GENERAL SESSION

May 15, 1962 - 9:00 A.M.

Dr. William L. Wilson, Chairman, Presiding

LASER BEAMS--THEIR USE AND POTENTIAL OCCUPATIONAL HAZARD

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Abstract

Laser is an achronym for light amplification by the stimulated emission of radiation. Another term having the same meaning is "optical maser." These devices produce extremely intense monochromatic, coherent light in a unidirectional beam. The purity of emission permits the light to behave as a signal source similar to radio-frequency communication. The beam and coherence characteristics permit detection and ranging applications similar to radar. Short pulse times permit power outputs in excess of 100,000,000 watts and, as laser beams obey the laws of optics, the energy density can be further enhanced by suitable lens systems to focus the light.

Research, especially with the ruby laser, is expanding rapidly to meet various scientific, communications, industrial, space, military and medical requirements. A technological revolution is in the offing in the application of this new science.

Concommittantly, there exists a serious occupational hazard. Any part of the body exposed to a laser beam may be injured. However, the eye is particularly vulnerable due to its optical qualities wherein a laser beam would be focussed on the retina. Moreover, the retinal tissue contains pigment which absorbs light efficiently.

In the Department of Ophthalmology at New York University Medical Center, my co-workers* and I performed experiments on the pigmented rabbit eye which demonstrated that a pulsed, ruby laser emitting approximately 0.1 joule per square centimeter in a single 0.5 millisecond burst could produce profound eye damage.

Retinal burns, similar in appearance to those produced by viewing the fireball of nuclear explosions, were observed. These lesions were produced with relatively low power densities and long exposure times. With higher energy densities, it is theoretically possible to induce photo-electric effects and ionization to originate from within the eye as well as the possibility of in situ ultra-violet harmonic emanations. Moreover, by reducing the emission time to microseconds and less, the energy could be absorbed with explosive force completely disrupting the globe.

Aside from the animal experiments, as a consultant to several industrial laboratories working in the research and development of these devices, I have had the opportunity of examining about 200 people working with these devices. To date, no serious accidental exposures have been experienced. However, three individuals have evidence of laser induced injuries--one of them had a subcutaneous skin burn of the hand with a permanent area of pigmentary change and the other two had minor retinal burns.

*Drs. Goodwin Breinin, Harris Ripps, and Irwin Seigel

The hazard of inadvertant exposure to optical masers is real. Proper precautions must be instituted as part of the routine preventive medical program for personnel working in the laboratories. Rules and regulations protecting the general public from exposure must be promulgated. Until the parameter of hazard has been firmly established, no exposure should be considered permissable.

JOINT SESSION WITH AMERICAN INDUSTRIAL HYGIENE ASSOCIATION

May 15, 1962 - 1:45 P.M.

Session Arrangers - E. Lynn Schall, ACGIH
Ken M. Morse, AIHA
Co-Chairmen - Herbert T. Walworth, AIHA
John C. Soet, ACGIH

NEW DIRECTIONS IN ENVIRONMENTAL HEALTH

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To talk about environmental health to a group like yours is easy. We speak the same language. We are on the same team. I look upon the industrial hygienist as the forerunner in the field of environmental health. He is the first to see modern changes in industrial technology and the concurrent pollution problems which those changes give rise to.

Today, however, the original industrial hygiene concept needs extension to the health effects of the off-duty environment. The worker is, of course, on the job some 40 hours a week as against the 128 hours or so he spends outside. Today, the environmental risks of those off-duty hours may be actually greater than the occupational risks, partly because there are more than three times as many off-duty hours, but also because you have done such excellent work in safeguarding the working hours.

When I said that we are on the same team, I had in mind a far larger team than just the physician-engineer-hygienist combination which carried the ball so effectively during the last few decades. I have in mind, too, much more than the extension of our concern from 8 hours a day to 24. I have in mind all the factors in our modern environment which affect man - his well-being as well as his health - psychological and social factors as well as physical - beneficent factors as well as adverse. We must consider their cumulative as well as their immediate effect. Above all, we must consider them in combination as well as singly.

That is why I look upon the multi-disciplinary approach as the most important of the "New Directions" in environmental health. And that is certainly the guiding principle behind all the new developments which I shall report to you in the environmental health sector under my direction in the Public Health Service.

Of almost equal importance, in my opinion, is a positive approach. One of our New Directions is that splendidly positive definition of health in the constitution of the World Health Organization: "Health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity." Let us aim our sights for an environment that is not merely free from preventable hazards but also conducive in a positive sense to man's complete well-being.

What has the Public Health Service been doing to further that high objective? I sincerely believe that some of our new plans and projects in environmental health may prove to be the necessary first steps - long and firm and well-directed first steps, I hope - in the most far-reaching advances of the present half-century. The most important of these are the integration of all our separate environmental health efforts into a single working unit; substantial expansion of our support of others in research, training, and technical services; our projected Office of Environmental Health Sciences; our plans for an Environmental Health Center on a scale commensurate with the magnitude of the problems we face...and the enthusiastic endorsement of all these projects by a distinguished outside group of scientists and educators. I refer to the Committee on Environmental Health Problems, under the chairmanship of Professor Paul M. Gross of Duke University, President of the American Association for the Advancement of Science, whose report has just been published.

I shall return to these important developments shortly, but first I should like to review rapidly for you the progress we are making within the five "Environmental Health" Divisions of the Public Health Service.

Our Five Environmental Health Divisions

As currently organized, there are five Divisions within the present Bureau of State Services which are especially concerned with problems of environmental health. These are: Air Pollution, Environmental Engineering and Food Protection, Occupational Health, Radiological Health, and Water Supply and Pollution Control.

Each of these Divisions uses many disciplines, but similar skills are needed in all of them. There are also many other respects in which their insterests coincide or overlap. A few examples will illustrate the forces that were compelling us toward cooperation and consolidation long before the brilliant study by the Gross Committee confirmed and spotlighted our need for a unified mechanism on a major scale to cope with all the interrelated elements of our swiftly changing environment. Radioactive fallout can pollute alike our water, our air, our food. To understand lead levels in the human system we must add to occupational hazards the lead from the air we breathe, the water we drink, and the food and beverages we ingest. If we find that our engineers and physicians need help from the meteorologist and the toxicologist - and they do - some of the same wind and weather conditions affect radioactive substances in the air or automobile exhaust; the same chemical compounds may present similar hazards under a factory roof or mixed with our drinking water. As our interest expands to new elements in the environment, we need for the sociologist and the economist exactly the same professional skills, and often exactly the same facts, in all five of our present Divisions.

Nevertheless, each Division has a fairly well defined sphere of action. Their structure has been modified with the passing years to reflect the findings from careful studies by qualified advisers inside and outside the Public Health Service. We regard them today as basic building blocks for control action in a strong Environmental Health structure we have blueprinted, in which all our efforts in this field can move forward under unified direction toward a single common goal.

Water Supply and Pollution Control

I shall begin with our Division of Water Supply and Pollution Control because it is the biggest of the five and because this program has recently been strengthened by important new legislation - including greater Federal support to State

and local control programs - which we consider equally desirable for some of the other Divisions.

Secretary Ribicoff of Health, Education, and Welfare has called 1961 "a banner year in the long struggle to protect the Nation's water resources from unhealthy, costly, and destructive pollution." One of the first objectives of the Kennedy administration on coming into office was to strengthen the Federal role in water pollution control. Congress responded with Public Law 87-88, signed by President Kennedy July 20, 1961. In addition to providing for intensified research with special emphasis on more effective control methods, the new Act extends and increases Federal financial assistance to States and municipalities, and extends Federal enforcement powers.

The need for a more vigorous national program was obvious and urgent. The water pollution problem which confronts us today has reached - to quote President Kennedy's words - "the proportions of a national disgrace." Since similar considerations apply to our other problem areas, I will mention some of the factors which have made water pollution one of the most serious economic and social and public health issues we face today. Water pollution grows with every increase in our population, our urbanization, and our industrialization; and with every new technological advance we hail so proudly. Swelling the ever-increasing floods of municipal and industrial wastes, new chemical substances - such as man-made fibers, detergents, and pesticides - and radioactive substances from our nuclear technology, are reaching our watercourses in ever greater number and quantity. By 1980, the supply of clean water will be grossly inadequate for the needs of millions of our citizens in many parts of our country...unless we expand prodigiously our control efforts. Already, some 5200 U.S. communities need new, enlarged, or improved sewage treatment plants. Increasingly, we have to use our supply of flowing water over and over again and we shall have to keep it clean, or make it clean, as a simple matter of survival.

For Federal work in that stupendous cleansing operation, exclusive of construction grants to cities, our budget for fiscal '62 was something under $19 million, and the President's budget for fiscal '63 calls for something over $23 million. Of those amounts, research - with something less than half for direct research and the rest in grants to support outside research - accounts for roughly $4.6 million in '62 and $6.6 million in '63; and technical services for $8.2 million and $10.8 million respectively. An item which we expect to assume increasing importance, in this and other Divisions, is grants to States and interstate agencies for control programs, up from $4.8 million to $5 million.

The most important advance made possible by the new legislation was a substantial rise in Federal aid to cities to help erase the long-standing backlog of needs in municipal sewage treatment plant construction. Previously $50 million a year, construction grants totalled $80 million in fiscal '62 and will rise to $90 million in '63 and to $100 million in each of the four following years.

The lion's share of those expenditures, past and proposed, is devoted to helping our States and cities to help themselves. Actually, all our research and educational activities serve the same purpose. Congress on many occasions has declared as its policy that primary responsibility for pollution control shall rest with the States and local communities. But the problems of our changing environment have become too vast to be fully understood and effectively dealt with by any one level of government. The function of the Federal Government, therefore, as I see it, is to find the necessary answers through research and to

aid and expedite the application of those answers - partly through a limited program of direct financial aid, when needed to stimulate action at lower governmental levels - but mainly through education, whether the latter takes the form of formal technical training courses or of actual initiation, in the field, of sound technical procedures.

In 1957, we started a National Water Quality Network to maintain a constant check on water pollution in major waterways. It now has some 100 primary checkpoints which collect data on radioactivity as well as bacterial, organic, and inorganic pollutants. In Cincinnati, and through grants to universities and other outside agencies, we conduct or sponsor a substantial research program. This includes not only studies on the nature, sources, and effects of pollutants but also efforts to find and apply more effective control measures. One such major current project demonstrates the feasibility of using reconditioned secondary sewage for boating and swimming. Another is seeking to purify sewage so completely that the treated effluent can actually be piped direct into a municipal water main!

Advanced training is provided for engineers, chemists and other scientists from Federal and State agencies, municipalities, and industries. Short laboratory and classroom courses are given at the Robert A. Taft Sanitary Engineering Center of the Public Health Service, Cincinnati, Ohio; seminars and conferences are held on major areas of interest; training grants are given to teaching institutions; and demonstration grants foster familiarity with new control methods. From all our training projects - and I include in these the practical technical services we are able to render States, communities, and industry - the hoped-for end-product, of course, is better pollution control. And it is worth repeating: the primary impact of our control Divisions on our enviroment will be through the educational process.

Since many of the principles involved - and even many of the objectives - are identical in all five environmental health Divisions, I shall be able to summarize the other four programs more briefly.

Radiological Health

Our Division of Radiological Health is the watchdog on all forms of radiation exposure throughout the United States. After last fall's testing by the Soviet Union caused widespread nuclear fallout over the northern hemisphere, this responsibility assumed new importance and the Division's activities have been expanded accordingly.

The President's budget for this Division for fiscal '63 calls for some $15.9 million as against about $10.5 million in the current fiscal year. Roughly $5.8 million of the new total is for research, up from $4.2 million in '62 about two-thirds for direct research, the remainder for extramural grants. The figures for Technical Services are $5.2 million for '63, up from $4.3 million. A most important new item in the '63 budget is $1.5 million for State Program Development Grants; previously, only our Water Division was authorized to make grants of this type.

More obviously than any other in our group, this Division surveys and measures a recognized environmental hazard. Its monitoring program, therefore, is extensive and expanding. The Radiation Surveillance Network, and early warning system of air sampling stations, has been increased from 45 stations to over 60.

The Pasteurized Milk Network also has more than 60 stations and, instead of once a month, some of these stations now collect samples as frequently as five times a week. A total diet sampling program covering teen-agers and infants is underway in 30 cities. From these and other sources, all available data - including gross beta radioactivity of particles in the air and in rainfall or snowfall, and iodine-131 and other radionuclides in milk - to a new Radiation Surveillance Center at Division headquarters, which assembles and assesses them. Mobile radiochemical laboratories and teams have been sent to the Pacific to assist in monitoring the U.S. atmospheric tests now under way.

I must resist the temptation to expand further my report on this Division, but I do want to stress one phase of its activities which perfectly illustrates a key feature of our New Directions in Environmental Health. That feature is teamwork.

You will have noted already that our "Rad Health" Division must work in close cooperation with our specialists in water and air pollution and our specialists in milk and food protection. It must also work in constant unison with other Federal agencies - the Defense Department, the Atomic Energy Commission, the Department of Agriculture. Increasingly, it is working on radiation problems with the States, for example, in developing licensing programs for radioactive materials. In New Mexico - where some exposures have been above normal - we have contracted with the State Department of Public Health to build a radiochemical laboratory. Division specialists are being assigned to several States. Here, as in the other Divisions, research activities and what I have called "educational" activities - training and technical services - are carried out cooperatively with universities and many other public and private organizations.

To drive home a point which has become rather obvious in the Public Health Service, the radiological scientist cannot function in isolation; he needs the advice and counsel and collaboration of many others.

Environmental Engineering and Food Protection

None of our Divisions better exemplifies teamwork in action than Environmental Engineering and Food Protection. I will mention only a very few of its many and varied activities in which cooperation with industry and other governmental agencies is the first essential.

Our new Food Service Sanitation Manual incorporates new technical knowledge to help prevent food-borne illness, as a guide to enforcement authorities in States and cities; its predecessor was adopted by 37 States and over 100 communities.

In milk sanitation, 845 shippers now participate in the Cooperative State-PHS Program for the Certification of Interstate Milk Shippers. Although the Department has supported Congressional action to make its provisions compulsory, this is now a wholly voluntary program on the part of the industry.

In shellfish sanitation, we depend upon effective State programs and interstate cooperation, which our research and technical services are designed to foster; we are also seeking agreements on sanitary standards for shellfish imports from Japan and other nations.

A new development of special significance, because it emphasizes some of our most important "new directions," is the release of our new Environmental Health Planning Guide*, designed to help communities assess their own environmental health problems. Already pretested in several cities, the Guide is serving as the basis for a novel kind of study now under way in the Kannapolis, North Carolina area. While a primary aim of this study is to determine whether or not a sanitary district is needed for handling throughout the area, it will also consider other health-related problems. The Kannapolis study is novel in several respects. It is citizen-motivated and citizen-conducted. In keeping with our modern urban pattern, it will cross jurisdictional boundaries and consider only population densities and the needs for improved services. Finally - and notably - it will not be limited to a single factor of the environment but will review them all, including their economic as well as their public health aspects.

