Spot checks had been made in the past, and they were of little value. We are fully aware that the data being collected by our people during this continuing study must be made on a division-wide basis. Anything less than this would be of no more value

than those spot studies taken previously at infrequent intervals.

Secretary Lewis E. Evans of the Department of Mines stated at a later meeting, comprised of the same representatives who attended the original meeting, that it was his intention to employ first-grade mine foremen as dust study personnel both in the anthracite and bituminous divisions. Following this meeting, four first-grade mine foremen were employed—two assigned to the anthracite division and two to the bituminous division.

A comprehensive six-weeks training period was arranged to familiarize our dust study personnel with various techniques of sampling and analyzing coal dust. Following this training period, we equipped two complete laboratories—one in each division. Presently, dust counts are made with a microprojector. Some work has been done on direct counting, and our personnel are familiar with both methods. Qualitative samples are collected by our people and the determinations are made by the Department of Health. The laboratories are not presently equipped to make qualitative analyses.

At the end of the training period, Secretary Evans met with the dust study personnel from both the anthracite and bituminous divisions. He outlined a tentative procedure and described his expectations. Briefly, his instructions were:

1. He emphasized that dust study personnel must be concerned only with the work for which they were employed. This department had reports that on some occasions, personnel making similar studies had exceeded their authority and reported situations about which they had no knowledge or jurisdiction.

2. He insisted that before entering the mine, our personnel should have a thorough understanding of the property, thus enabling them to conduct a study that would be representative of the dust in suspension throughout the mine.

3. He suggested that periodically, procedures were to be discussed with representatives of the Department of Health and with mine management.

4. Our people were advised that the purpose of this study was to enable the Department of Health to evaluate the effects of dust on the lungs of our mining people, and that any piece-meal publication of the report could have undesired effect. Therefore, it had been agreed by all parties to this study that one copy of the report would be furnished to the Washington office of the United Mine Workers of America, the operator of the sampled mine, the Secretary of the Department of Health, and one copy was to be retained in the Department of Mines and Mineral Industries.

Before our entry into the first mine, three of the major companies operating in the bituminous area expressed the desire to conduct studies simultaneously with our personnel in their mines. We welcomed this idea and felt that in time other coal companies in Pennsylvania will express the same interest and conduct studies of their own.

At the time this was written, we had completed surveys in at least one mine of each of the companies who were making simultaneous studies. We then met with the coal company industrial hygienists from these companies and outlined our procedure. We invited their criticism, and I am happy to report that in the main, they were most complimentary. It was felt by all concerned that periodic meetings of this type would prove most beneficial in arriving at a standard procedure that would be indicative of the intended purpose.

Insofar as is possible, we have adopted similar procedures both for the anthracite and bituminous divisions. It might prove interesting and helpful to this group to outline this procedure:

1. The Deputy Secretary of Mines and Mineral Industries of the pertinent division makes arrangements with mine management to conduct a dust study in a specific mine.

2. The dust study personnel meet the state mine inspector at the mine for the purpose of becoming acquainted with local mine management. At this meeting, the mine inspector goes over the mine map and gives a description of the methods of mining being practiced. It is only for this one-day meeting that our state mine inspectors are delayed in their regular duties. They can, of course, as time permits, accompany our dust study personnel on at least a part of the survey.

3. No attempt is made to study every working place in the mine. During the orientation discussion, our dust study personnel ascertain the number of ventilation splits, the percentage of retreat mining compared to first mining, and a general description of the haulages over which men are transported. This orientation period has proven most helpful in making plans for the actual survey.

4. Determinations are made of each of the various classifications and in proportion to the number of such classifications in each mine. For example, if there are twenty continuous mining machines operating in a mine, we make an effort to take dust counts and samples at at least half of them. Likewise, the same procedure is followed for each of the various job classifications.

5. Daily samples are correlated into average time weighted exposures. For example, if a continuous mining operator is to be sampled on a certain day, the operator is met at the lamphouse by at least one of our dust study people. The sampling period starts on the ingoing mantrip. Originally, we took 10-minute samples, but we learned that sampled periods of such short duration were not necessarily representative of each individual operation. Now, samples are extended over a one-hour period and at least 30 minutes of that hour represents the sampling time. This is done by sampling for 10 minutes and delaying for 10 minutes throughout the hour. By doing this, we feel that the entire day during high dust and low dust concentrations, periods can best be described.

6. With each time weighted exposure, a dry dust sample is taken. We have tried various devices for collecting dust from the atmosphere without success. Presently, we are collecting adhering dust from ribs and/or timbers. Along haulages, dust traps are installed so that this dust can be collected over an entire shift period.

The quantitative samples are collected in alcohol using a midget impinger. The Department of Health feels that counts should be taken within 24 hours. Some of the coal company-employed hygienists do not agree that this is necessary. However, since this information is sent to the Department of Health, we comply with their directions. The qualitative samples are collected and sent to the Department of Health for analysis. With each time weighted exposure, there is also listed a silica determination of the dust collected during the operation.

In our years of operation, we have sampled five mines. To be of any value, there are not shortcuts to be taken in making a dust survey. Our dust study people are fully familiar with mining and mining operations. It is not necessary for mine management to assign personnel to accompany them into the mine. They stay with the individual classification being sampled on each particular shift and need not be taken into or brought from the mine during the shift. At the completion of a dust survey, reports are prepared and sent only to the interested representatives of each agency and mine management of the sampled mine. Since it was originally agreed that these reports would contain all information pertinent to the survey, they are quite voluminous and are composed of the following:

1. Letters of transmission.

2. A synoptic description of the mine. This description includes the number of persons employed, methods of ventilation, methods of allaying dust, transportation, and conclusions. If, during our dust study, we find that dust concentrations are beyond the allowable threshold limits for an entire average time weighted exposure, this information is given to our district mine inspector for his action. I am happy to report that in the mine study thus far, there has been little necessity for this procedure.

3. Location of qualitative dust sampling points.

4. Qualitative analysis results.

5. A description of the impinger samples taken and the determination of the dust count.

6. Dust size determination from 0 to 10 microns.

7. Copies of the various forms used in making this study are attached for your information.

The Department of Health is only interested in dust sizes from 0 to 5 microns. However, some of the coal companies continue these size determinations to 10 microns, and we for the present are doing likewise.

We are too new at this work to offer any definite conclusions. We have learned that ventilation alone is not sufficient for allaying micron-size dust. Likewise, spray systems alone will not sufficiently allay dust particles of this size. We do feel that we have learned conclusively that a healthful atmosphere at working faces, particularly

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where mechanical mining is being practiced, is dependent upon an efficient combination of both ventilation and water sprays.

In roof bolting operations, we have been able to determine the efficiency of certain dust collectors. I would like to say at this point that some of these collectors are most efficient. It is this dust containing from 35 per cent to 65 per cent silica, depending upon the nature of the material drilled, that is most harmful.

As this program continues, I am certain that we will be able to offer more conclusive and valuable information to groups of this kind. I feel that I have had an invaluable experience in being permitted to initiate this program in the bituminous division of Pennsylvania. Secretary Evans has emphasized on many occasions that health is a function of our department, and if through this program we can prevent one case of silicosis, anthraco-silicosis, or pneumoconiosis, the program will be well worthwhile.

I am certain that this is not only Pennsylvania's problem, but a problem in all mining states throughout this nation. It is well deserving of our best efforts and consideration.

SAFE PRACTICES IN STRIP MINING

By EUGENE E. QUENON
Director of Safety, Peabody Coal Co., St. Louis, Mo.

Injury records at strip mines, compiled on a tonnage basis, have always been enviable when compared with deep mines, and one is likely to take for granted that serious hazards seldom exist in strip mines.

Shortly after being employed by Peabody Coal Co., I had a very rude awakening to the fact that hazards in the strip mines were numerous—and that many of these hazards were serious and decidedly dangerous.