The President's budget for this Division in fiscal '63 calls for a total of about $7.5 million. This is less than the '62 total of about $7.8 million, mainly because the current year included under technical services a nonrecurring item of some $1.5 million for construction of two shellfish laboratories. Technical services, therefore, will total some $2.2 million, down from $3.5 million. An interesting feature is the high degree to which this older Division - with plenty of established precedents - has been able to use outside facilities in its research efforts. Not counting the Arctic Health Research Center, for which the round figures remain at about $.7 million,[1] some $4 million is earmarked in the new budget for research grants as against half-a-million for direct research. The Report of the Committee on Environmental Health Problems,** which I shall review in a few moments, has urged us to use outside research competence to the fullest possible extent.

Occupational Health

The activities of our Division of Occupational Health are those with which the industrial hygienist is probably most familiar. Like the other four, it conducts direct research and sponsors research by others, and fosters professional education in its field by training courses and by "applied" education, through technical services. The '63 budget calls for about $4 million, a slight increase over the '62 figure, which was, however, double that for '61. Of the new total, something over $3 million is for direct research and research grants, and something under $1 million for training and technical services.

Its recent field studies, which cover a wide variety of environmental conditions and toxic chemicals, have ranged from potential occupational risks in animal feed mills to hazardous mining exposures, with special emphasis on silicosis and uranium mine studies, in cooperation with the U. S. Bureau of Mines. Laboratory studies of animals seek to determine just how injurious substances work in the body and how the body responds to them, and to assess behavioral reactions as indicators of tolerance for toxic substances. Laboratory research also includes analytic studies to devise more sensitive methods for detecting and measuring chemical and physical components of the work environment.

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* PHS Publication No. 823.

1 $700,000.

** The Gross Report.

We provide basic and advanced training courses in industrial hygiene - for local health officers as well as for specialists - and special courses for sanitarians and industrial nurses.

A new development for the future was the recent addition to our staff of a new discipline - to investigate the psychological component of occupational health problems. We published last year the results of a long-term study in four Federal penitentiaries on the relationship of industrial noise to hearing ability. But what about the relationship of industrial noise - and the noise of street traffic and airplanes - to our peace of mind, our sanity? I am convinced that one of our important New Directions will be to begin underlining the mental in environmental!

Air Pollution

Our Division of Air Pollution is by no means last in the magnitude of the environmental hazard with which it deals. But I have purposely reserved it till last because its past history, its present activities, and its future needs will perhaps serve best of all to demonstrate the timeliness of the Gross Committee's study of environmental health problems and the soundness of that committee's recommendations.

Air pollution is a comparatively new environmental hazard. The first air pollution program in the Public Health Service was authorized by Congress in 1955. Actually, there were at first two programs, one medical and the other engineering. The first was then a part of a Division of Special Health Services, the other a part of Engineering Services. This sharp separation of functions simply did not work. In the light of what we know today, it could not be expected to work. The nature of the problem called for interdisciplinary action. The measurement of pollutant levels, for example, and the study of their effects on biological systems proved to be inseparable. Late in 1960, therefore, the two programs were combined in a single Division, in which some 50 professional disciplines altogether can jointly attack this highly complex problem.

To an even greater extent than in the other Divisions, Air Pollution's major emphasis has been on research. Typical of many other multi-discipline projects is the largest: following the passage, late in fiscal '60, of the Schenck Act - which called for a thorough study and report to Congress by June 30, 1962, on the health effects of motor vehicle emissions - we have sharply accelerated our research in this area. The major study is being conducted in Cincinnati. It includes human eye irritation, vegetation damage, and effects on animals of short-term and chronic exposures. Also being examined are the effects of variations in the chemical composition of the exhaust. Other projects include studies of the nature, sources, and interactions in the air of pollutants; of meteorological aspects; and of improved instrumentation and other control measures. The circumstantial evidence which has linked air pollution to certain cardio-respiratory diseases - including asthma, emphysema, and lung cancer - comes from three types of medical studies: statistical, epidemiological, and laboratory.

The 213 stations of the National Air Sampling Network include at least one urban and one nonurban station in every State; 50 of these now sample gaseous as well as particulate pollutants. In eight cities, exhaust-related gaseous pollutants are measured continuously to determine their ranges of concentration. These networks provide continuing information about what is in the air, and help cooperating State and local control agencies to deal with their own specific problems.

High on this year's agenda is the National Conference on Air Pollution, which Surgeon General Terry has called for December 10-12. It will be held in this city; in fact, in this hotel. I hope that many of you will be here again for that important meeting. Nationally sponsored conferences - like demonstration projects, but on a larger scale - can contribute greatly to what might be called control-by-education. The theme of this one is simple - "Let's Clear the Air" - but it has a double meaning. It means "Let's agree on what needs doing," an area in which a great deal of progress has been made since the last national conference in 1958. It also means "Let's go ahead and get it done," and here much faster progress is urgently needed.

Research, largely conducted or sponsored by PHS, has shown us how to prevent or control many sources of air pollution. But State and local governments - which under current laws have sole responsibility for air pollution control - have not been uniformly responsive to the swiftly growing need for protective measures. Two identical bills, endorsed by the Administration and now before Congress, would greatly augment our ability to help these governments to help themselves. They provide for loans of Federal personnel, Federal studies and public conferences on pollution problems of nationwide or multi-State significance, and cooperative compacts between States. Most important of all, they would authorize project grants-in-aid to State and local control agencies for initiation or improvement of air pollution control programs. "The Public Health Service," concludes an air pollution subcommittee in the Gross Report, "should seek this additional authorization and should seek the funds to carry out the legislative provisions."

As against some $8.2 million in fiscal '62, the President's Budget for this Division in '63 calls for a little over $10 million. The House of Representatives, however, has increased this by $1 million. As budgeted, something under $1.4 million is allocated to training ($.3 million), training grants ($.5 million), and technical services ($.6 million). More than $8.7 million is for research, with $6 million of this earmarked for intramural research, the rest for extramural grants. The extra large percentage for direct research is due to the fact that scientific knowledge about air pollution was almost negligible a dozen years ago, and Public Health Service research has had to blaze a trail through an almost uncharted wilderness.

For all five Divisions, expenditures for fiscal '62 will total approximately $130 million. This increases in the '63 budget to about $155 million. Of the latter figure, research accounts for around $28.5 million or 18 percent; technical services for $19.5 million (12½%); training and training grants for $5.9 million or something under 4 percent. Of the remainder, $90 million, rather more than half the entire budget, goes to the Water Division for construction grants. Only $7 million is allocated to demonstration grants, control grants, and State program development grants. All three are designed to accelerate pollution control measures in our States and communities, and we are convinced that the need for such direct grants-in-aid is great and growing.

In this and many other respects, the findings of the Gross Committee on Environmental Health Problems - to which I shall devote the remainder of my talk - tend to reinforce my own conviction that many of the "new directions" which we have recently been following in these five Divisions are in the <u>right</u> direction, straight toward that better environment we are all seeking.

The Gross Committee on Environmental Health Problems

Although the membership of the Gross Committee included some of the finest scientific talents in the nation, although the depth and scope of its study were monumental, and although its final report deserves nationwide acceptance as a sound blueprint for the future, the New Directions which this Report points out so clearly were by no means altogether new to those of us in the Public Health Service who were most concerned with environmental problems.

As I hope my short survey of our five Divisions has indicated, we had steadily increased our emphasis on environmental health, and we were gradually achieving better cooperation, between disciplines, between Divisions, and between the Divisions and outside organizations - governmental, educational, industrial, and private. Our plans for integrating all five Divisions in a new Bureau of Environmental Health awaited only Congressional approval. Above all, we had wholly accepted as a new fact of life that you cannot deal with any one environmental factor as if the others did not exist, any more than today's diagnostician can concentrate on a single symptom or a single organ and ignore all the other factors, mental and physical, which affect his patient's well-being.

But as we moved forward in our thinking and offered new proposals, with new emphasis on Environmental Health as a single entity, questions were raised as to the need for certain of our program activities and the relationship of these to other Federal programs. Other important questions had to do with the proper relationship between our programs and those of State and local governments and of universities. There was also a serious question as to whether or not it was possible - because of the shortage of trained manpower - to expand our programs rapidly enough to cope with the expanding needs.

To questions such as these the Gross Committee on Environmental Health Problems addressed itself.

The Committee's report* was published early this year in book form. There are 288 pages and every one of them is well worth reading by anyone interested in industrial hygiene or any other facet of environmental health. I will mention here only the highlights.

The Report calls for a "major national effort," inside and outside the Federal Government, to deal with environmental health problems which result from the rapid growth of our highly technological civilization. The Federal Government, however, should assume the leadership, not only in acquiring through research, and transmitting, the necessary knowledge, but also in demonstrating to State and local governments appropriate prevention and control techniques.

The recommended focal point for Federal activity - and for the entire national effort - is the Public Health Service. The Service should, however, make the fullest possible use of outside research facilities and technical competence wherever they can be found - in universities, in industry, in other governmental agencies - so that a major fraction of each year's effort would be extramural.

* PHS Publication No. 908

To a group like yours, the need for a major effort in this area needs no demonstrating. The leadership role, we in the Public Health Service have gladly accepted and shall do our utmost to maintain with honor. Within the proper limitations of current laws and available funds, we have already begun to exercise more vigorous leadership. The research conducted or sponsored by the Service is pointing the way to more effective control measures, and a start has been made in what I have called control-through-education. In the '63 budget, nearly half of our research will be extramural, and this fraction can be increased as the findings from more trail-blazing research projects become available.

The Committee recommended that our five working Divisions be materially strengthened in staff and facilities, including adequate regional staff and facilities. It recognized, however, that these Divisions could not, unaided, provide either the depth of effort which their own specific missions call for or the special effort needed to deal with the multiple effects of many different environmental hazards combined.

To overcome these limitations - and to provide the Public Health Service with organization and facilities geared to the immensity of the problems we face - the Gross Committee approved and expanded two Big Projects which we had first dreamed about and now have begun to blueprint: the Office of Environmental Health Services and the Environmental Health Center.

The Office of Environmental Health Sciences

As envisioned in the Gross Report, the Office of Environmental Health Services would be independent of the Divisional structure and with separate budgetary provisions. It would be in essence groups of scientists reporting to a Scientist Director. These groups - biological, and social scientists, and mathematicians - would be responsible for an overall view of the entire field of environmental health. They would be free to study basic problems of common interest to several operating units. This Office would also provide central services in such areas as mathematics, statistics, data processing, information storage and retrieval, instrumentation, and analytical laboratory procedures. It would also provide advice and counsel to the projected Bureau of Environmental Health on the overall direction of research.

It is this Office which would eliminate wasteful duplication of effort and make possible a truly integrated national environmental health program. It could appraise problems now wholly neglected and develop new protection standards based on <u>all</u> aspects of the environment.

The Environmental Health Center

The new Office of Environmental Health Sciences would be headquartered (housed) in a comprehensive new Environmental Health Center, as would all other Public Health Service headquarters activities in environmental health, including the present operational programs. Here, administration, operations, intramural research and educational activities, and direction of all extramural activities, would be centered. Each would benefit by proximity to the others and to the important new specialized services which none could well afford alone. Each would stimulate the others and bend its own methods and objectives - early and often - in the light of advances by the others. As the number of outside grants increases and more cooperative projects are undertaken with other national, State, and local agencies - in line with the Committee's recommendations - unified direction from

the Center should facilitate effective liaison between the Public Health Service and all these outside groups, and reduce duplication of effort to an absolute minimum.

Above all, the new National Center would most effectively create a true focal point for the total nationwide effort in environmental health - a single authoritative source of information and a powerful stimulus to effective control action at other governmental levels and by industry.

The Committee Report confirms our own conclusion, based on experience, that the National Environmental Health Center should be located in the National Capital area, where liaison with Congress, the Executive Branch, and other Federal agencies, is most easily maintained, and where a cultural-scientific center of growing national importance will help to attract the needed professional manpower.

If funds for site acquisition and detailed planning are forthcoming shortly, and our time schedule is realized, Capital visitors in 1967 will be able to see the new National Environmental Health Center in being ...like the National Institutes of Health in Bethesda, and perhaps with an almost equal potential for lengthening man's tenure here on earth...in an environment that will again be fun to be alive in!

Needed - New Legislation, Additional Funds, More Manpower

The Gross Committee Report urged the Public Health Service to seek through new legislation the needed authorization for this far-reaching new program - legislation designed to supplement, rather than limit, the authorities under which the five Divisions now operate. The necessary preparatory steps are already under way.

As a clue to the scope of the Gross Committee recommendations (and also indicative of the comparative emphasis it gave to intramural and extramural activities), a word about suggested expenditures may be in order. By 1970, the Committee estimated, some $100 million a year will be needed for intro-Division activities (including regional) and no less than $250 million for grants and contracts to others. These are large numbers, but this is also a large country and the stakes are high in terms of human life and health. They do not seem so large when we recall that air pollution alone, in economic damages alone, is estimated to cost us some $11 billion dollars a year!

Since it costs less to control most environmental pollution sources than to pay for the damages they cause, the needed funds will probably be forthcoming. The needed manpower seemed at first to present a greater obstacle.

The Gross Committee concluded, however, that while a training and recruiting effort of major magnitude will be required, this will not create any imbalance with the Nation's other needs for scientific and technical personnel. The Committee recommended substantial expansion of the present short-term training programs within the Public Health Service and a new program of grants to educational institutions. The figure I mentioned of something under $6 million for training programs in the '63 budget represents an increase of some $2 million over '62, but the Committee concluded that funds in excess of $25 million are urgently needed to put these programs into full operation.

You will find in the complete Gross Report ample supporting evidence for this and the other recommendations I have summarized. I feel certain that you - who are knowledgeable professionals in this field - will recognize in this Report a major landmark for our New Directions in Environmental Health.

In closing, may I suggest that, for the long view, we all raise our sights a little higher still? When we have learned to cooperate with each other and with the social scientists, let us also enlist the teacher and the parent, the architect and the artist, the minister and the judge. For education, esthetics, ethics - as well as science - are involved here. When we have abated the nuisance, cleaned up the dirt, removed the health hazard, let us keep on working together, to create a truly good environment - pleasant, invigorating, beautiful, decent, and safe - in which our children's pursuit of happiness will have at least a sporting chance of reaching its goal.

PHYSIOLOGICAL FACTORS IN THE PRACTICE OF INDUSTRIAL HYGIENE

Harwood S. Belding, Ph.D.
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(This paper was not available for publication.)

PSYCHOLOGICAL FACTORS IN THE PRACTICE OF INDUSTRIAL HYGIENE

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I. Introduction

The effectiveness of any man-machine system depends upon the integration of the biological characteristics of the operator with the mechanical design of equipment and working areas. With the increasing mechanization of industrial operations and the greater complexity of machinery many operational difficulties have been encountered, especially during World War II. Major problems resulted from failure to consider human capabilities and limitations in the original design of equipment. It was soon learned that sonars, radars, rangefinders, aircraft, and other types of equipment had to be operated by human subjects who often lacked the necessary capabilities to make responses safely and efficiently. (9)

A new discipline, referred to as human factors engineering, or biotechnology, in the United States, and ergonomics in Great Britain soon developed. The objective is to integrate men and machines more effectively. This field of research refers not only to the application of psychological and physiological data in the design of specialized instruments and controls in the layout of working areas, but also in the design of products for general use in homes and factories.