While many hazards exist in strip mines under normal mining conditions, some of these same dangers become much more serious under adverse weather conditions, and cannot be entirely eliminated without the assistance of improved weather. Peabody Coal Company's injury records definitely indicate that adverse weather has a direct bearing on the increase in frequency and severity rates of accidents at our strip mine operations.

The following example will serve to point out the effect of severe weather changes in the operation and maintenance of our strip mines. Late last Fall, a round of inspections was made at our strip operations. The weather was ideal, and conditions of the pits, haulage roads, equipment, shops and cleaning plants, as well as newly painted buildings and well-kept lawns and yards, all seemed to coincide with the wonderful weather.

Working conditions such as were observed during this inspection, along with the attitude of employees toward adhering to safety practices, gave me a confident feeling that real progress was being made toward an over-all improvement in safe working conditions which would ultimately result in a much lower frequency and severity rate.

A prolonged cold spell of several weeks' duration followed these inspections. During this time, the surface had frozen to a depth of 15 inches; and when thawing started, the pleasant surroundings observed a few weeks earlier at many of our mines had, indeed, changed to such an extent that conditions throughout the operation seemed to invite accidents. The hardships caused by muddy terrain not only created new hazards, but were indirectly responsible for several equipment breakdowns. The overall adverse weather conditions actually appeared to discourage both workers and supervisors from following adopted safety practices that were normally in effect.

Other than the main haulage roads and uncovered coal at these mines, the surroundings were a mass of mud that definitely retarded the entire mining operation and created new hazards. Highwalls and spoil banks now presented a definite danger from falling or rolling material; handling power cables in the mud was much more dangerous; walking and working under such conditions caused fatigue, resulting in a lack of alertness. A majority of strip mine officials, who were consulted regarding the greatest hazards involved in strip mining, stated that unusual weather conditions—such as heavy rains, extremely low or high temperatures, thawing of the surface following long periods of freezing, and extremely dry weather—were all conducive to accidents.

Frequently, a heavy rain will completely flood a pit, necessitating the setting of pumps, moving equipment to higher ground, causing slides along the spoil banks and unstable highwalls. Until conditions return to normal, employees are exposed to abnormal hazards.

Zero temperatures in the open pits retard the operation and tend to increase the frequency of accidents. One of the superintendents explained his reasons why an employee is subject to injury during low temperature: "His ears are covered up—he can't hear. He sometimes has his face covered up to where he can hardly see. He is so cold that he's numb, and has but one thought in mind—get the job done and get thawed out." The superintendent might have exaggerated a little, but from observations, I don't think he is too far wrong.

It was also the consensus of opinion that more breakdowns occurred in periods of extreme weather conditions. Temperature changes caused expansion and contraction of metals—in cold weather metal becomes brittle and lubrication becomes less effective—plus the fact that equipment working in mud and water is subject to overloading. Our experience in the past four and a half years proves that a large percentage of serious injuries resulted from employees doing repair work in the open pits during periods of inclement weather. Such injuries are partially due to weather and also due to the fact that the men are required to perform different types of work from their normal routine. Lack of experience makes any task more dangerous, and repair jobs always require haste, which is also unsafe.

The seriousness of safety problems involved in a modern preparation plant depends to a great extent on the construction, maintenance and operation of the plant. In recent years, Peabody Coal Co. has constructed several modern preparation plants, building into them certain features that will enable management to operate them safely and efficiently.

While these tipples or cleaning plants are built to include the most modern equipment for maximum safety and efficiency, these modern devices will only help to eliminate accidents. Constant supervision is necessary to make certain that personnel think and work safely at all times.

An employee is less likely to be injured when he has been trained in his routine work and when the plant is being operated under normal conditions.

Since the cleaning plant at River Queen Mine is of modern construction and similar to those at other Peabody operations, it will serve as an example to describe, briefly, the importance of building the plant with certain features to increase efficiency and eliminate hazards.

The River Queen preparation plant is of fireproof construction throughout; all electrical wiring is in closed conduit; motors for driving the various pieces of equipment are moisture-proof. The equipment is arranged to provide adequate room for safe maintenance and repair work. The moving parts of equipment are adequately guarded. Stairways and cross-overs are installed at convenient locations and are guarded with toe boards and hand rails. Floors, stairways and cross-overs are, in most instances, constructed with metal grills, thus eliminating accumulations of coal and dust. A series of water jets, spaced about 30 inches apart, are installed on the ground floor for cleaning purposes.

The plant is adequately lighted throughout by windows and incandescent lights, and provisions are available for heating in cold weather. The entire plant can be cleaned with water, without damage to equipment. Switchboards and control panels are provided with rubber mats, and the equipment is controlled by a series of pushbuttons from a central location. A railroad car spotter, controlled by pushbuttons, eliminates the hazards of having workers exposed, as when conventional methods—such as dropping railroad cars by gravity—are employed.

The most hazardous period in the preparation plant is believed to be while repairs are being made to equipment following a breakdown—usually, because those doing the

detector on the acoustic principle may be rather difficult. Where the ratio of the gas to air is only one to ninety-nine, the degree of change is extremely small, and the resulting unit will be very critical, particularly to foreign gases, water vapor, and dust.

Dr. Maas of the Netherlands Department of Mines reports that a methanometer which is mounted against the wall of a roadway has been in use for about eight years in the Netherlands. This is presumably a stationary methane recorder, for he states that it is too fragile and too large to be mounted on heavy equipment. As he points out, any such instrument can be modified to actuate a relay and give an alarm at any preset value.

The following is a very brief article in the November 4, 1960, issue of the South African Mining and Engineering Journal which gives some insight into what the Russians have accomplished in the field of methane monitoring: "Methane measuring stations in various parts of a mine feed information through the mine telephone network to a computer which programs the ventilation system—as methane builds up in an area, more air is automatically directed into the area, thereby diluting the methane. If the methane builds up to a dangerous concentration, the mine power system is automatically cut off."

Methanometers built on seven of the nine principles (all but density and viscosity) listed in the table in Pritchard's paper, one based on the absorption of ultraviolet light passing through a methane-air mixture, and one that measures on a photoelectric cell the quantity of light emitted during the combustion of methane by a catalytic filament have been investigated, evaluated, or at least are familiar to those of us in the Bureau who have been involved in this problem. It is noteworthy that most of the successful methanometers and detectors for other combustible gases have been developed on the second principle listed, "resistance of electrically heated filament on which methane is burned catalytically." In most cases, the change in resistance that results from the combustion of the methane by a catalytic filament is employed to throw a bridge circuit out of balance. In the Bureau-developed detecting device, the heat transfer is used to mechanically actuate a thermal switch. The heat of combustion might also be used in conjunction with thermistors and thermocouples.

Although a number of the listed principles might be applied in the development of satisfactory laboratory methanometers, certain limitations preclude their successful application as methanometers intended for use in coal mines. The resulting unit would be too delicate, too critical, or too expensive.

A study is in progress to determine the component parts best suited to the Bureau-developed sensor, the best arrangement of these parts, and an ideal source of electrical energy. The last is relatively simple if alternating-current power is available but somewhat more difficult if the mine power is direct current. Fortunately, alternating-current power is becoming more available. However, since the proposed schedule 32 requires that the system shall function for a period of 4 hours, independent of the mine power, the most logical source of energy for powering the methane monitor seems to be a storage battery which can be floated on the line, and thus kept at near full charge while power is delivered to the machine. The relatively new hermetically sealed nickel-cadmium batteries seem to offer the most nearly ideal source of energy.

Although a methane-monitoring system will not increase production other than by necessitating improved face ventilation and thereby preventing explosions, we have been encouraged by the reception our experimental monitoring equipment has received from those in the industry who have seen it. There seems to be many officials in the coal mining industry who feel that there is a need for an automatic means of determining the methane concentrations in the face regions. This is particularly true in the case of those using continuous mining machines.