Although human factors engineering is an organized discipline initially developed chiefly within the aircraft industry it has been extended to many other manufacturing areas. (15) In the U.S. the Human Factors Society now includes 830 members representing 330 organizations in 35 states and seven countries. Almost half of the membership resides in California and New York. Additional information in regard to the history of the Society and an analysis of the academic specialties and interests of the members may be found in the Human Factors Society Directory for 1962.

The industrial hygienist is in an unusually favorable position to assist in the development and application of human factors engineering because of his broad training. This relates both to the design of equipment and its use. This applies not only to the original design and mock-up stage of equipment, but also during factory inspections and the introduction of corrective measures.

A few examples may illustrate this point of view. If an auditory warning signal is used to indicate the malfunction of equipment, would it not be best to select a frequency band to which the ear is most sensitive, and which lies below the frequencies which older people hear poorly? If muscular "feedback," as well as vision, is important in controlling the directional stability of a vehicle, should not the resistances in a power-steering system be related to information about human "muscle sense?" If two control knobs are located close together on a console might not designing them so that they can readily be differentiated by touch help prevent inadvertent operation of the wrong control? Similarly, the machine operator while working should have a seat so designed as to insure maximum comfort and efficiency and to eliminate the back strain and fatigue so often present in contemporary industrial situations. (17)

In general, the analysis of a design for its use by human operators will fall into these categories: (a) Manner of perception; (b) Manner of response; and (c) Environmental and physiological condition of the operator. Many questions will arise and will naturally vary with the type and purpose of the operation. Some of the more important questions are as follows:

1. What sense organs are used by the operator to receive information? Does he move into action at the sound of a buzzer, blink of a light, reading of a dial, verbal order? Does the sound of a starting motor act as a cue?

2. What sort of discrimination is called for? Does the operator have to distinguish between lights of two different colors, tones of two different pitches, or compare two dial readings?

3. What physical response is he required to make? Pull a handle? Turn a wheel? Step on a pedal? Push a button?

4. What overall physical movements are required in the physical response? Do such movements interfere with his ability to continue receiving information through his sense organs? (For example, would pulling a handle obstruct his line of vision to a dial he is required to watch?) What forces are required (torque in turning a wheel)?

5. What are the speed and accuracy requirements of the machine? Is the operator required to watch two pointers to a hairline accuracy in a split second? Or is fairly close approximation sufficient? If a compromise is necessary, what is more essential -- speed or accuracy?

6. What physiological and environmental conditions are likely to be encountered during normal operation of the machine? Any unusual temperatures, humidity conditions, crowded work space, poor ventilation, unavoidable fumes, and so on? Will the operator come to work from presumably a normal good night's rest and work in well-ventilated, well-lighted, cheerful conditions? Or will he be working under strain such as battle conditions? (4, 12, 30)

II. General Principles, with Special Reference to Systems Analysis

The importance of considering the operator from the outset as one of the components of the man-machine system has become very clear. The earliest phase in design, where the human factors specialist can assist the design engineer is when the system's sub-tasks are assigned to component elements. Sometimes the question may be "man or machine" - at other times, "which element of the machine," or "what kind of a man." A second aspect of this phase concerns the "linkages" between the man and the machine, i.e., the transfer points of energy or information between the components. Both of these require the application of biological and psychological knowledge about the operator. (29, 31)

If a worker is viewed as a component of a man-machine system the general characteristics pertinent to design may be outlined as follows: (1) Physical dimensions; (2) Capability for data sensing; (3) Capability for data processing; (4) Capability for motor activity; (5) Capability for learning; (6) Physical and psychological needs; (7) Sensitivities to physical environment; (8) Sensitivities to social environment; (9) Capability for coordinated action; (10) Differences among individuals. Quantitative information on these human characteristics must be coordinated with the characteristics of the machine if maximum man-machine integration is to be achieved.

A great deal of the biological and psychological information needed for this purpose is now available. As is well-known, one of the most significant developments is in the field of electronics, especially in regard to high speed monitoring, recording, and computing procedures. It is now possible to study very effectively and quantitatively the human component of the system in relation to the other components and to the output or objectives of the total system. The application of digital and analog computers in simulators to reproduce the performance of submarines is one example of the progress made in this area. In aviation, greatest use has been made of this approach to study problem areas of the pilot-aircraft system in relation to the design of control and display systems, and the training of the pilot in specific aspects of flight in simulators. Instrumentation has reached a point where it is possible to monitor a pilot's responses in particular tasks, and through analog computer circuits to operate the control system of the simulated aircraft in certain specific types of maneuvers by a faithful reproduction of the pilot's responses. (26, 29)

A. Advance Analysis of Equipment

The initial phase of any human engineering program for man-machine systems should always consist of an advance analysis of all possible faults in the equipment and in the working area, for if defects are present, it is only a matter of time before an operator fails and either decreases his productivity or has an accident. Advance analysis assumes an operational job analysis that should include a survey of the nature of the task, the work surroundings, the location of controls and instruments, and the way the operator performs his duties. A functional concept of accidents should be maintained throughout - that is, the errors that may occur while the operator is working at the machine should be anticipated. The repetition or recurrence of near or real accidents clearly indicate a need for redesign. It should be assumed at all times that no worker is perfect.

In fact, he may be far below the ability adjudged by the designer. If his duties are too complex, the cumulative burden becomes too great and he may reach or exceed his limits of attention and ability. Therefore, a wide margin of safety should be provided to eliminate any possible situation that places the operator near his maximum ability with regard to aptitude or effort, especially when adverse factors are present. (15)

It is obvious that maximum use must be made of all available biological materials relevant to machine design carrying out a human engineering program. As discussed below, these include: (a) data on sensory abilities for the design of displays; (b) data on biomechanical abilities for the design of controls; (c) data on the range of human body size, at rest and in motion, for determining the dimensions of the workspace and its components; and (d) data on human reactions to the physical variables of the environment for determining the proper levels of those variables within the workspace.

III. The Use of Human Body Size and Biomechanical Data in Equipment Design

One approach to equipment design and industrial safety relates to the layout of the workspace and its contents in terms of the biological characteristics of the worker. If equipment and workspaces are designed specifically for or around the worker's physical capabilities, limitations, and body size, increased efficiency and a reduced risk of accidents can be expected. Such design procedures are highly desirable from the point of view of industrial health and safety, since the provisions that are made for the satisfaction of human physical requirements in the design of equipment, determine to a considerable extent the way in which that equipment will be used.

To design properly for the range of human body size and capabilities, it is first necessary to determine: (a) the job or task to be performed; (b) the kinds of equipment used; (c) the population who will use that equipment; and (d) the biological characteristics of that population. The task and the equipment used can generally be described rather easily, and the population using the equipment is almost always known, though their biological characteristics can often be determined only from a specially planned survey. (18) The kinds of data needed are:

(1) The range of human body size with reference to the specific measurements used to establish the dimensions of the equipment. For example, three basic body measurements are needed to establish the dimensions of a seat to ensure maximum comfort. They are: popliteal height, or floor-to-thigh height (for seat height), buttock-back-of-knee length(for seat length), and buttock breadth (for seat breadth). Again, the functional arm reach (not simply anatomic arm length) of the smallest members of the group must be known before the outer limits of the workspace for the location of controls can be determined. (See Table 1) (20)

(2) The range of motion of the various parts of the body. How far can a control knob be turned before regripping is required? How does wrist rotation and finger manipulation vary as the hand is moved to the different parts of the workspace at which control adjustment, or assembly tasks might be necessary? (27)

(3) The limits of strength that can be exerted in various tasks. It is especially important to obtain these data on the weakest members of the group. The information desired might include the maximum weights that can be lifted or carried, the maximum forces exertable in turning a wheel or in pulling a lever, both in single applications and over periods of continuous operation.

(4) The speed of body movement. How do people vary in reaction time? How much time will elapse before the slowest members of a group perceive a signal, perhaps a warning signal, and start to take appropriate action. Once this action is started, how quickly can a control be moved? How rapidly can a dial be turned? For how long can this be done, and at what speeds, before fatigue sets in?

(5) Accuracy of movement. What is the maximum amount of precision that can be expected from the least capable workers in the group? What accuracy can be expected in a tracking task, in fine assembly work?

TABLE I

Percentile	Sitting Height erect (in inches)	Elbow-to-Elbow Breadth (in inches)
99	38.9	20.9
98	38.6	20.5
97	38.3	20.2
95	38.0	19.8
90	37.6	19.2
85	37.3	18.8
80	37.0	18.5
75	36.8	18.2
70	36.6	18.0
65	36.5	17.7
60	36.3	17.6
55	36.1	17.4
50	36.0	17.2
45	35.8	17.0
40	35.6	16.8
35	35.5	16.7
30	35.3	16.5
25	35.1	16.3
20	34.9	16.1
15	34.6	15.8
10	34.3	15.5
5	33.8	15.2
3	33.5	15.0
2	33.3	14.8
1	32.9	14.5

Table I. The percentile distribution of Sitting height and Elbow-to-elbow breadth. The data on sitting height are used to determine the seat-to-roof distance needed in a workspace to accommodate various percentages of the population. The data on

elbow breadth, the maximum body breadth, are used to determine the minimum lateral dimensions in the workspace necessary to accommodate the human body. Appropriate clothing allowances should be added. These data describe an American male, - military population. (Hertzberg, Daniels, and Churchill, 1954)

It will be noted that most of these human abilities and characteristics are closely interrelated. That is, speed of movement varies with the degree of accuracy required, and the amount of strength that can be exerted on a control depends to a great extent on the location of that control within the range of body movement. Hence, each human capability must be defined and described as but one element in the integrated pattern of physical activity that is characteristic of a specific task. (5, 6, 11)

It will also be noted that special reference has been made to those persons at the ends of the range of abilities or characteristics under consideration, e.g., the weakest, the slowest, the largest. This use of extreme values is of considerable importance in equipment design. For example, in establishing clearances around the body to ensure "fit" and minimal interference with body movement, the designer is not concerned with the smaller persons in a group, but only with the largest ones. When establishing maximum allowable resistances in a control, one needs to know only the maximum strengths that can be applied by the weakest persons using that control. Similarly any control speeds that can be attained by the slowest persons can also be attained by the fastest persons. (2, 11)

Consequently, in order to be applied most effectively in equipment design, those kinds of biomechanical and anthropometric data need to be presented in terms of distributions describing the range of abilities or characteristics of the population, not just in terms of an average. The use of average values in equipment design has led to considerable difficulties in the past, since, by definition, one half of the population falls above the average and one half below this average. A control just reachable by the man with an "average" arm reach would be out of reach to all those smaller than average. A workspace dimension affording head clearance just adequate for a man of average height would not provide clearance for the 50% of the population taller than average, etc. (6)

Such problems can be eliminated if the biological data are presented in percentiles, a statistical measure that expresses the numerical values of a given dimension or ability for selected percentages of the population. Often the data are given at 5% intervals from the 5th to the 95th percentiles, and at 1% intervals between the 1st and 5th, and 95th and 99th percentiles. The latter percentiles frequently represent the part of the range of human capabilities that are most critical in equipment design. By using these percentile tables, a given piece of equipment, or a task, can be evaluated in terms of the relevant human variables to determine what percentages of the population can be accommodated with regard to desired limits of efficiency and safety. More important, criteria for new design can be established in advance to accommodate any specified percentage of the population. (18, 20)

Unfortunately, both individuals and occupational groups differ in their physical attributes to such an extent that equipment designed for one group might be quite unsatisfactory for another group with a very different range of physical

abilities and body size. (A young, male, military population, and an elderly, mixed, civilian population, to take an obvious comparison). This will necessitate, in many cases, direct measurements of the body size and the biomechanical abilities of the specific persons for whom the equipment is intended. Some of these kinds of data are currently available on specialized military and civilian groups, and have been evaluated, summarized, and presented for the design engineer's use in a recent publication by Damon, Stoudt, and McFarland, 1962, together with a detailed description of the methods to be used in gathering original data of this kind, and the principles to be followed in applying the data to specific design situations. (6)

IV. Human Capabilities in the Design of Displays and Controls

The important aspects of industrial machine design directly related to the safety and productivity of the worker concern the design of displays and controls. Displays are one of the most common types of operator input, the others being direct sensing and verbal or visual commands. Displays tell the operator what the machine is doing and how it is performing. Problems of display design are primarily related to the human senses. Controls, on the other hand, govern the operation of the machine, and their manipulation is the most common form of operator output. Problems of control design are primarily related to biomechanics, i.e., the range, strength, speed and accuracy of body movement.

Design of Displays. A machine operator can successfully control his equipment only to the extent that he receives clear, unambiguous information, when needed, on all pertinent aspects of his task. Accidents, or operational errors, often occur because a worker has misinterpreted or was unable to obtain information from his displays concerning the functioning of the equipment. Displays are usually visual in nature, though they may also be auditory, i.e., warning bell rather than a warning light, especially when there is danger of overloading the visual sensory channels.

There are three basic types of indicators which supply the machine operators with information. They are: (1) the check display, which indicates whether or not a given condition exists, i.e., a green light, or no light, to indicate normality, and a red light to show failure, danger, or faulty operation; (2) the quantitative display, which indicates an exact numerical value to be read, e.g., speedometer, clock, thermometer; (3) the qualitative display, which indicates whether, and in what direction, an operation has deviated from a desired level, without presenting precise quantitative data (Baker and Grether, 1954); some temperature gages are used in this way, and, in fact, may quantitative displays could profitably be changed to this simpler type of indicator. Whenever possible, the least complex type of display should be used, consistent with the degree of precision required. (22, 24, 28, 31)

Any display or indicator, regardless of type, must possess the following basic characteristics if it is to be as nearly foolproof as possible: (1) it can be read quickly and in the manner desired, i.e., as a check, qualitative or quantitative display; (2) it can be read as accurately as is required -- and preferably no more accurately; (3) there is no ambiguity or likelihood of gross reading errors; (4) the information is provided in the most immediately useful form and does not require mental translation into other units; (5) changes in value are easy to detect; (6) it can be easily identified and distinguished from other instruments;

(7) the information is as current as possible, i.e., lag is minimized; (8) if inoperative, it either cannot be read or the operator is properly warned; and, (9) when applicable, the instrument indicates which control to use, and in which direction to use it, when changing its reading. (28)

The necessity of applying human engineering techniques to the design of displays is well illustrated by the frequent difficulties which even experienced operators have in correctly reading certain types of instruments. The conventional aircraft altimeter, for example, is equipped with three pointers, each requiring separate interpretations before the pilot can determine his altitude. Errors caused by this type of instrument have been frequently reported by pilots in confidential statements, and misreading of the altimeter has been cited as the cause or probable cause of a number of recent aviation accidents in the United States and Great Britain. The most common type of error reported has been that of misreading the altitude as either 1,000 or 10,000 feet too high. The design of the instrument has been improved by presenting altitude in thousands of feet by numerals in a window on the dial face, with interpolations between thousands of feet read from a single pointer. Studies comparing the errors made in reading the old and improved altimeters by both novices and experienced pilots have shown that the new design can be read much faster and with far fewer errors. (9, 15)

Design of Controls. In regard to controls, an operator must decide upon the proper course of action and manipulate them in such a way as to produce any desired change in the machine's performance. The efficiency and effectiveness with which controls can be operated depends upon the extent to which information or the dynamics of human movement, or biomechanics, has been incorporated in their design. This is particularly true whenever controls must be operated at high rates of speed, against large resistances, with great precision, or over long periods of time. (10, 26)

Controls should be designed so that rapid, accurate settings can be easily made without undue fatigue. If so, many accidents and operational errors would be avoided. This thesis is strikingly illustrated by the landing gear and landing flap controls of many modern aircraft. These two controls, having very different functions, are sometimes placed very close together, and sometimes have their locations reversed on different aircraft.

In one instance a co-pilot recently transferred from one type of plane to another, was requested to raise the flaps after landing and, since the flap and landing gear switches were exactly reversed on these two planes, inadvertently activated the wrong control. The safety mechanism was defective, the landing gear retracted, and the plane broke in half on the field. In the United States Air Force, the inattentive manipulation or mistaken identity of those same two controls resulted in 547 recorded accidents during one 22-month period of World War II. Industrial machinery has, util very recently, rarely been designed, or evaluated, according to human engineering principles. (15)

Some general principles of human engineering that may be applied to the design of machine controls to eliminate error, accident and inefficiency are as follows: (1) always use as few controls and as few control movements as possible - consistent with maximum efficiency; (2) determine the best kind of control for a

specific task, i.e., foot or hand control stick or wheel, push button or toggle switch; (3) whenever possible place contr ls within the normal, confortable, reach area of the operator; (4) the direction of control movement should always be in the expected direction, i.e., up or clockwise for on, right for movement to the right, etc.; (5) the direction of movement should be consistent with the other characteristics of the control, i.e., some directions are superior to others when maximum force must be exerted, other directions would be preferable when speed is of primary importance; (6) the extent of control movement should never exceed the range of movement of operator; (7) the amount of resistance to control movement should never exceed the abilities of the weakest operator, -- but there should be enough resistance to discourage inadvertent operation; (8) the degree of precision with which a control can be operated should never exceed the operator's abilities, nor should the control be capable of finer adjustments than are necessary; the (9) size, (10) shape, and (11) orientation of the control should be compatible with maximum operational efficiency, i.e., ease of grasp and movement; (12) where necessary controls should be differentiated, as by shape, size, or color, to prevent mistaken or inadvertent operation; and finally, (13) where compromises on any of the above principles become necessary, they should be made on a priority basis with the most critical and the most frequently used controls given first consideration. (7)

V. The Use of Psychophysical Methods in Studying the Influence of Environmental Factors

In addition to the design of equipment in relation to human use, the human factors engineer should collaborate with the industrial hygienist in the control of environmental influences. This refers not only to illumination, noise and vibration, and temperature, but also especially to toxic agents in the environment.

The experimental psychologist and the industrial hygienist might collaborate to their mutual advantage in the use of psychophysical methods for the more precise determination of MAC (Maximum Allowable Concentrations) values. The fact that these values are so frequently revised suggest the need for more precision in their measurement for both animal and human subjects.

Carbon Monoxide and Altitude: The first example will be taken from the field of carbon monoxide determinations in relation to pilots and cigarette smokers. We became interested in this subject in establishing safe limits of CO in the cabins of aircraft. (14)

In the case of airmen, carbon monoxide may be absorbed from two main sources: engine exhaust gas and tobacco smoke. When carbon monoxide combines with hemoglobin, the oxygen-carrying capacity of the blood is reduced. Furthermore, carbon monoxide displaces the oxygen dissociation curve to the left, thus inhibiting the release to the tissues of even this decreased amount of oxygen. As a result, there is a marked lowering of the tissue oxygen tension. This would naturally accentuate the anoxia caused by exposure to high altitude. (13)

Theoretic considerations have led to the conclusion that the venous (or even tissue) oxygen tension, which is associated with the loss of a given percentage of the oxygen capacity of the blood due to saturation with carbon monoxide, is the same as that caused by a similar decrease in arterial oxygen saturation at

high altitudes. On this basis, 5 per cent saturation with carbon monoxide would be expected to have an effect equal to that of an altitude of about 8000 to 10,000 feet on those functions which depend on the tissue oxygen tension.

Earlier attempts to determine the least amount of carbon monoxide capable of producing impairment of psychologic functions yielded no clear results. Even with 30 to 35 per cent saturation, causing numerous subjective complaints, such as headaches, there was no clearly demonstrable impairment in various psychologic tests. This was probably caused by the fact that the tests employed were not sufficiently sensitive and that the subject could mask a considerable degree of impairment by exerting greater effort. In the measurement of visual sensitivity, on the other hand, compensation is not a factor. The subject merely reports whether or not he sees a flash of light and is unaware of the intensity required. The psychophysical Method of Limits was used to determine these thresholds.(14,16)

A series of experiments was carried out to determine the effect of carbon monoxide on visual thresholds, both in normal air and in combination with varying degrees of oxygen deprivation. The results were entirely consistent with the theoretic expectations. It was found, for example, that 5 per cent saturation with carbon monoxide depresses visual sensitivity to as great an extent as anoxia at 8000 to 10,000 feet altitude. Fifteen per cent saturation caused an impairment corresponding to that at about 15,000 to 19,000 feet. At various simulated altitudes, the addition of carbon monoxide, causing a given percentage of saturation produced an effect equal to that at an altitude sufficient to produce an additional loss of arterial oxygen saturation of the same amount.

The test proved to be so sensitive that even the effects of the small quantities of carbon monoxide absorbed from cigarette smoke were clearly demonstrable. Deep inhalation of the smoke from a single cigarette caused a carbon monoxide saturation of almost 2 per cent. After inhaling the smoke of three cigarettes, the saturation of the blood with carbon monoxide was approximately 4 per cent and the effect on visual sensitivity was equal to that at an altitude of about 7500 feet. The loss of arterial oxygen saturation at this altitude is about 4 per cent. The absorption of a similar amount of carbon monoxide at 7500 feet altitude causes a combined loss of sensitivity equal to that at 10,000 to 11,000 feet. (16)

The inhalation of oxygen and carbon dioxide was found not only to accelerate the elimination of carbon monoxide but also to produce an improvement in visual thresholds after inhalation. The improvement was equivalent to a decrease of about 5 to 7 per cent carboxyhemoglobin when breathing oxygen as compared with room air. If, instead of oxygen, the subject breathed atmospheric air throughout the recovery period, the visual thresholds failed to recover as rapidly as the percentage of carboxyhemoglobin declined.

These studies indicate that carbon monoxide at high altitudes may be harmful in much smaller amounts than previously supposed. The importance of guarding against the entry of exhaust gases into an airplane and of adequate removal of gases liberated by gunfire is therefore intensified. The importance of refraining from excessive inhalation of tobacco smoke and the importance of the use of oxygen in flight is obvious. Theoretic considerations had led to these same conclusions previously, but these studies represent an objective demonstration of the effects of small quantities of carbon monoxide.

Aging and Sensory Functions in Relation to the Environment: All of the senses manifest changes to some degree or extent with advancing age. Some are more important than others, depending upon the equipment to be designed or the tasks to be performed. In some occupations, adequate vision and hearing are of special importance and even small changes are significant, especially in the presence of pre-existing handicaps.

The changes in auditory acuity with advancing age are well known. In general, there is a definite but relatively small decrease in sensitivity, chiefly confined to the higher frequencies. If this fact is not appreciated by the designers of acoustical equipment older workers will be at a disadvantage and the useful lives of many employees will be shortened.

In the search for a sensitive test that might be used to measure the aging process light sensitivity was found to be one of the best. Previous investigations had revealed that light sensitivity is one of the most accurate for studying visual changes under conditions of oxygen want. Such tests will detect effects as low as 5 to 6,000 feet altitude. In the first experiment on 200 subjects varying in age between 20 and 60 years a correlation of 0.89 was found between age and in the final point of dark adoption, i.e., the older subjects were poorer on the test. The intensity of illumination at threshold levels had to be approximately doubled for each increase of 13 years of age. On the basis of the test results a person's chronological age could be predicted within ± three years. (14, 19)

A more extensive investigation was then planned using 240 subjects varying in age from 16 to 90 years. The result confirmed the previous findings. For example, at the second minute of the dark adaptation curve the very young subjects were almost five times as sensitive as the most aged and at the 40th minute the very young were 240 times more sensitive than the very old. The correlations between age and light thresholds at 2, 5, and 40 minutes were 0.71, 0.80, and 0.84 respectively. This appeared to give one of the highest correlations between age and any biological function. Obviously, placing a tinted windshield in front of a an older subject might be dangerous in driving at night. (25)

Subsequent investigations dealt with an analysis of rate of dark adaptation, as well as threshold as a function of age. Also a short test was developed so as to predict the final degree of dark adaptation at 30 - 40 minutes from the data obtained at thirteen minutes. Finally a mathematical model was derived representing dark adaptation as a function of age and time. (8)

In a related study of glare recovery and age it was found that the ability to see in the presence of a glare source provides another good test of the aging process. An increase in target luminance was necessary for detection with increasing age. A very dramatic discontinuity was revealed at age 40.

VI. Accidents, and Their Prevention in Industry

Another important area in which human factors engineering and biotechnology can assist the industrial hygienist concerns industrial safety. The mortality due to accidents is now greater among many segments of the peoples of the world than from disease. The World Health Organization reports that in 19 countries, with a combined population of 553 million persons, accidents caused more deaths

in 1958 than all infectious diseases and more than any single illness except cancer and cardiovascular disease. Motor vehicle accidents are the primary cause of these deaths. Approximately 100,000 persons are losing their lives each year from accidents on the roads alone. (21, 23)

In the United States a similar picture prevails. Deaths from accidents rank ahead of disease, except for certain of the degenerative diseases. About 90,000 persons are killed in accidents each year, about 400,000 are permanently disabled to some extent, and the number injured seriously enough to require the services of a physician, or disabled for more than a day is estimated to reach 47 million each year.

The accidental injuries and deaths occur chiefly on the highway, in the home, while persons are at work, or are engaged in recreational or other activities. It is of interest that the most striking advances in safety in the last 40 or 50 years have been made in the industrial accident field. In 1960, accidents at work contributed only 14.8 per cent of the total accidental deaths, and 20.7 per cent of the total of disabling injuries. Some industries have made greater improvements in safety than others. Between 1926 and 1957 the combined frequency rate of all the companies reporting to the National Safety Council dropped from 31.87 to 6.36. In the same period both the severity rate and the number of accidental deaths and total disabilities in relation to man-hours-worked declined by almost two-thirds. At present, in many companies the time lost from injuries which are incurred off-the-job now constitutes a greater problem than that lost from accidents in the plants. (22)

The specialized skills of safety engineering, human engineering, industrial hygiene, industrial medicine, have been developed as methods of preventing injury to the worker and of reducing costs. The first two attempt to reduce the number of injuries and disabilities in the occupational setting by removing their environmental causes, and the second two are concerned with minimizing the consequences of injury and disease and with restoring the disabled worker to useful employment.

Initially, the emphasis was on machine guarding and protective devices. This brought about a rapid decline in machine risks, and today they are less than half the number of 25 years ago. It became apparent that more could also be accomplished by stressing the application of basic safety engineering principles to the design of machinery, plant layout, and working methods, with safety considered an integral part of normal operating procedure, and not merely a desirable condition to be achieved by the safety engineer and the industrial hygienist alone. (17)

More recently, there has been a growing emphasis on personal factors, with a recognition of the importance of supervisory practices, and of the mental and emotional adjustments of the workers. This involves, for example, (1) the proper placement of employees, based on job analysis, (2) the evaluation of the functional capacities of the worker, (3) the control of the working methods and (4) a working environment which will insure the health maintenance of the workers.

Although great advances have been made in industrial safety, the rate of improvement has been slower during the past two decades, and there is reason to believe that some of the techniques may be reaching the limits of their effectiveness. It is likely that further gains may depend upon newer approaches, in addition to continued emphasis on traditional methods. It is becoming apparent that additional improvement will require more complete information on the interrelationships between the various factors involving the basic causes of accidents. In this approach it will be necessary to give joint consideration to the worker, his tools, materials and equipment, and his general work setting, including all of the environmental variables, both physical and social. It is possible that the next important advances may be made through the application of newer principles from the medical and behavioral sciences in collaboration with the discipline of human engineering. The biostatistician and epidemiologist can make important contributions in such an interdisciplinary approach. (21, 24)

VII. Summary

This report deals with the role of experimental psychology in human factors research (ergonomics) in industry. First, the general principles of human factors research was developed. Then, the usefulness of the techniques of psycho-physics and related disciplines was explored in regard to the integration of various sensory and mental functions with the design of dials, levers, and various types of instruments. By this method, it was demonstrated how the basic input and response characteristics of the human organism could be effectively related to the design and operation of equipment. Also, human variability, and the capabilities and limitations of performance, were taken into consideration. Examples from various industries were given to show how neglect of the human element in designing equipment result in costly redesign. Brief reference was made to the role of human factors in operational research and the design of more complicated systems.

Another area dealt with the way in which various types of equipment (if not designed on the basis of advance analysis of human requirements), may result in operating errors and serious accidents. Studies of critical incidents and accidents, therefore, may aid in identifying faults in design. Finally, the changes in capacities with advancing age was discussed as an area requiring further study if (1) design errors are to be avoided, and (2) the abilities of older workers are to be fully utilized. The objective of ergonomics is to insure that men are not required to carry out tasks which may be dangerous to their health and safety.

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DISCUSSION OF PAPERS ON ERGONOMICS

Douglas H. K. Lee, M.D.
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Division of Occupational Health
Public Health Service

It will be my purpose, not to repeat details or to attempt a summary of the two papers you have just heard, but to go behind the papers to an outlook and philosophy, if you will, which they both admirably exemplify, but which goes beyond the limits of the papers to the very structure of industrial hygiene.

The continued life and useful service of any professional group depend, not simply upon an effective application of existing knowledge, but equally upon an active advancement of knowledge, responsiveness to changing patterns in the community it serves, and intelligent anticipation of the challenges to come.

In each of the fields which make up a profession's area of responsibility, the current activities could be arranged in a sort of distribution curve, from routine service at one end to basic research at the other. Activity is seldom equally distributed over the curve, and with the passage of time, the activity in any one field tends to move away from research in the direction of application. If professional standing, vitality, and destiny are to be preserved, new fields must be developed in which the emphasis is first upon research, perhaps "blue-sky" research, out of which new competencies, new potentialities, and new knowledge will develop to give in time new services and new hope to the community it serves.

Occupational health has hitherto been largely concerned with specific, dramatic, and relatively gross diseases caused by single or a few related environmental factors. Today it must extend its concepts and activities in new dimensions. The laws governing the operation of physical and chemical environmental factors are fairly well established, although details remain to be worked out and new examples are constantly being created by the ingenuity of man. Without lessening our effort in ameliorating their incidence, we must now take cognizance of those environmental factors which are less understood, and of those degrees and types of bodily impairment which do not amount to frank clinical disease but nevertheless reduce the worker's health, efficiency, and welfare, and we must cope with the combined effect of multiple environmental factors.