In conclusion, progress has been made, but the successful development of a complete methane-monitoring system is still not a reality. Furthermore, the Bureau-developed sensing element is not considered the ultimate in design and operation. There may be better ways of achieving the desired results. Considering all of the technological advances that have been made in recent years in this country, surely other satisfactory equipment can be developed. The Bureau will gladly cooperate in every way possible with anyone willing to undertake the task.

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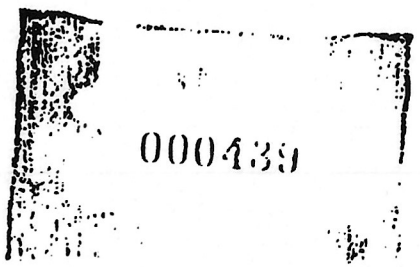
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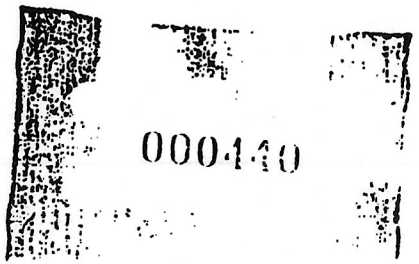
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Celebrating the 50th Anniversary of the NATIONAL SAFETY COUNCIL

WHEN: October 29 through November 2, 1962

WHERE: Conrad Hilton Hotel, Chicago

The National Safety Congress brings together safety people from all over the country—10,000 of them! By attending the Congress you become part of the largest and most important safety meeting of the year. You meet safety men with the same safety problems and responsibilities you yourself have. You exchange views and ideas on accident prevention, health, hygiene and fire prevention—on safety in industry, in traffic, at school, at home and on the farm. From a program of more than 400 meetings, discussions and demonstrations you select the activities that interest you most and that most closely relate to your safety work. This week-long educational program—planned and presented by the National Safety Council—can be your most inspiring, most thought-provoking safety experience of 1962.

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we do not have respect for the law and its officers.

There is some real basis, in my view, for the lack of respect for the law and its officers. Traffic law enforcement has not always been carried through with that integrity, reasonableness, and intelligence which the public has a *right* to expect. Let us look at each of these.

Integrity. The "fixing" of cases by police officers, prosecutors, clerks and judges, while greatly reduced over what it was a decade ago, is still widespread. The effect of this upon the confidence of the public is incalculable and positively dangerous—particularly among our younger citizens. This is a serious weakness in the moral fabric of our society, reflecting a lack of both devotion and courage on the part of the officers and a cynicism on the part of the public which has lost its capacity for *righteous indignation* wherever these conditions are tolerated.

Reasonableness. The use of radar to enforce speed laws to within two or three miles of the limit; traffic violation bureau fine schedules and the crowded courts which deny a hearing; the fixed limits in chemical testing for intoxication; and the "point system" for drivers' license revocation, while apparently "business-like and efficient" are substituting artificial standardization for judgment and reason and courage in law enforcement. This mechanization and efficiency are very handy for the politician, but the public has a deep sense of the unreasonableness of it all.

Intelligence. The aim of selective enforcement is to produce the safest possible condition with the available resources. It is based upon accident investigation and good records—by time, place and type of violation. The public will understand and support such enforcement; but it is still not being done in even a majority of our cities and states; it requires the training of top people, both staff and line.

When the public knows that enforcement action truly reflects accident experience, then understanding and acceptance will follow.

What does all this add up to? We have seen that we must have enforcement; we cannot have enforcement without public understanding and support; the public will not support unless the enforcement is honest, reasonable and intelligent; and for such enforcement we need highly trained, well motivated, adequately supervised police, from top to bottom, to carry on a well-organized program which, in turn, is supported by an effective court program.

The initiative to achieve all this can come either from the official (court and/or police) or civic side (safety council, chamber of commerce), but initiative must be taken in the development of enforcement that meets these criteria.

Once the enforcement program has begun, then all of the citizenry must be informed *by every means available*, from the police officer writing a selective enforcement ticket, to the statements of the judge to the defendants, to the use of TV programs. This will be easier to do as the inevitable results of an effective traffic law enforcement program evidence themselves in a reduced accident experience; for in this, as in almost all human endeavors, nothing succeeds like success.

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Industrial Safety Training—E. S. Hannaford, Safety Engr., Long Lines Dept., American Telephone & Telegraph Co., New York, N. Y.

Mechanical Safeguarding—K. S. Hilgas, Safety Dir., General Motors Corp., Detroit, Mich.

Nominating—W. E. Montgomery, Safety Dir., Quebec Asbestos Mining Assn., Montreal, Quebec, Canada

Nuclear Energy—D. E. Hayes, Chief, Safety and Fire Protection Branch, U. S. Atomic Energy Commission, Washington, D. C.

Off-The-Job Safety—T. J. Berk, Safety Consultant, Safety and Occupational Health Bureau, Metropolitan Life Insurance Co., New York, N. Y.

Research Projects—S. F. Spence, Dir., Safety and Loss Prevention, American Cyanamid Co., New York, N. Y.

Small Business and Associations—F. Laderer, Dir. of Safety, Nationwide Insurance, Columbus, Ohio

Standards—W. Burris, Phillips Petroleum Co., Bartlesville, Okla.

Technical Publications—C. Runnoe, Pittsburgh Plate Glass Co., Pittsburgh, Pa.

Beryllium

Beryllium metal is being used quite extensively in the aviation and missile industries. Exposure to minute quantities of fume or dust from this metal may also cause an acute chemical pneumonitis. The maximum allowable concentration is 0.002 milligrams per cubic meter of air and concentrations as low as 0.025 milligrams per cubic meter for thirty (30) minutes are hazardous. The toxicity of this metal can be attested to by the reports of non-occupational illness caused as a result of air pollution or home contamination resulting from dust carried home on the employee's work clothes.

Recommended control procedures are to enclose beryllium machining and finishing processes as much as possible and to ventilate by means of a local exhaust system.

Carbon Monoxide

From the time man first encountered fire to the present, when the automobile contributes gas to his environment, carbon monoxide has been with us as an insidious killer. You can suspect its presence wherever there is fire, but don't be fooled into believing that just because there is a lot of air present that carbon monoxide will not be formed. To illustrate this point, take the burning of newspaper in excess air as an example. According to the experimental work performed by Easton, the following analysis of the products of combustion was found.

Carbon Dioxide	7.6%
Carbon Monoxide	6.2%
Oxygen	7.7%
Nitrogen	77.6%
Unsaturated Hydro-carbons	1.2%

The maximum allowable concentration for carbon monoxide is 100 parts per million; the concentration obtained by the burning of newspaper in excess air was 62,000 parts per million, enough to kill a man in less than five (5) minutes of exposure. Sources of this gas are smoke from a coal fire, flue gas from boilers and house heaters, gas from charcoal braziers and from coke-burning salamanders, and whenever a flame impinges upon a cold surface -just to mention a few.

Carbon monoxide is not a protoplasmic tissue poison. Were it not for its affinity for the hemoglobin of the blood, it would be classified with the simple asphyxiants such as nitrogen and hydrogen.

For some unknown and unfortunate reason, the hemoglobin's affinity for carbon monoxide is approximately 300 times greater than its affinity for oxygen. Its chief mode of action is to combine chemically with the hemoglobin and thereby deprive the body of its respiratory function. There is no further change in the system. The carbon monoxide remains thus combined until the victim is removed from the contaminated atmosphere to fresh air where the chemical process is completely reversed; that is, the hemoglobin gives off the carbon monoxide and takes on oxygen.

There are no cumulative effects from carbon monoxide for it is not a cumulative poison. The misconception expressed as "chronic carbon monoxide poisoning" is probably based on cases where there has been prolonged asphyxia which has damaged the brain too severely for complete recovery but not sufficiently enough to kill the victim. This same brain damage will result regardless of what the circumstances are that caused a deficiency in the supply of oxygen to the brain cells.