We need to know much more about the nature, incidence, mode of operation, and ultimate effect of the numerous physiological, psychological, and social factors that are intrinsic in the work situation. We need to know how the effects of the non-work environment carry over into the work situation and affect the health and efficiency of the employee at work. Most will agree that the distribution curves of activities in these fields are at present skewed markedly to the research end, and that no more than the thinnest of tails reaches down toward routine application. Most will agree, also, that the total activity under the curve is still quite small in compaison with what we have seen for the study of infective, chemical and physical factors. Intensification of effort and application of the results are badly needed.

Today's speakers have demonstrated forcibly, and in some detail, what is known, what can be applied, and what needs to be done in two major new fields. They clearly believe that more intensive effort should be devoted to these fields, and would probably agree with me that, if industrial hygiene is to repeat

in the future the kind of success that it has had in the past, it must devote considerably more attention to new fields such as these.

The human body is a complex system of moving equilibria. None of us are quite what we used to be! The speed and direction of the movements, and their interactions, are modifiable by a wide variety of environmental circumstances. Health, efficiency, and self-realization are profoundly affected by the position of these equilibria. If we are to optimize these equilibria in the interests of health, we must understand their intimate structure and behavior; and for this modern science has placed in our hands tools and knowledge vastly more precise than any we dreamed of at the turn of the century, when occupational health started its upward surge. We can no longer content ourselves with the simple concept of man versus environment, or with a single disease produced by a single cause, we must view them as complexly interacting components of a single system -- man and environment. To individual investigators will remain the task of individual inquiries; but to the profession or science of industrial hygiene, the whole is vastly more important and greater than the sum of its parts.

This holistic point of view was expressed by Dr. Anderson at the beginning of the session. You will find it running as the connecting thread throughout the report of the Gross Committee, to which he made reference. You will find it in the staff paper prepared by the Division of Occupational Health. You will find it in the organization of the Bureau and Division. If I may summarize in one sentence the lesson propounded by all the speakers this afternoon, it is that the aim of industrial hygiene today is not merely to protect the employee from disease, but the much more positive one of maximizing his chances of a long, vigorous, healthy, and gratifying life. Our objective is the full man!

BUSINESS SESSION - May 14, 1962

Dr. William L. Wilson, Chairman, Presiding

The first business session of the American Conference of Governmental Industrial Hygienists convened in the Continental Room, Sheraton-Park Hotel, Washington, D.C., at 11:00 A.M., Monday, May 14, 1962, Dr. William L. Wilson, Chairman, presiding.

CHAIRMAN WILSON: Let us come to order please. Our first business session of the 24th annual meeting is now in session.

Before we start the routine here, Ed Baier and Pete Schall wanted me to show you this "Facts About Pure Chlorethylene Solvent Used in Coin-Operated and Commercial Dry Cleaning," published by the National Automatic Laundry and Dry Cleaning Council, and I would read these few lines addressed to you, but since enough copies will be made available by this Council, we plan to mail one copy to the head of each Industrial Hygiene Unit listed in our Division of Occupational Health Directory, and I won't take time to read it. After that, each unit head should accept responsibility for letting their own staffs know that other copies can be requested individually by addressing the Council. But each unit will receive one copy by mail.

Our order of business is to first announce the Resolutions Committee for the 24th Annual Meeting. This is Dr. Christine Einert, Chairman, Ron Bales, and Jim Barrett.

Now we will have the Report of the Secretary-Treasurer.

MR. HOSEY: Last year, Pete Yaffe told me I didn't know what I was letting myself in for when I agreed to have my name placed on the ballot for the office of Secretary-Treasurer of this Conference. At that time I thought Pete was being duly pessimistic as he normally is. However, I want you and Pete to know that I found out in the first few months just how much work is really involved in this job. In organizations such as ours, the membership often takes too many things for granted and does not realize the tremendous amount of effort expended by its officers. I want to take this opportunity to express my appreciation to all of the previous officers of ACGIH for their diligent efforts and the many hours spent in conducting the affairs of this Conference. I know that you can count on your newly elected officers to uphold the splendid traditions established in previous years and to serve the best interests of this organization during the coming year.

The following are a few highlights of our activities from the Secretary-Treasurer's point of view.

Our membership has continued to grow. You may recall Pete Yaffe telling you last year that our membership had increased about 85% during his six years as Secretary-Treasurer. I am happy to report that we now have 616 members -- a 100% increase over the past 7 years. However, according to a report by our Ad Hoc Membership Screening Committee, with Joe Flanagan as Chairman, our membership potential is much greater than at present. This Committee reviewed the Directory of Governmental Industrial Hygiene Personnel and checked the names against our membership booklet. They found that 58% of these persons are not members of ACGIH, even though they are eligible. In addition, a large number of industrial hygienists are employed by the Armed Forces, Universities, and in other countries, all of whom are eligible for full or associate membership. We need to encourage

these people to join ACGIH so I suggest that each one of you conduct a membership drive in your respective establishment.

In regard to finances, I will give a more detailed treasurer's report later. Let me point out at this time, however, that even though our income was about $1000 less this year compared with 1961, our net worth increased by nearly $2000 to $15,861.26. Last year we received nearly $5300 from the Ventilation Committee, whereas this past year we received about $2200. Jim Barrett will probably discuss this matter in his report. (A check for $1300 was given to the Secretary-Treasurer by the Ventilation Committee after this Report was presented.)

The volume of our correspondence and business transactions has continued to increase during the past year also. We have not kept track of the number of letters or publications mailed but I do know that our bill for postage and addressograph service is more than double the sum spent last year. Part of this increased cost is due to the fact that we have had to use the addressograph service for all membership mailings to relieve Genny so she could have more time to spend on other matters. Some of this expenditure was due to an increase in parcel post rates and the fact that we have distributed a greater number of publications than in any previous year.

In this connection, the new format for the Threshold Limit Values was apparently a hugh success because the sale of this publication last year amounted to $698.60, while this year it was more than doubled. Last year 25,000 reprints of the Threshold Limits were ordered from the AMA Archives of Environmental Health, whereas this year we had 36,000 copies printed, most of which were sold and our supply is now exhausted. At its meeting last year, the Executive Committee agreed that our Conference should print and copyright the Threshold Limit Values instead of ordering reprints as had been done during previous years. While we sold more copies of the 1961 TLV's, the printing costs were nearly 3 times those of last year. Part of this increased cost was due to the new format and the other reason is that we bore the printing costs.

Two new publications were completed this year. One is the "Process Flow Sheets and Air Pollution Controls" and the other is the 112-page "Documentation of Threshold Limit Values", which was prepared by the Committee on Threshold Limit Values. A third publication will be available shortly -- the revised edition of the Air Sampling Instruments manual, prepared by the diligent efforts of the Committee on Air Sampling Instruments, chaired by Mort Lippmann. Incidentally, even though we still have about 140 copies of the first edition left, we recovered all our costs and cleared about $2,000 during the past two years.

The AIHA-ACGIH Joint Committee on Respiratory Protective Equipment has completed most of its work on the "Respiratory Protective Devices Manual." This Committee, most of whom are experts in this field, have spent several years compiling information, preparing and editing drafts for the Manual, and in making numerous revisions. The completed Manual, to be published this year, should prove to be an excellent reference source in this field. You may recall that ACGIH will share with AIHA on a 50-50 basis the costs and profits from the sale of this Manual.

Our Committee on Industrial Hygiene Codes and Regulations, under the able chairmanship of Ed Baier, completed a Proposed Code on Coin-Operated Dry Cleaning Establishments. This proposed Code appears on page 93 and extra copies should be available for sale within the next few months.

Speaking of Committees, and parenthetically let me state that the work done by the members of these committees is a true measure of the value of an organization like ours, we now have or have proposed a total of 20. In addition to these 20 Committees in ACGIH, we have two Joint AIHA-ACGIH Committees, namely the American Board of Industrial Hygiene and Respiratory Protective Equipment; we have 19 representatives on various ASA Committees and 2 on ASTM Committees; and a representative on the APHA Intersociety Committee on Air Sampling and Analyses. As a result of a September meeting, attended by 4 Past Chairmen, 2 former Secretary-Treasurers and other interested persons, a number of new committees were formed to study the various problem areas discussed.

Last year's Conference was a high success and reflected the excellent and hard work done by the various Convention Committees. From all indications, the meeting this year will prove to be even more successful. I wish to express my appreciation to all of those who worked long and hard to take care of our interests and needs during this meeting.

This concludes the Secretary's report. Unless there are questions, I will proceed with the Report of the Treasurer. Are there any questions on this?

(No response.)

MR. HOSEY: The report of the Treasurer is as follows:

Statement of Financial Transactions
Fiscal Year 4/1/61 to 3/31/62
American Conference of Governmental Industrial Hygienists

Cash Receipts		
Sale of Analytical Methods (Published 1958 & Supplement 1961, Expensed 1958 & 1961)	$ 290.00	
Received from Ventilation Committee from Sale of Ventilation Manuals	2,222.00	
Sale of Guide to Uniform Ind.Hyg.Codes or Regulations & Supplements	15.75	
Sale of Guide to Health Services (Published 1960 & expensed 1960)	84.25	
Sale of 1961 Transactions	65.00	
Sale of Trade Names Index & Supplement (Published 1955 & expensed 1955. Supplement published 1959 & expensed 1959)	90.00	
Sale of Air Sampling Instruments (Published 1960 & expensed 1960)	3,150.80	
Sale of Threshold Limits for 1961	1,583.67	
Sale of Documentation for Threshold Limits	52.00	
Sale of Process Flow Sheets & Air Pollution Controls (Published 1961 & expensed 1961)	5.00	
Membership Dues	1,101.40	
Share of Profit on 1961 American Industrial Hygiene Conference	547.50	
Total Cash Receipts		$ 9,207.37

Cash Disbursements

Travel & Hotel Expense for Secretary-Treasurer to 1961 Conference	$ 216.64	
Miscellaneous 1961 Conference Expenses	384.95	
Printing - Transactions	663.27	
Printing - Membership Booklet	505.22	
Printing - Method for Analytical Manual	485.13	
Printing - Flow Diagrams	62.33	
Printing - Air Sampling Brochure & Advertising	471.83	
Printing - Threshold Limit Values	1,540.41	
Merit Award Expense	17.96	
Binders for Analytical Manuals	191.10	
Stationery	393.48	
Committee Meetings Expense	1,256.23	
Copyrights	8.00	
Surety Bond for Secretary-Treasurer	61.50	
Audit of Books	25.00	
Postage, Addressing of Membership Service & List Maintenance	1,177.42	
Misc. Office Expense	11.43	
Total Cash Disbursements		$ 7,471.90
Excess Cash Receipts over Cash Disbursements		1,735.47
Add: Cash Balance 4/1/61		8,419.56
		$10,155.03
Deduct: Transfer to Savings Account 8/11/61		4,000.00
Cash Balance in Checking Account 3/31/62 (The Provident Savings Bank & Trust Co., Cincinnati, Ohio)		$ 6,155.03

Savings Account

Cash Balance Savings Account 4/1/61	$ 5,519.42
Cash Transfer from Checking Account 8/11/61	4,000.00
	$ 9,519.42
Interest Earned on Savings Account	186.81
Cash Balance Savings Account 3/31/62	$ 9,706.23
Total Cash Available 3/31/62	$15,861.26

AUDITOR'S CERTIFICATE

I have examined the Statement of Financial Transactions for the fiscal year 4/1/61 to 3/31/62 of the American Conference of Governmental Industrial Hygienists as submitted by the Secretary-Treasurer of the organization.

In my opinion the above statement presents correctly the financial transactions for the above organization for the period as stated.

/s/ Charles Gehler
Certified Public Accountant
1801 Carew Tower
Cincinnati 2, Ohio

April 23, 1962

CHAIRMAN WILSON: You have heard the report of the Secretary and Treasurer. Do I hear any motion to acceptance and approval of this report?

MR. DOYLE: I so move.

CHAIRMAN WILSON: It has been moved that this report be accepted.

VOICE: Second

CHAIRMAN WILSON: All in favor say "aye." (Chorus of "aye's.") Opposed. (No response.) Carried.

Did you have a separate Report of the Executive Committee?

MR. HOSEY: Yes, sir.

The Executive Committee met at the Sheraton Park Hotel in Washington, D.C. on May 12 and May 13. All members of the Committee and in addition the Chairman-Elect, attended the meetings on Saturday; and all but the Chairman-Elect, who had a previous commitment, attended Sunday's meeting.

The Executive Committee also held a meeting in Baltimore, Maryland last September, where a number of important matters were discussed and appropriate action taken. Many of these items concerned arrangements and other matters relating to this year's Conference.

As a result of our deliberations, the following actions are presented for your consideration and approval:

1. The 1963 Conference will be held at the Sheraton-Gibson Hotel in Cincinnati, Ohio May 6 through May 10, 1963.

2. A Resolutions Committee was appointed consisting of Dr. Chris Einert, Chairman, Jim Barrett and Ronald Bales.

3. The minutes of the Executive Committee meeting held in September, 1961, were reviewed and it was decided that no further action was necessary. These were approved.

4. The following letter was prepared Saturday afternoon and transmitted in person to the Board of Directors of AIHA, which was also in session:

"The American Conference of Governmental Industrial Hygienists and its Executive Committee have understood and have been sympathetic with the American Industrial Hygiene Association's mutual problems of scheduling our annual meetings at Detroit in 1961 and Washington in 1962.

"It is our understanding that similar problems will not exist in planning our annual meetings at Cincinnati in 1963 or in future years, wherever we might meet together.

"The Executive Committee of ACGIH will appreciate consideration by the American Industrial Hygiene Association's Board of Directors in order that positive reassurance will be given to the 1963 Conference Planning Meeting to be held immediately following the Exhibitor's breakfast on Thursday, May 17, 1962."

"Beginning in 1963, the ACGIH will anticipate exclusive utilization of the first and a half of the second Conference days for its meetings and look forward with pleasure to a joint meeting with AIHA on the afternoon of the second Conference day. In the present arrangement, we would expect this to involve Monday and Tuesday of the Conference week.

"Turning now to the more distant future, the ACGIH Executive Committee proposes your consideration of the earliest feasible scheduling end to end meetings of ACGIH, AIHA and some organized industrial medical group or other appropriate professional group. The purpose of such end to end meeting with a medical group would be to satisfy the membership of ACGIH and not in any way to separate the pleasant relationship with AIHA."

5. The Report of the Committee on the Guide to labeling of Hazardous Materials was received and discussed. The proposed draft was contained in the 1959 Transactions but a final draft was never presented to the Executive Committee for action. A further check will be made with the Chairman of the Committee to determine if a final draft is available before any action will be taken.

6. The advisability of incorporation of ACGIH was discussed. After due deliberation, it was agreed to table this matter for the present.

7. The advisability of establishing a Committee on Public Relations was discussed. No action was taken, since there was no need for such a Committee at this time.