Plastics

Polyurethane foams and epoxy resins are finding wider use in numerous applications. The diisocyanates used in the production of the urethane foams are upper respiratory irritants and extreme sensitizers. Persons who have once become sensitized to these materials develop severe asthmatic attacks if they should again be exposed to extremely minute quantities of the material. Exposure to large initial concentrations will also result in an asthma-like syndrome. As a rule once a person has become sensitized, he can no longer work with or in the vicinity of this material. The best control measures for protection against exposure to the diisocyanates is to put in a well-engineered ventilation system before operations begin.

The amine hardeners used in the epoxy resin system are the principle cause of dermatological manifestations resulting from contact with these materials. We have a great deal of difficulty in trying to convince people of the importance of wearing adequate protective equipment in order to prevent skin contact with subsequent sensitization. They are inclined to ignore the warnings because in many cases the skin reactions do not appear until several months after a person has started working with the resin. Once a reaction has developed, they must exercise even greater care then required initially in order to prevent a recurrence.

High Energy Fuels

The race for missile supremacy and the conquering of space has confronted us with increased problems of exposure to high energy fuels and their decomposition products. Among these are hydrazine and the boranes — diborane, pentaborane and decaborane.

Hydrazine finds its use as a propellant fuel, either alone or with other compounds such as nitric acid, hydrogen peroxide or oxygen. It has a maximum allowable concentration of one (1) part per million, and in addition to the inhalation hazard, the material is absorbed through the skin. It is primarily a central nervous system stimulant causing excitement, convulsions and cyanosis.

Diborane is a gas at room temperature and has a maximum allowable concentration of 0.1 part per million. Inhalation produces congestion, edema and hemorrhage in the lungs. Its toxicity is comparable to that of phosgene.

Pentaborane is a volatile liquid with a tentative maximum allowable concentration of 0.005 part per million; however, it is recommended that the exposure be kept as near to zero as is possible since no known preventive or therapeutic agent has been developed for this compound.

Decaborane is a solid having a tentative maximum allowable concentration of 0.05 part per million. Both decaborane and pentaborane attack the central nervous system. Protection is best afforded by the use of air-supplied respirators or cartridge type respirators that are specifically designed and designated for protection against these compounds.

In concluding this brief discussion, may I point out to you that the services of your local, state, and federal health agencies are always available to you. Should you desire information on the potential health hazard associated with any material or process to which you or your associates are exposed in your particular place of work, feel free to contact any one of them for assistance in evaluating the problem.

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OCCUPATIONAL HEALTH HAZARDS — MEDICAL ASPECTS

By HERBERT K. ABRAMS, M.D.
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I would like to quote from a famous writer his description of a "modern" community:

It was a town of red brick, or of brick that would have been red if the smoke and ashes had allowed it; but as matters stood it was a town of unnatural red and black like the painted face of a savage. It was a town of machinery and tall chimneys, out of which interminable serpents of smoke trailed themselves for ever and ever, and never got uncoiled. It had a black canal in it, and a river that ran purple with ill-smelling dye, and vast piles of buildings full of windows where there was a rattling and a trembling all day long, and where the piston of the steam engine worked monotonously up and down, like the head of an elephant in a state of melancholy madness. It contained several large streets all very like one another, and many small streets still more like one another, inhabited by people equally like one another, who all went in and out at the same hours, with the same sound upon the same pavements, to do the same work, and to whom every day was the same as yesterday and tomorrow, and every year the counterpart of the last and the next. . . .

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On every side, and as far as the eye could see into the heavy distance, tall chimneys, crowding on each other, and presenting that endless repetition of the same dull, ugly form, which is the horror of oppressive dreams, poured out their plague of smoke, obscured the light, and made foul the melancholy air. Strange engines spun and writhed like tortured creatures; clanking their iron chains, shrieking in their rapid whirl from time to time as though in torment unendurable, and making the ground tremble with their agonies. . . .[1]

Before you try to guess which city this is, let me tell you. Charles Dickens wrote this in his book *Hard Times*, published in 1854, describing a typical city in England during the years of the industrial revolution (1760-1830). The description sounds too familiar for comfort to us in America in 1961, at a time when we are going through another industrial revolution: automation, atomic energy, space travel, and many powerful new chemicals. They are exciting developments. They offer a promise of a wonderful world of tomorrow. However, they also pose serious threats to our health and well-being, unless they are properly controlled.

We must ask ourselves whether we are better prepared to meet these threats than the English were 150 years ago. Certainly, we are better prepared technically. In 1800, except in a few instances, little was known about the health aspects of exposure to chemicals, to ionizing radiation, or the effects of long hours of work, poor lighting and ventilation. Today, however, our technical knowledge is sufficient, so that we can say with assurance that we know how to use any chemical with safety. We know how to set up proper protective measures to make every job safe.

The big question is, "Are we utilizing this knowledge?"

Perhaps you who represent workers in industry know the answer better than I do. Let me give you only two examples that will help provide the answer. In Illinois, in 1958, there was found "a drug packaging plant where 103 employees were subjected to a full body fluoroscopic examination each day as they left the plant as a check against pilferage. During the examination, the entire body from the top of the head to the bottom of the shoes was exposed to ionizing radiation. The firm had practiced this procedure on all employees for some 12 years, but discontinued it when advised of the hazards involved." I am quoting from the Report of the Atomic Power Investigating Commission to the 71st General Assembly, State of Illinois, March, 1959.[2]

In the same report, the study found that:

Gross contamination and excessive levels of radiation typify nearly all radium processing installations in Illinois included in the survey. These conditions result from a lack of adequate shielding of proper routing of materials, as well as poor housekeeping within the plant, as noted by the contaminated paper and rags littering the floors, the lack of local exhaust ventilation and presence of contamination in eating areas. In addition, it was noted that labels on containers of radium-luminous compounds do not contain information as to the quantity of radioactivity included. In all radium plants surveyed, little or no use was made of personnel monitoring devices, such as film badges and, therefore, there is no adequate record of radiation exposures received by working personnel.[3]

This was Illinois, 1958—thirty years after the tragedy of the girls who painted watch dials: they pointed the brushes containing radium paint with their lips, and later died of bone cancer.

The role of environment on health grows in importance as we gradually control the infectious disease agents that caused the plagues of old, and as the chemical and physical hazards of our industrial environment become ever more important determinants of our health and our diseases. A recent report of the Public Health Service made for the House committee on appropriations states: "After hearing the evidence, the members of the subcommittee concluded that the health hazards resulting from changes in the environment are far greater than is generally realized and that all levels of government, industries, and research and educational institutions need to step up their efforts to deal with the problem."[3]

The number of chemical materials man is being exposed to is increasing constantly. Over 600 chemicals are currently being added to food; over 600 million pounds of pesticides are used annually, in the United States. Approximately 500 new chemicals are introduced on the United States market each year.

The occupational environment is the basic element in our total environment. Our occupations largely determine how and where we as individuals will live, and, indirectly or directly, may actually influence our life expectancy and our mode of death. Our industries, in addition to affecting the immediate eight-hour working environment, also largely account for the chemical and physical contaminants in the air we breathe, the water we drink, and in the food we eat.

One example will illustrate: recent studies show that people living in manufacturing areas experienced higher death rates than residents of non-manufacturing areas. The difference was greatest for cancer, and tuberculosis of the respiratory tract (mainly of the lungs), and for various forms of heart disease.[4]

Air pollution was a major factor in causing this greater mortality, but socio-economic conditions also played an important role.

Occupational Diseases

Occupational disease hazards may be classified in various ways. For example, by the type of agent which causes the disease: chemicals, in the form of liquids, dusts, gases, fumes and vapors; physical agents, such as noise, ionizing radiation, abnormal temperatures and pressures, vibration, and physical strain; infectious disease agents, such as the germ that causes brucellosis in meat-packing house workers and farmers.

Or occupational diseases can be studied according to the part of the body affected or the kind of disease. For example, many toxic chemicals may attack the skin, causing an inflammation which we call dermatitis. These or other chemicals may affect the lungs, the liver, the kidneys, the bones, or various combinations of organs of the body, and, in many cases, the entire system.

Occupational diseases may be acute and temporary, or may be chronic and long-lasting. Brief exposures to certain chemicals may produce symptoms that are of short duration, and the individual recovers quickly. A good example of this is metal fume fever, arising from inhalation of the fumes produced when certain metals are heated to temperatures above the melting point. Among the metals which can cause this are zinc, copper, magnesium, cadmium, iron, manganese, and others.

More important, however, are the chronic diseases of industry. These are the diseases of relatively long duration arising usually from long-continued exposure to relatively small amounts of toxic chemicals. Sometimes these diseases do not show symptoms until long after, in many cases years after, the exposure has stopped. A good example of this is beryllium, a metal which may result in serious and fatal lung disease up to 15 or more years after breathing the contaminated dust or fumes.

We must remember that disease, like everything else affecting living things, cannot be put into rigid categories. Not all chronic occupational diseases need to result from long-continued exposure. Only a brief exposure to a large dose of ionizing radiation (X ray or radioactive chemicals) may result in cancer. Similarly, a brief exposure to a sufficient dose of carbon tetrachloride may result in chronic kidney disease or liver disease. In other words, there are many variations and combinations of these conditions.

To attempt a detailed listing of all of the chemicals and metals which can cause disease would only be disturbing and confusing, and we would be in danger of not seeing the forest for the trees. Every industrial chemical is dangerous. It is merely a matter of determining how dangerous it is and establishing procedures for protecting against it. The time is past when "experts" can stand before a group of workers, or, for that matter, a group of physicians and scientists, and say without evidence that this or that chemical when absorbed into the body is harmless. I recall only a few years ago attending meetings of industrial physicians and being shown X-ray pictures of lungs of coal miners, black with inhaled coal dust, and being told that this dust was harmless. Yet, long before that time, British scientists had demonstrated that coal dust can cause disabling lung disease in miners. We in the United States were merely slow to accept the evidence.

Diseases of the Lung

The respiratory system (lungs, bronchi, and larynx) is the most frequent site of chronic diseases caused by industrial poisons. For a long time, we have recognized that silica dust, as it is inhaled by the metal miner, the foundry worker, the pottery worker, the tunnel digger and others, causes a disabling and often fatal disease called 'Silicosis.' Similarly, we know that asbestos dust causes a serious lung disease called

'asbestosis.' Also, there is a lung disease found in workers in the manufacture of alumina abrasives, called 'Shaver's disease' (after Dr. Shaver who described it). The dust has high concentrations of alumina and silica. Diatomaceous earth, a form of free silica, similarly causes serious lung disease. And there is byssinosis, resulting from the inhalation of cotton dust. Until a handful of years ago, some of the experts insisted that many dusts when inhaled into the lungs were inert; that is, they produced no effect on the body. However, as we learn more, we find that these so-called "nuisance" dusts are also capable of causing disease. For example, talc, corundum, feldspar, graphite, porcelain, barita, cement, mica, slate, kaolin, and many others.

Even farmers, as well as grain handlers in the holds of ships, suffer from a respiratory disability when inhaling large amounts of grain dust. They develop chronic bronchitis with shortness of breath, cough, etc. Chronic bronchitis can result from inhalation of irritating dusts, fumes and gases: for example; phosphorus chloride and other volatile chloride compounds, acid fumes, phosgene, nitrous gases, aldehydes, solvents and other chemicals.

One of the leading toxicologists in the country, Dr. Herbert Stokinger, of the Public Health Service, points out that:

> ... our experience with occupational lung diseases makes it difficult to escape the conclusion that *all dusts*, irrespective of their nature, if breathed in sufficient quantity and for sufficient time, may cause profound damage to the lung, and emphasizes the desirability of the physician's obtaining an accurate and thorough history on individuals suspected of pulmonary disease.[3]

Other Chronic Diseases

Let me discuss a few more of the chronic disease hazards, since these are the chief occupational health problems of the present day. The chlorinated hydrocarbons, such as carbon tetrachloride, represent a large group of chemicals used in industry. These can damage the liver and the kidneys. The chemicals known as aromatic amines, represented by beta naphthylamine, used in the manufacture of dye and other commodities, have been proven to cause cancer of the urinary bladder. The central nervous system—that is, the brain and spinal cord—can be affected by many chemicals. Tetraethyl lead causes severe brain disease called encephalopathy. Manganese, one of the important industrial metals, causes a disease that is remarkably similar to multiple sclerosis. Carbon disulphide may cause severe nervous system effects, affecting the nerves, muscles, and brain.

Serious and sometimes fatal blood diseases may be caused by exposure to benzol. Of course, we know that ionizing radiation in any form—whether through exposure to X-rays or radioactive chemicals—may cause fatal blood diseases as well as various types of cancer. The bones can be affected by exposure to radioactive chemicals, fluorides, phosphorous, and other chemicals. Cadmium affects the lungs and kidneys.

The heart may be affected by the metal known as antimony, and possibly by nitroglycerin, and there have been a number of reports that the heart may also be affected by brucellosis infection, which occurs among slaughter house workers and farmers.

Nitroglycerin and related chemicals used in the manufacture of dynamite and other explosives make an interesting story and illustrate some of the problems in occupational medicine. Workers have been exposed to this group of chemicals for many years. They have known for many years the severe headaches this chemical causes. For years, also, we have heard reports of sudden deaths among workers exposed to nitroglycerin. We do know that this chemical has a powerful effect on the body. It causes profound reduction in blood pressure, severe headaches, palpitation of the heart, nausea and vomiting, fainting, dizziness, and other symptoms. It can also cause skin inflammation. Whether it can cause heart disease is disputed. Even though we have known this chemical for many years, there has been insufficient investigation of the health hazards, and inadequate preventive measures.

Cancer

Occupational cancer is one of our most serious problems. It also provides us with a remarkable opportunity to study cancer in general. The first breakthrough in the mystery of cancer came with the discovery of an occupational cancer. In 1775, in England, Dr. Percival Pott called attention to soot as a cause of cancer of the scrotum in chimney sweeps. These were little boys who climbed into the chimneys to clean them out. Years after working in this occupation, they died of cancer of the scrotum, which was traced to the soot which penetrated their clothing. Similarly, for years we have known that an excessive number of uranium miners in Europe have died of lung cancer. (Recent studies in our own uranium mines reveal dangerously high exposures.')

Since then numerous other chemicals, in addition to ionizing radiation, have been demonstrated to be capable of causing, or contributing to the development of, cancer in various parts of the body. Some examples are beta naphthalamine, which I mentioned earlier, causing cancer of the urinary bladder, coal tars which can cause cancer of the skin, chromates which cause cancer of the lung, and many others. Recent studies have focused suspicion of lung cancer hazards in the work of welders, sheet metal workers and other metal workers.

Skin Diseases

Skin diseases are, as you know, the most frequent type of occupational disease which we see. Most of them result from direct irritation by chemical or physical agents. A smaller number result from an allergic reaction to a chemical. Almost any chemical contact can result in dermatitis. Many of the new chemicals are causing skin troubles. For example, the epoxy resins: These materials are being widely used in electronics, automotives, pattern-making, die-casting, aircraft, and other trades for surface coatings and paints, molding compounds, various plastics, and electrical insulation. Another group of chemicals which causes skin disease are the chromates. Chrome ulcerations of the skin are well known. The chlorinated hydrocarbons also may cause skin diseases. One of them is called 'chloracne' because it resembles acne. Machinists and metal workers often get a dermatitis from cutting oils. Coal tars produce skin changes, some of which may turn into cancer. There are a host of others too numerous to mention.

Protection

These are only a few examples of the occupational disease hazards arising from contact with chemicals. The alert worker will become acquainted with the materials he is handling and the process he is using, so that he can help to protect himself and his fellows. If he should suffer excessive exposure to some harmful material, he will know what to tell the doctor who examines him. The alert doctor will be able to correlate the occupational history with the physical findings and symptoms and decide whether the patient is suffering from an occupational disease.