8. Regarding the matter of publishing codes or guides, it was agreed that these should be sent to the membership for consideration at least two months before the annual meeting. The proposed Guide for Industrial Hygiene Codes or Regulations for Coin Operated Dry Cleaning Equipment will appear in this year's Transactions. Comments from the membership should be directed to the Chairman of this Committee, Ed Baier. The Executive Committee approved this proposed Code in principle.

9. In view of the increased costs involved in ACGIH publishing and copyrighting the Threshold Limit Values, it was decided that the price of these booklets be increased slightly. A new price list of all of our publications will be prepared and will be available to the membership and other interested persons.

10. A number of requests were received during the past year from various sources for permission to reprint our Threshold Limit Values for 1961. Due to the misunderstanding concerning the term Threshold Limit Values and Maximum Allowable Concentrations, it was agreed that in all future requests for reprinting these Values, the Preface of our List should be included.

11. A lengthy discussion ensued concerning expenses for various Committee meetings. The Secretary-Treasurer was instructed to ask the Chairman of each Committee to submit a budget. This applies only to those Committees who anticipate that travel or other expenses will be incurred as a result of the Committee activities.

12. The advisability of establishing Local Chapters of ACGIH was discussed. This proposal will be submitted to the membership for approval.

13. Applications for membership were approved for 15 full members and 3 associate members. Due to a change in occupation, one full member was changed to an associate.

14. The Secretary-Treasurer's Report was read and accepted with minor corrections.

15. The Secretary-Treasurer was instructed to write to those members whose dues are delinquent asking them if they wish to continue their affiliation in our Conference.

16. It was agreed to reimburse AIHA in the amount of $11.00 for each wife of an ACGIH member only who participates in the Ladies' Entertainment Program.

17. During the past year a number of new Ad Hoc Committees were appointed by the Chairman. The following action was taken on each of these:

    A. Ad Hoc Committee on Constitution and By-Laws - This was established as a permanent Committee with Dr. W. L. Wilson as Chairman.

    B. Ad Hoc Committee on Legislation - It was agreed that this will continue as an Ad Hoc Committee with Norman Schell as Chairman.

    C. Ad Hoc Committee on Trade Names Index - The Report of the Committee was accepted and it was agreed to establish this as a permanent Committee.

    D. Ad Hoc Committee on Occupational Health in the Future - No report was received so this Committee was discontinued. (See comments by Mr. Doyle following this report.)

    E. Ad HocCommittee on Minimal Standards for On-the-Job Medical Services continues as an Ad Hoc Committee and Lynn Schall will name its members later.

    F. Ad Hoc Committee on Qualifications for Membership - The 1961 Report of this Committee was reviewed and accepted as well as the Report of the Membership Screening Committee. The Ad Hoc Committee was discharged but a Membership Screening Committee will be appointed.

18. The Chairman of the Air Sampling Committee, Mort Lippmann, appeared before the Executive Committee and presented a brief report of that Committee's actions during the past year. A revised edition of the Air Sampling Manual will be available for sale in the near future. A tentative price was established at $8.00 for the paper cover and $9.50 for the hard cover. The Committee was allowed up to $650 for advertising this new Manual. Individual instrument write-ups and reprints of the papers will be made available to the authors and contributors at a nominal charge on pre-order.

19. The Executive Committee agreed that persons who are not members of ACGIH are not eligible to serve on any of our committees. However, Committee Chairman may feel free to ask certain qualified people to serve as consultants to the Committee.

20. The Secretary-Treasurer was instructed to advise the Chairman of each Standing Committee and Ad Hoc Committee that all appointments to these Committees should be submitted to the Executive Committee for approval at the annual meeting. Interim appointments should be submitted to the Chairman of ACGIH for approval.

21. Reports of Standing Committees and reports of representatives on other Committees such as ASA and ASTM were reviewed and appropriate action taken where indicated.

22. The membership of each Committee were reviewed and new appointments made where indicated. These will appear in the Membership Booklet and Transactions.

23. Dr. W. Clark Cooper, Acting Chief of the Division of Occupational Health, met with the Executive Committee during dinner and for a short period afterwards for informal discussions with the group.

24. Mr. Harry Ashe also met with the Committee to discuss a proposal for the formation of a Committee on the Evaluation of Dust Exposures and Effects Upon the Exposed Workers. The ultimate aim of this Committee will be an International Exploration which will attain uniform standards, techniques and interpretations. The Executive Committee heartily endorsed this proposal and will appoint a permanent Committee, the members of which will be announced later. (This Committee was appointed at the Executive Committee meeting on Tuesday morning and its members are listed in the Transactions and Membership Booklet.)

The following Committee Reports were reviewed and any necessary action is indicated at the end of each report:

Report of Committee on Agricultural Health

(No report presented)

Report of Committee on Air Pollution

The Air Pollution Committee has continued on its project of preparing process flow diagrams which pertain to specific industrial processes. Sources of air pollution are detailed and methods of control both in actual use and recommended, are noted. Also included in the accompanying text are up-to-date reference sources.

Although all committee members received assignments the press of other activities has slowed up completion of the work. Presently, the committee has one flow diagram to submit with its report. It is on the "Milling of Asbestos Ore" and is a thorough treatment of the process.

Several years ago it was thought that the committee should prepare a manual on air pollution sampling equipment. The idea was dropped because it represented some duplication of the work of other committees and in a sense paralleled an A.S.M.E. publication. There has been much recent progress in the development of instrumentation for air pollution measurement and control purposes and the committee feels that the manual idea should be re-evaluated with the thought of undertaking such a project.

As in past years, the committee welcomes comment on its activities from the membership at large.

Respectfully submitted,

Bernard D. Bloomfield, Chairman
John M. Brown
Raymond Smith
William A. Munroe
George W. Walsh
Norman E. Schell
Charles R. Ross

(Report accepted -- no action indicated)

Report of Air Sampling Instruments Committee

The Air Sampling Instruments Committee has been very active since last April, primarily with the promotion of sales of the first edition of the "Air Sampling Instruments" Manual, and the preparation of the revised second edition.

Promotional activities have included:

1. Obtaining book reviews in additional journals.
2. Placing sales promotion notices at no cost in journals, including the "American Industrial Hygiene Association Journal" and "Air Conditioning, Heating and Ventilating."
3. Placing our sales brochure in the mailings of cooperative organizations, including the American Industrial Hygiene Association and the Association of Casualty and Surety Company's.
4. Sending letters to all graduate schools teaching industrial hygiene and air pollution, encouraging student sales.
5. Advertising in Journals. Our ad has appeared in:

"National Safety News" - August 1961
"Health Physics" - August 1961
"Annals of Occupational Hygiene" - September 1961
"International Journal of Air Pollution" - September 1961
"Air Engineering" - October 1961 through January 1962

This promotional campaign has been successful. Between last year's meeting at Detroit last April and April 4 of this year, 478 manuals were sold, bringing total sales to 830. Income from sales for this period was $3,150.00, bringing the total income to $5592.40. Total expenses incurred in producing, promoting, and distributing the first edition to April 4, 1962 were $3,503.68, producing a net profit to the Conference for the manual of $2,088.72.

Of special interest in the sales figures are the large number of foreign purchasers. During the first year (April 1960 to April 1961) 34 copies of 352 were sold to foreign purchasers. This past year, it was 59 of the 478. With the increased coverage of instruments from foreign sources in the new edition, we should increase foreign orders still further.

The Committee has completed its work on the second edition and hopes to publish it in time for distribution at the annual meeting in Washington. The manual has been greatly improved as a reference source by the addition of much new introductory material, including three new introductory articles, eight new introductions to the various instrument categories, and an appendix of tabular information. Each article and introduction occupies about five to ten manual pages.

Forty-nine instrument descriptions have been retained from the first edition with no change or only minor changes, while 22 have been extensively rewritten. In addition, this edition contains 82 new descriptions, many of which cover a number of different, related instruments.

A major improvement initiated in the second edition is the inclusion of a comprehensive technical discussion at the beginning of each instrument grouping. These section introductions, each written by an authority in his field, provide

the reader with the background necessary for the efficient utilization of the instruments described in the latter parts of the sections. They cover the inherent capabilities, sensitivities, advantages, and limitations of the methods themselves, as opposed to the properties of the instruments.

As in the first edition, technical discussions of the principles and usage of air sampling and air sampling instruments are presented in Part A. Three new discussions have been prepared specifically for this edition. Another innovation is the inclusion of an appendix of tabular data useful to industrial hygienists.

Committee activities for the forthcoming year will center upon promoting sales of the new edition and the orderly acquisition of a data file for use in the preparation of future editions.

Respectfully submitted,

Morton Lippmann, Chairman
Paul E. Caplan
Irving H. Davis
Edwin C. Hyatt
Herbert H. Jones
Francis P. Jung
Howard L. Kusnetz
Victor E. Lavetter
Grant H. Vance

(Report accepted - see item 18 of Executive Committee Report for action taken)

Report of Committee on Awards

As Chairman of the Awards Committee, I regret that the Committee could not reach reasonable unanimous agreement in the naming of a recipient for the 1962 ACGIH meritorious service award. Therefore, as Chairman, I recommend to the Executive Committee that no award be given this year.

Jack Baliff, Chairman
Victoria M. Trasko
Lewis Weller
Elizabeth Neubert
Dr. Irma West

(Report accepted - no action indicated)

Report of Committee on Epidemiology of Occupational Disease

(No report received)

Report of Committee on Industrial Hygiene Codes and Regulations

The task of completing a previous assignment, that of developing a uniform guide for industrial plating, cleaning, and degreasing in open tanks, was undertaken by this Committee. A draft of this guide had been prepared by a previous committee, several members of which comprise the current committee.

The draft was circulated to representatives of industry, training institutions, and governmental agencies for comment. Comprehensive comments were received from approximately two dozen sources. These comments were reviewed by

the present committee and, since a similar code, ASA Z9.1 bore a close resemblance to the Committee's proposed guide, the project was abandoned. Incidentally, portions of the Z9.1 code are contained in the appendix of Industrial Ventilation, a Manual of Recommended Practice, published by this Conference.

Because of these factors, the project was discontinued and the Committee was polled in order to develop another project. This activity resulted in the development of a guide for coin-operated dry cleaning establishments.

Committee members wrote to all States in order to obtain existing and proposed regulations and legislative acts concerning coin operating dry cleaning. The information obtained was then assembled and a proposed draft prepared. Following comments and revisions, a final draft was completed and forwarded to the Executive Committee, ACGIH, for adoption.

The final draft differs from most existing regulations in that the criteria are based on performance, rather than on ventilation rates, per se.

This draft has been reviewed by representatives of the National Automatic Laundry and Cleaning Council who are in accord with its provisions. They have stated, "I know that all of us were very impressed with the approach of your Committee to this problem and feel that the proposed code is a real step in constructive legislation."

The Committee is currently working on a revision of "A Guide for Uniform Industrial Hygiene Codes or Regulations" which was issued by the ACGIH in April 1949. This draft has been circulated to the committee membership and all comments have been received. The course of action to be followed will depend largely on guidance received from the Executive Committee, ACGIH.

E. J. Baier, Chairman
L. J. Proulx
R. L. Harris
C. F. Berghout
C. R. Jensen

(Report accepted - the following proposed Guide is hereby referred to the membership for comments, which should be directed to the Chairman of this Committee before November 1, 1962. If no adverse comments are received by that time, the word "Proposed" will be deleted and the Guide will become effective.)

PROPOSED

A GUIDE FOR UNIFORM INDUSTRIAL HYGIENE CODES OR REGULATIONS FOR COIN-OPERATED DRY CLEANING ESTABLISHMENTS

The ACGIH Committee on Industrial Hygiene Codes has issued four supplements to the "Guide for Uniform Codes or Regulations." They are:

1. "Uniform Industrial Hygiene Code for Dry Cleaning Operation", October 1950.
2. "A Guide for Uniform Industrial Hygiene Codes or Regulations for the Use of Fluoroscopic Shoe Fitting Devices", July 1951.
3. "A Guide for Uniform Industrial Hygiene Codes or Regulations for the Use of Radioactive Static Eliminators", January 1953.
4. "A Guide for Uniform Industrial Hygiene Codes or Regulations for Industrial Spray Coating", September 1958.

Your Committee on Industrial Hygiene Codes now believes that a code for coin-operated dry cleaning installations is needed to provide guidance in minimizing hazards to workmen and to the general public.

Coin-operated dry cleaning establishments.

Section 1. Scope and Purpose

These regulations are for the protection of workmen and the general public from vapors and mists of solvents used in, released from, or disseminated by coin-operated dry cleaning machines.

Section 2. Definitions

"Coin Operated Dry Cleaning" is the business or process of cleaning wearing apparel, cloth, fabrics, and textiles of any type or kind, by immersion and agitation, or immersion only, in a non-aqueous solvent applied by means of a mechanical appliance which may be loaded, activated, or unloaded by the customer.

"Establishment" is any premise for public use of one or more coin-operated dry cleaning machines.

"Customer Area" means the area of an establishment which is available to customers in order that they may make use of a coin-operated dry cleaning machine.

"Maintenance Area" means those portions of an establishment in which all working or mechanical portions of the dry cleaning appliances and appurtenances, except the customer side of the appliances, are accessible.

Section 3. General Requirements

(a) No person shall erect, construct, maintain, or operate any establishment except in accordance with the provisions of this regulation.

(b) No establishment shall be operated or maintained in any basement, cellar, or other space below the ground level, or in any story above the first story in any building, unless approved by agencies concerned with proper safeguards to public health and safety.

(c) No building containing an establishment shall be used for any other purpose than commercial operation. It shall not be used for occupancy as an apartment or other dwelling unless approved by agencies concerned with proper safeguards to public health and safety.

(d) Enclosures for a steam boiler, furnace, steam generator, or open flame burner shall not be interconnected with dry cleaning machine enclosures and must obtain air for combustion from the outside atmosphere or other areas, but not from the dry cleaning machine enclosure.

(e) Only the solvent for which the equipment was designed shall be used. Each solvent container shall bear a label specifying the contents. A trade name alone is not considered in compliance with this requirement.

(f) The dry cleaning units shall be so designed that they are inoperable from their front if loading doors are open. Furthermore, such dry cleaning devices shall be so designed that the loading doors cannot be opened during the normal operating cycle, nor during an abnormal interruption thereof due to electrical, mechanical, or power failure. Each dry cleaning unit shall have a drying cycle of sufficient duration to prevent the opening of the loading doors until after all cleaning solvent has been removed from the cleaned items within the unit.

(g) No solvent shall be settled or stored in any open or unprotected vessels or tanks.

(h) All transfers of solvents shall be effected through continuous piping and all pipe connections or threaded joints shall be made with a suitable sealing compound and all outlets or drain lines shall be drained to settling or storage tanks. Daily make-up solvent may be transferred from storage to machine using flexible solvent resistant tubing or in a covered container rather than through continuous piping if maintenance area ventilation described in Section 4(e) is in effect during transfer.

(i) The discharge of lint to the outside atmosphere shall be prohibited.

(j) Filter residue and other residues containing solvent shall be stored in suitable covered containers and disposed of in accordance with existing disposal regulations. Containers shall be locked if stored outside of building.