Very few occupational diseases produce such characteristic symptoms that they can be readily identified as an occupational disease. After all, the body can react to harmful stimuli only in a limited number of ways. For example, a worker may have severe pains in his abdomen. These might be caused by appendicitis or by lead poisoning. Leukemia may result from unknown causes or from exposure to X-rays. A person suffering a certain type of paralysis may have multiple sclerosis, a disease of as yet unknown cause, or it could be manganese poisoning. The person who has a cough, shortness of breath, and is losing weight, may have tuberculosis, silicosis, beryllosis or cancer of the lungs. A history including occupational history and a thorough examination is the only way of telling these conditions apart.

Prevention

All occupational diseases are preventable. If we were doing our job right, we would have nothing to talk about today. The fact is that unknown numbers of people are suffering from a great variety of occupational diseases because we are not adequately protecting against them. What are the protective measures which we should follow?

(1) *Education:* Employees should be given adequate training for their jobs, so that they understand the process, know the materials they are handling, and, therefore, can protect themselves and other workers from injury.

Key employees should be instructed in first aid. Management and labor both have responsibilities here. Shop health and safety committees can help in the health education of workers. *There is no substitute for knowledge.*

(2) *Protection of the environment:* This means from the air of harmful dusts, fumes, gases, vapors. This is accomplished by means of engineering measures, such as exhaust ventilation, enclosure of hazardous processes, wetting down methods for suppression of

dusts, and substitution of less harmful for dangerous materials. Good lighting and reduction of noise, etc. are other environmental problems that the engineer can help to solve.

Only when engineering measures are not possible should respirators or other personal protective devices be depended on for protection against inhaling of harmful materials.

(3) *Good housekeeping and sanitary place of work:* This means a clean place of work, free of dirt and dust, and accident hazards. There should be adequate toilet, washing, shower, locker and eating facilities. Hand washing alone can often prevent dermatitis and other diseases. All containers of chemicals should be properly labeled.

(4) *Personal protective devices:* Wherever necessary, management should supply workers with respirators for protection against noxious dusts, fumes and gases in the air; suitable gloves and work clothing for protection from harmful chemicals; hard-topped shoes and hats for protection from falling objects; safety goggles, etc.

(5) *Medical protection:* This includes first aid facilities and a medical department. Every worker should have a periodic physical examination, not for the purpose of disqualifying him for work, but for the purpose of detecting disease early so that prompt measures can be taken to protect his health. The physician has an ethical obligation to inform the worker or his family of any finding important to his health.

In addition to first aid and medical care for work injuries, all workers and their families should have access to modern medical care. Unions throughout the nation are obtaining such care through collective bargaining. Union health centers and other plans, such as Health Insurance Plan of Greater New York and the cooperative health plans, are attempting to bring good care, including preventive medicine, to working people.

(6) *Plant health and safety committees:* Every place of work should have a committee of representatives of the workers concerned with the health protection of the men and women in the plant. This committee should have authority to make periodic inspections of the plant and make recommendations to management. The committee should meet regularly with the plant physician, the nursing staff, the plant safety and industrial hygiene engineers, and with other representatives of management to discuss health and safety problems and to plan programs of education of the workers in these problems.

(7) *Government safety and industrial hygiene agencies:* These agencies should be called upon for help, whenever the union believes that management is not adequately providing health and safety measures in any particular problem.

How We Are Doing Our Job

How well are we doing in protecting our workers? Let me cite a few facts. The prevalence and incidence of occupational diseases in the United States is unknown, because in many states there is no reporting of occupational diseases. And, in those states where there is reporting, it is incomplete and not uniform. Moreover, we know that numerous occupational diseases are not recognized because of medical ignorance, deficiency in medical education, deficiencies in workmen's compensation laws and health and safety laws.

Health services in many private industrial plants are inadequate, and most workers are employed in small plants where such services are not provided. According to the Public Health Service, 90 per cent of the labor force is not receiving proper industrial hygiene and health services.

The governmental agencies, federal, state and local, which are charged with responsibility for protecting the health of workers, are for the most part grossly inadequate in their resources and services. They suffer from lack of funds, personnel and even from lack of authority. At least seven of our states have no occupational health units in their health or labor departments, and in all of the state occupational health agencies in the entire country, there are less than 40 physicians employed. There is no uniformity of industrial health codes and standards, and the states differ in the hazards regulated and in their regulations for the same hazards.

There is a serious and growing shortage of physicians and other health personnel both in and out of industry. Dr. Harold J. Magnuson, Chief of the Division of Occupational Health of the U. S. Public Health Service, estimates that by 1970, industry will need 4800 physicians, but is expected to have only 2900; while 35,000 industrial nurses will be needed, but only 26,000 are expected; and 3400 industrial hygienists will be needed, but only 1600 are expected.

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Workmen's Compensation

Good workmen's compensation laws are basic to the health of industrial workers. Without strong workmen's compensation laws, it is difficult to see how we can ever have really effective implementation of our industrial health measures. The fact is that although the workmen's compensation laws are the earliest form of social legislation in the United States, they are in almost all cases hopelessly behind the times. They are inadequate in their provisions for compensation, for medical care and rehabilitation, and most of them have not been brought up to date to permit equitable recognition and compensation for the injuries inflicted by radiation and chemical hazards which cause chronic diseases, usually after long latent periods between exposure and the first symptoms of disease.

Two states still have no occupational disease coverage. Nineteen state laws cover only specified diseases. Most of the laws exclude farm work, domestic work and casual employment. In over half the states, employees in small establishments which have less than a specified number of employees are excluded, and in 12 states the laws apply mainly to a list of "hazardous" employments. Many white collar workers are today excluded from the workmen's compensation laws.

Research

The level of our research in occupational health is correspondingly low. Research is largely in the hands of private industry, and it is guided substantially by the economic needs of the particular industry. Even where research is done in universities, much of this is subsidized for special needs by private industry. Governmental agencies sporadically have made excellent contributions, but their resources are chronically inadequate. There is an urgent need for a system of research and consultation facilities in various parts of the country where workers and employers alike can go for scientific solutions to their problems.

Needs for the Future

Last year a subcommittee of the House Committee on Appropriations under Congressman Fogarty conducted hearings on these problems. These are published in a "Report on Environmental Health Problems," available through the Government Printing Office." It is interesting reading. These hearings raised hope that better appropriations would be made to the Public Health Service and other agencies for an expansion of services in the environmental health field.

In the meantime, there is a dangerous vacuum in the supervision of hazards from ionizing radiation as differences prevail among the interested agencies, AEC, U. S. Public Health Service and the states, over jurisdiction in this field. At the moment, controls in this field are a patchwork with good programs in a few states like New York and California, but poor or almost non-existent programs in most others.

The implications of all this should be obvious. Occupational health and workmen's compensation vitally and directly affect the health and life of working people. Yet the unions so far, for the most part, seem to be apathetic about this. Now that unions are deeply involved in health insurance, for the care of non-occupational diseases, perhaps there will be a resurgence of interest in the environmental factors which affect our health.

A few unions have begun to help themselves. Some have negotiated clauses in their collective bargaining agreements embodying a number of the preventive measures I outlined earlier, and have also asserted the union's right to bring expert consultant into the plant.

The United Auto Workers has a department of occupational health, staffed by two experts in safety and industrial hygiene. The International Association of Machinists has a medical consultant. The International Chemical Workers' Union also has a medical consultant and recently appointed a staff safety man. These people can be of great help to workers in providing them with expert knowledge and honest information. Obviously, however, every union cannot and should not hire its own corps of experts and set up its own research laboratories. We are dealing with *big* social problems, and they must be met socially.

Professor of Sociology of Columbia University, C. Wright Mills, defines the issue in this way:

> No moral endeavor, no political orientation, no human study that does not pay close attention to man at work, can possibly be adequate for our time. For work is affected by and in turn affects all that man is and all that he might become. The question we must ask of any society or of any social program is what kinds of men and women does it select, encourage, create? And, in terms of this human evaluation, the most important question we can ask is whether work is a void in which men sacrifice themselves or whether work is a central feature of a style of life in which man may realize himself. . . ."