(k) Properly fitted respiratory protective equipment of adequate capacity approved by the U. S. Bureau of Mines for protection against organic vapors shall be provided for maintenance personnel and must be kept in good repair and available for immediate use. It shall be used as required.

Section 4. Installation and Operation Requirements

(a) Only the front or customer side of the dry cleaning machine shall be exposed in the customer area. Access doors to the maintenance area shall be kept locked.

(b) The maintenance area shall be separated from the front of the machine by suitable partitions.

(c) As a means of minimizing any solvent build-up in the customer area and also to control any minor solvent leakage, mechanical exhaust ventilation shall be installed to maintain air concentrations of the solvent at less than 0.4 of the applicable Threshold Limit Value established by the American Conference of Governmental Industrial Hygienists in the customer area.

This exhaust ventilation shall be provided on a continuous basis while the establishment is open for business. The fan motor wiring shall be such that the dry cleaning equipment cannot be operated unless the fan system is in operation.

Although the performance criterion above may be met, in a well-maintained and properly-operated establishment, by considerably lower ventilation rates, the following are offered as the maximum which should be necessary:

No. of Machines	Air Flow Rate Per Machine (cfm)
1 - 3	500
4 - 8	400
9 - 16	375
17 or more	360

(d) Grille openings are to be installed in the partition to facilitate air movement and should be sized on the basis of 500 cfm per square foot of net grille area. Grilles shall be placed as close to the machines as possible, preferably near the base or just above the machines.

(e) One or more general ventilation fans, wired independently, shall be provided to exhaust air from the maintenance area to the outside in the event of accidental solvent vapor dispersion. Air Flow of at least 1000 cfm per machine shall be exhausted when these fans and those required by Section 4(c) are operated simultaneously.

(f) The cleaning equipment must be provided with an exhaust system which maintains a minimum of 100 feet per minute face velocity through the loading door whenever the door is open. The ductwork connections from this system must be sealed (soldered or taped) and the discharge stack extended to a height above the highest point of the roof line.

(g) A satisfactory means of preventing liquid leaks from escaping the enclosure must be provided. This shall include some method of "diking" the floor of the enclosure or machine base to hold a liquid volume equal to the maximum quantity of solvent which might possibly escape from a single system. Some means must be provided for draining solvent in the event of a leak and containment. This can be done by gravity flow with the solvent transferred to a standby holding tank. This tank shall be vented to the outside.

(h) The establishment shall be checked twice weekly and kept in good repair. All maintenance personnel must be familiar with necessary machine repairs and instructed as to the solvent hazards.

(i) A supply of make-up air (heated to at least 60°F.) equal to or greater than the total volume of air exhausted from the plant shall be provided in order to eliminate any negative pressure conditions which might otherwise develop. The emergency ventilation capacity required in Section 4(e) need not be considered as part of the total volume of air exhausted from the plant.

(j) Exhaust ventilation stacks from dry cleaning machines shall be located as far as possible from combustion air or dryer air intakes. (The concentration of solvent vapor in combustion air shall not exceed 5 parts per million parts of air).

(k) Use of devices or substances which are intended to mask the solvent odor shall be prohibited.

(l) Detailed installation, operation, and maintenance manuals for equipment must be made available to authorized representatives of agencies having jurisdiction over the installation.

Report of Committee on Industrial Ventilation

The Committee is pleased to report that this has been another busy and rewarding year.

We would like to acknowledge the continued enthusiasm and cooperation of the Conference members which have been a tremendous asset in publicizing the manual. In this last fiscal year, 4,443 manuals were distributed in the United States, Canada, and other foreign countries making this the best record ever. Making this possible was the sale of 1,600 copies of the manual to the Cleveland, Ohio chapter of the Sheet Metal Contractors Association. This chapter and other branches of the Association have found the manual invaluable as a guide to good ventilation practice for fabrication of industrial ventilation.

Other sales included the Industrial Ventilation Conference at Michigan State University and at North Carolina State College and the coming Industrial Ventilation Conference at Seattle. It is gratifying that these conferences and trade associations are helping us to distribute the manual into the hands of persons who are in need of practical design information.

The 7th edition of the manual is available for distribution; it includes many improvements and new data that were not available in the previous years. As before, your Committee continues to revise and edit the existing manual and add new design data as it becomes available to continue to keep the manual as a practical up-to-date reference.

Due to the press of publication this year, it has not been possible to devote as much time as we would have liked to the development of a Spanish language version of the manual. It is hoped that this next fiscal year will offer us the opportunity to devote the necessary time and attention to this very worthwhile project.

Attached to this report is a certified audit of our Committee accounts.

We trust that the membership will find that our Committee has been actively carrying out our charge to disseminate information about practical industrial ventilation. We hope also that the membership will continue to guide our activities and provide us with suggestions and useful data for further improvement of the manual.

James Barrett, Chairman
Howard Ayer
Benjamin Feiner
George Hama
John Lumsden
Jack Wunderle
Marvin Schuman

COPY

April 20, 1962

Mrs. Arlyn Donovan, Secretary
Committee on Industrial Ventilation
P.O.Box 453
Lansing, Michigan

Dear Mrs. Donovan:

I am enclosing a Statement of Assets, Liabilities, and Net Worth for the Committee on Industrial Ventilation as of March 31, 1962, and an Income and Expense Statement for the year ended March 31, 1962, summarized from your records.

The records were well kept by the secretary during the year, and improvements have been made in the coordination of inventory records with receivables, and in substantiating petty cash expenditures. I vouched recorded receipts and disbursements.

Respectfully submitted,

/s/ Charles Lawrence
Certified Public Accountant

Committee on Industrial Ventilation
American Conference of Governmental Industrial Hygienists
Statement of Assets, Liabilities and Net Worth
March 31, 1962

Assets

Cash:		
Cash in Bank	$ 4,655.12	
Savings account	2,202.96	$ 6,858.08
Accounts receivable:		
Current	1,054.30	
Past due	606.00	1,660.30
Inventory:		
Paper	3,914.90	
Cloth	166.00	
Calculation Sheets & Supplies	354.66	4,435.56
Total Assets		$ 12,953.94

Liabilities and Net Worth

Accounts Payable:		
Withholding taxes payable	87.98	
Printer's invoices payable	354.66	442.64
Net Worth:		
Balance, April 1, 1961	11,204.99	
Increase for the year	1,306.31	12,511.30
Balance, March 31, 1962		$ 12,953.94

Committee on Industrial Ventilation
American Conference of Governmental Industrial Hygienists
Statement of Income and Expenses
for Year Ended March 31, 1962

Sales of "Industrial Ventilation" and calculation sheets		$ 12,802.10
Cost of materials sold		5,631.10
Gross profit		$ 7,171.00
Expenses:		
Secretarial	$ 1,643.51	
Advertising	927.43	
Postage	432.57	
Committee expense	341.19	
Office supplies and expense	219.75	
Accounting services	100.00	
Adjustments to accts. receivable	21.00	3,685.45
		3,485.55
Interest income on savings account		48.84
Remitted to ACGIH		2,228.08
Increase in net worth		$ 1,306.31

(Report accepted - no action indicated)

Report of Committee on Ionizing Radiation

(Report accepted - See page 113)

Report of Committee on Recommended Analytical Methods

During the past year, the Method for the Determination of Cadmium in Air, a Monocolor Dithizone Method, was distributed in mimeographed form to the State and local occupational health agencies and in printed form to previous purchasers of the Manual of Analytical Methods. This Method had been refereed by Mr. D. E. Rushing, U.S. Public Health Service.

A Method for the Determination of Composition of Solvents, refereed by Mr. D. E. Van Farowe, Michigan State Department of Health, has been approved by the Committee. After final editing, copies of the Method will be distributed. Approval of this Method brings the total of the recommended Methods to 13.

Progress has been reported by Dr. B. E. Saltzman, the referee for nitrogen dioxide, in the development of an accurate NO_2 generating system which would be duplicated for each of the collaborating laboratories. Present activities by the referree on this assignment include the refinement of a method for the analysis of tank mixtures of NO_2 in air.

In April 1961, a 2-page questionnaire was sent to the State and local occupational health agencies. The first page was designed to obtain information on the experiences with the methods which had been recommended to that date. The

second page was designed to solicit suggestions for additional methods needing evaluation and recommendation and also to solicit volunteers to serve as referees and collaborators on these additional methods. Returns were made by 33 agencies, of whom only 8 stated that they were unable to participate. The reasons given ranged from a complete lack of laboratory facilities to current shortage of personnel, with the hope that participation would be forthcoming when the indicated situations improved. We wish to thank all of you who responded to this questionnaire and provided the information needed to guide the future program of the Committee. Your suggestions for additional referee activity are receiving our attention, now that we have received a sufficient number of returns to guide us in planning new assignments.

With regard to reports on the performance of the present group of recommended methods, the consensus is that most of the methods have been found to be satisfactory, while certain procedures might well be substituted, after adequate testing, for two or three of the older methods for which improved specificity and sensitivity are required, i.e. nitrogen oxides, mercury, and sulfur dioxide (polarographic method).

The Chairman of the Committee was appointed by the Chairman of the Conference to represent the ACGIH on the Intersociety Committee on Air Sampling and Analysis. A report on the proceedings and progress of the Intersociety Committee's Meeting held in Washington, D.C., on May 1, 1962, has been sent to the Executive Committee of the Conference. The ACGIH representative to the Intersociety Committee will work for the interests of the Conference, as well as the intersociety group, on this assignment.

Respectfully submitted,

Robert G. Keenan, Chairman
Martin W. Jeremias
J. Lloyd Monkman

Leonard D. Pagnotto
Harry E. Jaworski

(Report accepted - no action indicated)

Report of Committee on Standard Labeling Procedures

There has been considerable activity in the field of labeling of hazardous materials in the past year.

The LAPI Committee of the Manufacturing Chemists' Association has issued the sixth edition of its Guide to Precautionary Labeling of Hazardous Chemicals. This manual gives, as it has in previous editions, recommendations for the labeling of many pure substances, but is still inadequate as a guide for the labeling of many industrial mixtures.

The U. S. Department of Health, Education, and Welfare has issued a set of Regulations under the Federal Hazardous Substances Labeling Act. It is our opinion that the Regulations with their amendments have helped strengthen the original Act. However, this Act specifically excludes the coverage of industrial materials.

In its 1961 report, this Committee pointed out that its effectiveness is very low in the absence of its being permitted to sponsor legislation and to

testify at legislative hearings. The Conference has recently appointed an Ad Hoc Committee on Legislation and Regulations. It may be expected that that Committee will make some recommendations which may comply with our request for a ruling on that matter.

Hervey B. Elkins
Joseph E. Flanagan, Jr.
Kingsley Kay
Samuel Moskowitz, Chairman
John Soet
Herbert E. Stokinger

(Report accepted - action by Executive Committee was deferred until such time as a final draft of the 1959 Proposed Guide on Labeling of Hazardous Materials is received.)

Report of Committee on Threshold Limits

The membership of the Committee has been enlarged to 14, from its previous number of 8, to help meet the growing complexities of the Committee's work. Members were selected to serve on the basis of their experience and interests, and as far as possible on a regional basis.

The plenary committee held a 2-day meeting in Washington, D.C. in February, from which the following actions were taken: Nine revisions and 11 additions will appear in the 1962 list of threshold limit values. The most important revision has been the adoption of the formula $\frac{250}{\%SiO_2+5}$ for calculating the limit of crystalline silica (quartz and cristobalite). The formula permits determination of the limiting number of silica particles per unit volume of air at any percentage crystalline silica, and eliminates the inaccuracies arising from the small number of percentage classifications that existed previously. Carbon tetrachloride has been revised downward to 10 ppm, zinc oxide fume, to 5 mg/m^3, nitroglycerine to 0.2 ppm, either alone or in combination with ethylene glycol dinitrate, and ethylene chloride (1,2-dichloroethane) to 50 ppm.

Notable additions to the 1962 list have been inclusion of 3 cancerigens, benzidine, B-naphthylamine and nitrosodimethylamine; instead of the usual limiting value, a cautionary notation for each substance appears in an Appendix. The following, with the cancerigens, comprise the 1962 additions to the list: Camphor, cobalt, epichlorhydrin, ethyleneglycol dinitrate, osmium tetroxide, perchloryl fluoride, platinum salts, and sulfuryl fluoride.

Seventeen substances have been moved from "Tentative" to "Recommended" values having remained on the tentative list the usual 2 years without adverse comment.

A departure from past listing of the values has been made in 2 respects. 1) "Gases and Vapors" and "Dusts, Fumes and Mists" are now arranged in one alphabetic list, 2) Trade-name listing has been avoided as far as possible; listing is made by chemical name followed by trade name.

A major effort of the Committee has been the preparation of justifications of the Threshold Limit Values now totalling somewhat under 300. These are concise statements with documented evidence for the selection of the values. The justifications have now been published by the ACGIH and are available at $4.00 per copy. New justifications will be issued from time to time as a supplement.

Consideration is being given to modifying the preface to the Limits to the extent of adding "as a relative index of toxicity (by making a ratio of two limits)" to penultimate paragraph "they are not intended for use..."

A brief composition of the meaning and use of Threshold Limit Values in comparison with the Maximal Acceptable Concentrations has appeared in both the Archives of Environmental Health and in the American Industrial Hygiene Association Journal, and has been reprinted variously elsewhere. This publication made a clear distinction between the TLVs and MACs and further explained developments in policy and philosophy of the Limits Committee. It is hoped that the publication will go far towards rectifying the common error of confusing the Threshold Limits with the MACs.

The Committee accepts with regret the resignation of Dr. W. Clark Cooper, who has served for several years with distinction, particularly in the area of mineral dusts.

Submitted -

Herbert E. Stokinger, Ph.D., Chairman
Harry B. Ashe
E. J. Baier
Allan L. Coleman
Hervey B. Elkins, Ph.D.
Bernard Grabois
Wayland J. Hayes, Jr.,
Keith Jacobson, Ph.D.
Harold N. MacFarland, Ph.D.
William F. Reindollar, Sc.D.
Russell G. Scovill
Ralph G. Smith, Ph.D.
Mitchell R. Zavon, M.D.

(Report accepted - see page 130 for discussion and action taken).

Report of Ad Hoc Committee on Local Sections

The local sections committee consists of Jack Rogers, Col. E. J. Dehne and myself. Article IX, Section 3 empowers the Executive Committee to grant permission for members to hold special meetings on a regional basis. This is not sufficient to meet the needs of the California group. The Executive Committee will need to decide if a constitutional amendment should be introduced specifically allowing local chapters, or if they should allow meetings only on the basis of Article IX, Section 3.

The following is a proposed constitutional amendment suggested by our Committee:

Section 1. The Executive Committee of ACGIH shall have the power to foster the formation of Local Sections. The Executive Committee shall consider an application from six or more members of the Conference to establish a Local Section and the Executive Committee shall establish the geographical area of such sections.

Section 2. The Chairman and Chairman-elect of each Local Section must be members in good standing of the American Conference of Governmental Industrial Hygienists.

Section 3. The Constitution and By-laws of each Local Section must be approved by the Executive Committee of the American Conference of Governmental Industrial Hygienists.