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SOME OBSERVATIONS ON OCCUPATIONAL DERMATOSES

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Incidence of Industrial Skin Diseases

While there are at present no reliable statistics on the incidence of occupational dermatoses, their frequency is undisputed. Indeed, in World War II evidence indicates that there were more skin casualties than all other battle casualties in this very specialized occupation of soldiering.

In England, a three year study done between 1930 and 1932 inclusively, more than 72 per cent of all occupational diseases were found to be industrial or occupational dermatoses.

Reports from the compensation boards in seven states in this country indicated that 65 per cent of all compensible cases were occupational dermatoses. In a fashion more understandable to those of us accustomed to cost and taxes, this means an estimated loss of more than ten weeks per year with an annual cost of approximately one million dollars. This, in itself, a staggering figure.

Anatomy and Function of the Skin

With these brief statistics, it is well to ask something of their body area, so easily disposed to such great measure of damage. And *again* it is felt that a most superficial look at the anatomy and function of the skin, as it is related to this question, is indicated especially for those not related to the medical sciences.

It is not always realized that the skin is one of the most important organs of the body. In its embryonic development, it represents the first of the three primary or basis tissues formed, the ectoderm. And from this ectoderm the largest sensory organ is developed, the brain. So the skin is not only a prologue to the brain, but remains the next largest sensory organ.

The skin is an organ, a very complex organ, constituting about one sixteenth of the total body weight. It contains, within its comparatively thin structure, muscles, blood vessels, nerves, glands, specialized cells such as those that produce pigment and appendages such as nails and hair.

With over-simplification, we can divide the skin in two major layers - an inner layer, called the corium and an outer layer called epithelium. The inner layer is tough, elastic and resilient, and its chief function is to protect against normal and everyday injuries the more susceptible inner organs, and this is the skin layer which, on tanning, produces leather.

The epithelium, or outer layer, likewise protects by means of its outermost, insensitive, cornified layer, its oil gland and sweat gland secretion, and by means of pigment content. These elements are present in all normal skin and vary only by degree or quantity.

Of the many functions of the skin, the following are of particular pertinence to this discussion:

(1) It protects the under-lying tissues of the body by the physical means of resilience and elasticity.

(2) It protects by means of the relatively insensitive outer "horny" layer of the epidermis by its resistance to noxious substances.

(3) It protects the integument from actinic and other physical radiations by means of its pigments.

(4) It receives and transmits sensations of many types to the central nervous systems such as pain, heat and cold.

(5) It regulates body heat so that extremes of external temperature changes can be neutralized.

(6) It secretes water and some waste products.

(7) Finally, it has a small role in respiration and gaseous interchanges.

All of these functions are constantly being modified by internal and external influences designed to allow man to maintain some constancy in an ever changing environment.

Historical Background of Industrial Diseases

From a historical point of view, injuries suffered by the skin were known but not favored in medical writings for many years. Not until 1700 when Ramazzine published his *Treatise* was formal recognition achieved and many of his observations still hold true today.

In 1775, Percival Potts noted and described the chimney sweep cancer of the scrotum, as previously mentioned by Dr. Abrams.

Not until the early part of the nineteenth century were added interests and contributions made to this subject. Then English, French and Germans began to describe the occupational dermatoses of their era.

Not until World War I did American dermatologists begin their prolific and significant studies. At this time there was an intense revival and expansion of the chemical industries and many new areas in the field of industrial dermatoses had to be explained. These new areas are still being met with even today.

In 1928, the United States Public Health Service organized the Office of Dermatosis Investigation, which is exclusively concerned with occupational and other forms of contact dermatitis. This, in part, has led to formulation of laws in the majority of states designed to compensate workers for occupational diseases.

Predisposing Causes of Occupational Diseases

It is almost impossible to classify clearly all the professional and occupational damages to which skin is subjected. The new chemicals, the complexities of manufacture and the wide usages and the resultant chemical products increase this difficulty.

However, certain factors remain constant. I should like to summarize some of these among the predisposing factors that play an important role:

First—Illustrating the protective role of epidermal pigment, it is an accepted if not proven fact that negroes are less susceptible to certain skin irritants than other races. Thus they are the choice employees as grinders and dyers in dye factories, where irritating dusts as well as dyes are the major hazards. This is likewise true where solvents are the irritating factor as in dry-cleaning establishments. However, oils and their by-products are the chief irritants of negroes and an increase in dermatosis occurs in negroes chiefly in the form of oil acne.

Secondly—Types of skin vary markedly in individuals as well as in races. The thin, blond-skinned individual has trouble obtaining employment in those industries that bring them in contact with potential irritants and, I may add, if these industries' pre-employment examinations are adequate.

Workers with thick oily skin can tolerate the action of fat solvents, such as soap,

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do the job even under the present inadequate law. It is little wonder that workmen's compensation insurance rates jumped 11 per cent last year.

It was interesting to note that school custodians met in East Lansing recently. While there, one minute of silence was observed for a fellow custodian who unfortunately was blown up while performing his duties at the school. By the grace of God, it was one unfortunate victim and not a whole school of children. But even one is too many. Not one recommendation was made from this meeting to the House-Senate Labor Committee to amend the law to cover all boilers, increase the Labor Department staff or provide adequate funds for the department.

Each of these points discussed with you today are but part of the overall picture. Management and labor should join hands with pride and humility to work side by side towards a common goal, which is greater than all of us.

Nothing great was ever achieved without enthusiasm. This is 1961 with all its automated machinery, new hazards from chemicals and radiation. The old problems still have to be whipped before we can lick the new ones. We have a long way to go and a short time in which to do it.

Return home determined to work enthusiastically towards wiping out the misery and heartbreak caused by these needless deaths and injuries.

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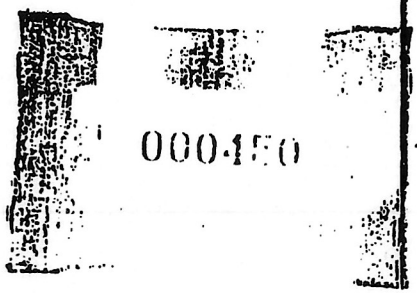
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TO ATTEND THE 1962 NATIONAL SAFETY CONGRESS

Celebrating the 50th Anniversary of the NATIONAL SAFETY COUNCIL

WHEN: October 29 through November 2, 1962
WHERE: Conrad Hilton Hotel, Chicago

The National Safety Congress brings together safety people from all over the country—10,000 of them! By attending the Congress you become part of the largest and most important safety meeting of the year. You meet safety men with the same safety problems and responsibilities you yourself have. You exchange views and ideas on accident prevention, health, hygiene and fire prevention—on safety in industry, in traffic, at school, at home and on the farm. From a program of more than 400 meetings, discussions and demonstrations you select the activities that interest you most and that most closely relate to your safety work. This week-long educational program—planned and presented by the National Safety Council—can be your most inspiring, most thought-provoking safety experience of 1962.

See the Latest in Safety Equipment
At the Greatly Expanded Congress Exhibit Hall

See nearly 300 exhibits! This alone—the largest of all safety equipment exhibitions—will make your trip to the Safety Congress worthwhile. The industry's leading suppliers will display their newest and best safety products for your inspection. See . . . compare . . . ask questions. There is no finer opportunity to reach well-informed buying decisions for your company.

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ent colors. There are a lot of channels through which people can be motivated. Let's list some to provide you some fuel for thought:

individual and family security,
individual and family health,
personal recognition,
economic reward,
increased status,
individual creativity.

These channels can apply to the person to be motivated, or to the person motivating toward the goal of safety awareness.

Over 80 per cent of the visitations that take place at our company hospitals because of injuries are due to minor cuts, lacerations, abrasions, contusions, and bruises. Of all the types of injuries to eliminate, this category is the most difficult. If we could give you a solution—a cure-all humanity would probably put up a statue of us. We won't hold our breath for that statue, for we know that the cure lies with you—not with us.

The first step towards the solution of the problem of cuts, lacerations, abrasions, and contusions is the recognition that the problem exists. Your knowing that a problem exists and keeping yourself and your employees aware of this problem will provide the solution to it. This solution is not an over-night deal but can be obtained by adding the magic element of perseverance.

Hog waving is a bunch of hog wash! A great many people called the great strides of advancement in the technological fields hog-wash. One of these strides was the establishment of a preventive maintenance program for all machines. This has long since proven highly successful.

The first and most important tool necessary to a successful human preventative maintenance program is a good supervisor. A good supervisor, like any good man, does not live in that dismal swamp land called "indifference"; nor does he look at friends, employees, or problems with all the enthusiasm of a corpse.

Boil it all down and it condenses to a priceless, magical element (that we all possess, but which, through lack of use, has for most of us become rusty), common sense. If we were to tear down this tool of common sense, we would find that it's made up of these important parts:

1. Ability to think logically and systematically.
2. Control of emotions.
3. Just and high ideals.
4. A control of egotism.
5. Belief and practice of the golden rule.
6. Courage.

It's possible to shine these parts lubricate them with usage—and apply them to the important job of protecting your employees from physical injury and pain.

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Staff Representative—E. E. KOCH, National Safety Council, Chicago, Ill.

*Past General Chairman

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(2) Needs a rewarding climate

(3) Accident then seen as wastage

(4) No ceiling on work, or reward for continued excellence

D. Adjustment stress theory (45-60 per cent)

1. Unusual, negative, distracting stress upon the organism increases its liability to accident or to other quality behavior

2. Supported -- Hersey — "Emotional Factors in Accidents"

a. 400 accidents, more than half took place when worker was in a worried, apprehensive, or emotional state

3. Stress can come from

a. Work situation--boss, other worker, lack of knowledge, grapevine, etc.

b. Home situation, family problems, money, etc.

E. Conclusions:

1. Dealing with man as an entity

a. Purposeful actions -- needs, goals, values, ideals

b. Emotional factors

—distraction, incapacitating effect

—disruption of usual safe behavior

—development of negative attitudes

—safety, safety programs, etc

2. Need to do something about man in his environment

3. Recognition of individual differences

III. What is to be done

A. Creation of positive psychological climates

1. Physical surroundings

2. Foreman and other superiors

a. Not so much what, but how

b. Recognition of needs and ways to satisfy them

3. People in the environment

a. Acceptance or belonging group

b. By company

B. Foreman and permissive listening

1. Proper training with follow-up for safety

2. Example setting

a. Enthusiasm for safety

b. Following all rules and policies

3. Correction of employee

a. Concentration on error not individual personality

4. Permissive listening

a. Acquired skill of listening not only to words, but to the emotional expression with the words reflecting deep-seated feelings of people

(1) Without evaluative judgments

b. *Why?*

(1) Reduce emotional tension and anxiety, due to stress in or out of plant (stress theory)

(2) Determine needs, goals, etc., which can then be perhaps satisfied

(3) Get at roots of negative attitude toward safety, other personnel, reasons for unsafe behavior

C. Safety engineers and directors

1. See that foreman in the know on how to do the best for the safety program

a. Foreman — managers equated

2. Utilize the participation and know-how of the workers in safety programs

a. Ego involvement

3. Safety is the man's concern for reasons important to him

IV. Conclusion: raised more problems and questions than resolved. If it brings forth thoughtful consideration or an evaluation, it is enough.

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PETROLEUM SECTION

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WHEN: October 29 through November 2, 1962
WHERE: Conrad Hilton Hotel, Chicago

The National Safety Congress brings together safety people from all over the country—10,000 of them! By attending the Congress you become part of the largest and most important safety meeting of the year. You meet safety men with the same safety problems and responsibilities you yourself have. You exchange views and ideas on accident prevention, health, hygiene and fire prevention—on safety in industry, in traffic, at school, at home and on the farm. From a program of more than 400 meetings, discussions and demonstrations you select the activities that interest you most and that most closely relate to your safety work. This week-long educational program—planned and presented by the National Safety Council—can be your most inspiring, most thought-provoking safety experience of 1962.

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At the Greatly Expanded Congress Exhibit Hall

See nearly 300 exhibits! This alone—the largest of all safety equipment exhibitions—will make your trip to the Safety Congress worthwhile. The industry's leading suppliers will display their newest and best safety products for your inspection. See . . . compare . . . ask questions. There is no finer opportunity to reach well-informed buying decisions for your company.

WATER UTILITY SAFETY

In speaking of safety on the reservoirs and lands belonging to a water utility, Mr. H. D. Harman, vice president and general manager of the Gary-Hobart Water Corp., Gary, Ind., said that the ground rules of a water safety program must deal with these areas: the utility and its employees, the customers, the equipment, the quality of the water, and the elevated storage facilities supplementing the reservoirs. He defined a reservoir as any impounded supply of water.

Mr. Harman gave an example of the dangers of having a reservoir near a community, pointing out the pressure exerted by citizens to gain permission to fish in the reservoir, usually followed by extensions to allow row boats, then motor boats, and from there through water-skiing to a full-fledged resort and pollution of the water.

Mr. Harman mentioned that the 10-12 elevated tanks in Gary, located at pumping stations, were a constant safety problem. He said that the greatest dangers were from intrusions by teenagers, and that barbed wire, locked gates, and solid, high foundations were barely enough to prevent them.

Mr. J. C. Vaughn, chief filtration engineer, South District Filtration Plant, Bureau of Water, Chicago, discussed safety at the water treatment plant, and said that the functions of a safety program there should be to eliminate existing hazards, provide protective equipment, and ensure safe-work practices through a safety education program. He said that his plant owned $30,000 worth of safety equipment.

Mr. Vaughn, in an excellent series of slides, showed the range of safety devices in use at his plant: bulletin boards and suggestion boxes, monthly safety bulletins, chain guards at steep stairways, plastic protectors on pumps and grinders, striped guards on couplings, voltage signs to warn of electrical wires, safety clothing for work with chemicals, washing facilities for acid burns, and gas masks, solvay kits, and other equipment for work with poisonous gases.

Speaking of safety in the storage and distribution of water, Mr. Merrill H. Anderson, safety advisor, City of Duluth, Minn., mentioned that Lake Superior was the reservoir for Duluth, and that the pumping station at Lakewood turned over 15.5 million gallons of water per day. He pointed out the attendant problem of obtaining a satisfactory pressure of flow from the distributed water. Another problem arose from the use of cast iron mains, which developed leaks after years of use, probably due to electrolytic deterioration, and necessitated large-scale replacement and even the laying of entire new systems of mains.

Mr. Anderson said that most accidents resulted from misadventures during routine operations, and that unusual or particularly hazardous operations were so carefully attended to that accidents were few and minor.

Mr. Oliver Summers, plant engineer, Indianapolis Water Co., Indianapolis, Ind., discussed the problems of administering a safety program at a water utility. He said that water utilities were somewhat behind in the safety endeavor, but that an encouraging start had been made through the adoption of a safety manual and increased contact with smaller utility plants.

Mr. Summers stressed the need of having top management take an active part in the safety program, by attending safety meetings and by meeting with supervisors. He said that tail-gate sessions were a must in any safety program, and that such sessions should be held with the engineering and meter reading departments, but not necessarily with the office staff. He stressed the role of the supervisor as the main line of safety defense, and the necessity of keeping records.

In a note on automotive safety, Mr. Summers outlined a two-point program for the maintenance of a safety fleet: inspection of vehicles (most important), and the detailed investigation of accidents. He said seat belts were an excellent idea.

In the question-and-answer session that followed, the means of disciplining safety-rule infractions were discussed, and two different solutions were proposed: penalties of suspension or loss of pay, and compulsory attendance at safety training sessions.

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