Section 4. Before a Local Section publishes or otherwise issues publicly any statement upon a policy matter which purports to represent the opinion of the American Conference of Governmental Industrial Hygienists, it must obtain the consent of the Executive Committee of the Conference.

Section 5. Before any member of a Local Section publishes or otherwise issues publicly any statement upon a policy matter which is within the policy area of the Local Section, he shall determine by a poll that the statement expresses the majority opinion of the members and associates of the Local Section.

Section 6. The Executive Committee may establish reciprocal relations with any local or national organization whose work and activities are closely allied to industrial hygiene. A group of this nature may become an affiliated society under conditions set up by the Executive Committee.

/s/ George Hama, Chairman

(Report accepted - comments from the membership are requested before any action will be taken by the Executive Committee. Please send comments to Lynn Schall.)

Report of Ad Hoc Membership Screening Committee

On September 29, 1961, the Chairman of the ACGIH appointed an Ad Hoc Screening Committee consisting of me as Chairman, Dr. Morris Kleinfeld, and Mr. Jack Rogers. The Committee was asked to:

(1) Screen all applications for membership submitted by the Secretary during the forthcoming year, judging the applications both by the present Constitution and also according to the recommendations made by the Ad Hoc Membership Committee which I chaired during the previous year.

(2) Check the DOH Directory of Governmental Industrial Hygiene Personnel against the ACGIH membership booklet in an effort to determine whether new members could be secured from the governmental agencies themselves.

(3) Consider the creation of the category of honorary membership in ACGIH.

The deliberations of your Committee with respect to these tasks follow:

(1) The Ad Hoc Membership Screening Committee reviewed all applications for membership presented to it during the year by the Secretary-Treasurer. There were no impossible problems under the present Constitution and its membership requirements or under the requirements for membership suggested by last year's report of the Ad Hoc Membership Committee. Two or three cases were found which qualified for associate membership under the present Constitution, but which would qualify for full membership under the changes proposed by the Ad Hoc Membership Committee.

The case of William Harris, a private consultant in the New York City area, was perhaps the most difficult. He is primarily self-employed as a consultant, but is also a regular lecturer on the staff of New York University. Under the proposed requirements for membership suggested by the Ad Hoc Membership Committee, Harris would be an associate member. Under the membership clause of the present Constitution, it is questionable whether he could join the Conference in any capacity. Your Committee suggested that Harris be given associate membership, however. He is a long-time worker in the field of industrial hygiene and occupational health, is well-known to many members of the Conference, and the feeling was that an associate membership should be voted to him. This case, however, highlights a possible difficulty under the present Constitution. There would be no difficulty under the proposed membership changes.

Because of the experience of this Screening Committee this year, and as Chairman of the Ad Hoc Membership Committee as well as Chairman of this Screening Committee, I should like to have the Executive Committee of the Conference reconsider last year's report by the Ad Hoc Membership Committee and either accept it or reject it --- and in either case, discharge that Committee from its responsibility.

(2) Your Chairman, with the able assistance of his secretary, understood the task of checking the DOH Directory of Governmental Industrial Hygiene Personnel against the membership booklet of the ACGIH. Attached to this report is a copy of our findings. The persons whose names are preceded by a horizontal dash are not members of the Conference. The non-membership amounts to 58%. It is my opinion that this is a fruitful group with whom to work and it is the considered opinion of this Committee that the Chairman of the ACGIH, using the attached information, should send a letter to the Directors of the various Governmental Industrial Hygiene groups, indicating which of the employees are not members of the Conference, and at the same time asking for the support of each Director in recruiting new members from those listed. One of the interesting things about this check list is that few physicians and relatively few nurses in the industrial hygiene business maintain membership in the ACGIH. It is from these groups that most of the recruits probably will be secured. It is our considered opinion that this recruiting activity cannot be done by a committee and that the above suggestion is sound procedure.

Your Committee feels that new members are always desirable and for us, necessary. Some other areas to be explored for membership and associate membership are the following:

1. Association of Teachers of Preventive Medicine

2. University faculties concerned with fields connected with occupational health, such as sanitary engineering, chemical engineering, health education, hospital administration, dentistry, radiation physics, and the like.

3. University students enrolled in such programs. (Consider the possibility of developing interest in various aspects of occupational health recruitment.)

4. Association of State and Territorial Health Officers.

5. Personnel of research foundations, non-profit, unrelated to industrial organizations, working with cognate problems, e.g., Sloan-Kettering, Battelle, Rockefeller.

(3) Your Committee members had a variety of feelings and thoughts about the question of establishing honorary membership in the Conference. As Chairman, I believe the Committee feels it might be possible and desirable to work out suitable criteria for such membership. Because of the inability to get this Committee together during the year or at the time of the annual meeting, there was no good opportunity to organize our various views. We present them, however, for the consideration of the Executive Committee with the recommendation that a class of honorary membership be established by the Executive Committee under rigidly defined criteria which would enable future committees to maintain very high standards of selection if such classification of membership is established. The views

of your Committee with respect to some of the possible conditions or criteria for honorary members follow:

Honorary membership upon retirement from active service is fitting and proper. It would be appropriate as an award for service in occupational health by one whose work and position might not be directly related to the field of occupational health, e.g., someone employed directly in a basic science which is applicable to one of the occupational health disciplines, could be recognized by honorary ACGIH membership. If honorary membership is to be given to those who have taken "other jobs", it was felt that there might be a problem with respect to those employed in private industry. It is presumed that such honorary membership would be non-dues paying, non-voting, and that carefully defined criteria should be established to define the honorary membership group.

It is felt that honorary membership could be conferred upon former office holders, former committee chairmen, or other members who made outstanding contributions to the Conference. It might also be conferred upon any individual who has been a member of the Conference and who, in the opinion of our Executive Committe has made an outstanding contribution to the advancement of industrial health.

The Ad Hoc Committee feels that while honorary membership may be appropriate, it should not be given to those who are active members of ACGIH, but reserved for those who have made outstanding contributions while they were members, and conferred after the individual has either retired from active duty or after he has dropped his ACGIH membership. If the Executive Committee should decide to follow this recommendation, it would enable us to confer honorary membership upon possibly the first Chairman of the Ventilation Committee for the outstanding work which he did which subsequently resulted in the production of one of our "best sellers". This is used only as an example and is not a recommendation for or against such an action.

Respectfully submitted:

Joseph E. Flanagan, Jr., Chairman
Morris Kleinfeld
Jack C. Roggers

(Report accepted and will be referred to newly appointed Committee on Membership Screening. The question of honorary membership will be referred to the newly established Committee on Constitution and By-Laws for consideration.)

Ad Hoc Committee on Qualifications for Membership

(1961 Report was reviewed and accepted in principal. The Committee was discharged. For further details see Report of Ad Hoc Committee on Membership Screening above.)

Report of Ad Hoc Committee on Trade Names Index

This is a report of the Ad Hoc Committee for Trade Names Index, ACGIH. The Committee members are E. Elbridge Morrill, Jr., Chairman, Frances L. Hyslop, Evan E. Campbell and John D. Vaden. We had our first meeting (by mail) to plan for the publishing of the next issue of the Index. Subsequent to this activity, a letter was written to members of ACGIH representing several official industrial

hygiene agencies as a random sampling (California, Colorado, Connecticut, Florida, Hawaii, Kentucky, New York, New Jersey, Pennsylvania, Texas and Wyoming) to seek their comments, recommendations, and suggestions for the next issue. Many worthwhile comments were received and the response is greatly appreciated by the Committee.

As reflected by these comments, along with ideas of individual members of the Committee, the Ad Hoc Committee for the Trade Names Index makes the following recommendations.

1. The next issue of the Trade Names Index should be a new complete issue and published in 1963 from all the material available to the Committee through 1962.

2. Future complete issues should be published every five years, assuming there continues to be a need for this type of publication.

3. Annual supplements should be provided in inexpensive form such as a mimeographed issue.

4. Material for the Trade Names Index file should be maintained on a continuing basis. This policy would provide for regular submission of trade name information to the Committee and would materially spread the clerical work over the year, which would greatly assist the Committee.

5. The Index should be published with a hard cover to minimize rapid deterioration from extensive use.

6. A cross-index should be included as to various classes of trade name products such as plastics, solvents, etc.

7. The next issue should be treated as a confidential or restricted publication. However, the Committee should explore further the possibilities for a less restricted publication if it is at all possible, feasible and practical to do so at a later date.

8. It is strongly recommended that the Committee on Trade Names Index be made a Standing Committee with rotation of the membership including the Chairmanship as is considered advisable by the ACGIH Executive Committee.

The Committee seeks approval of the above recommendations. We would also appreciate any additional suggestions or comments from the Executive Committee.

Respectfully submitted,

E. Elbridge Morrill, Jr., Chairman

(Report accepted and approved with exception of items 5 and 7, which will be discussed at a later date. A Standing Committee on Trade Names Index was appointed.)

Report of Joint AIHA-ACGIH Committee on

American Board of Industrial Hygiene

The American Board of Industrial Hygiene has been active in the past year carrying out the purposes of the organization. Meetings of the Board were held on April 9 and 14, 1961 in Detroit and on October 27, 1961 in Pittsburgh. The major considerations at these meetings concerned the implementation of certification and the solution to various problems that have come up in the certification program.

In May of last year a bulletin was issued by the Board outlining the history, the purposes of the organization and the requirements and procedures necessary for certification. Also included is a copy of the bylaws of the organization.

In the past several months the Board has been actively engaged in processing the applications for certification. As of April 1, 1962 the Board has received 180 applications with a backlog of 100 applications still to be processed.

Included in the past year's activities of the Board was the appointment of committees to formulate examination questions in the several specialties. This work has been progressing satisfactorily and there is every indication that the first examinations for certification will be held during the week of the annual meeting of the AIHA and ACGIH in Cincinnati in 1963. Present plans require a two-day examination.

As Chairman of the Board I should like to remind the membership of ACGIH that the deadline to receive applications for certification without examination is July 1, 1962.

John C. Soet, Chairman

(Report accepted.)

Report of Joint AIHA-ACGIH Committee on

Respiratory Protective Equipment

We indicated in the Semi-annual report all of the efforts of the Joint AIHA-ACGIH Respiratory Protective Devices Committee has been devoted to completing a technical manual. The Chairman wishes to comment on recent developments pertaining to AIHA technical manuals and AEC monographs. It is my understanding that the AIHA contracted with the AEC in the Fall of 1961 to produce three monographs. Also, that the AEC is paying AIHA $10,000 for each book. The Chairman was asked by Mr. George Clayton if our committee would be interested in having the respirator manual published as an AEC monograph. He pointed out that the AEC was especially interested in having a monograph on respiratory protective devices. The Chairman advised Mr. Clayton that he preferred to publish the manual that is about to be completed as a Joint AIHA-ACGIH manual. This item will be discussed at our committee meeting in Washington.

An Editorial Subcommittee met in Pittsburgh on July 10 and 11 to review several chapters of the manual. Those present included Dr. W. P. Yant, Mr. S. J. Pearce, Dr. H. H. Schrenk, Mr. A. D. Hosey, and the Chairman. A second subcommittee meeting (Hosey, Pearce and Hyatt) was held in Pittsburgh for two days following the IHF Conference. Following the last manual review, all chapters were completed and forwarded to Mrs. Chambliss, the technical editor. She edited all

chapters, except Chapter 11 by December 15, 1961. Chapter 11 was edited by February 1, 1962. The Chairman obtained the services of a professional typist and had all of the manual typed with the exception of Chapters 10 and 13. The typing was completed by March 1, 1962.

An editorial sub-committee consisting of Dr. L. Silverman, Carl Jensen, Harry Jordan, and the Chairman met several times in January and February to review the last newly-typed chapters which included all editorial revisions. The editorial subcommittee meeting in Los Alamos found it necessary to request several changes and revisions in Chapters 1, 3, 4, and 5. Several relatively minor changes were suggested for Chapters 6, 8 and 9. At the present time, the authors are reviewing the edited drafts and the editorial subcommittee editing suggestions. No final deadline has been set to complete this work although the Chairman hopes to have the majority of it finished by June 1.

The following expenditures were made during the year by the Chairman:

1. Drafting (J. Pozzuto, Pittsburgh) -- $45.50
2. Drafting (H. Olsen) -- 140.00
3. Typing (Mrs. W. Spack) -- 250.00
4. Postage (Chairman) -- 25.00

Mrs. Chambliss will be paid $500 for technical editing. The editing includes a final review of all drafts before they are submitted to the publisher. The Chairman is requesting an additional $250 for typing during the next year and $50 for final draft charges.

The committee will meet in Washington on May 13 from 1:00 P.M. to 5:00 P.M. and again on Monday, May 14 from 9:00 A.M. to 12:00 Noon.

Respectfully submitted,

E. C. Hyatt, Chairman

(Report accepted).

CHAIRMAN WILSON: Andy, one thing you didn't mention which possibly was not necessary. Who are the various ACGIH Committee Chairmen for the 1963 Conference? It was our new Chairman's wishes, Pete Schall, that those were designated earlier during this year and perhaps that is why you didn't mention that. But they are designated and will be incorporated, won't they, in the Transactions for everyone's information?

MR. HOSEY: And in the membership booklet.

CHAIRMAN WILSON: Are there any questions or comments, or at least commendatory remarks? Henry Doyle?

MR. DOYLE: Mr. Chairman, I presume I am one of those people you alluded to this morning in your remarks.

CHAIRMAN WILSON: Everybody here was alluded to.

MR. DOYLE: I am Chairman of the Ad Hoc Committee on Occupational Health.

CHAIRMAN WILSON: In the Future.

MR. DOYLE: In the Future, which I see is discontinued. I hope you will reconsider this action, because it was not the intention of this Committee to report at this meeting because we have not had the opportunity of organizing, of getting together in the form of a Committee.

CHAIRMAN WILSON: Henry, I am sure that our Executive Committee will without any question reconsider that at our meeting tomorrow morning. Do I hear any objection from any Executive Committee member? (No response.)

MR. DOYLE: It is my fault for not having communicated this to Andy, I am sure, our intention of not reporting on it at this meeting, but hopefully at the next meeting.

CHAIRMAN WILSON: I remember vaguely that you were not required to report here. We will have to look back in the minutes and perhaps we will eat crow.

MR. DOYLE: I don't think I was.

CHAIRMAN WILSON: Is that acceptable to every member of the Executive Committee? (No response). We shall reconsider then, tomorrow morning.

Is there any other comment or remark or suggestion to the Executive Committee? If not, do I hear a motion for acceptance and approval of its publication in the Transactions?

VOICE: I so move.

MR. VAUGHAN: Second.

CHAIRMAN WILSON: We have published this before. Unless someone wants it, I will not take time to read the 1963 Conference Committee members.

It has been moved and seconded. All in favor say "aye." (Chorus of "aye's.") Opposed? (No response.) Unanimously carried.

We have received only a few, as Andy indicated, formal reports from committees. Unless a Chairman of a Committee that has submitted a report will now indicate he or she desires to be heard before the membership, may I inquire whether any committee chairman who submitted a report wishes to report further in any detail?

Mort Lippmann and Jim Barrett. Mort, will you comment first? We will have to make these fairly rapid in order to get everything crowded in, but I am sure both of you appreciate this.

MR. LIPPMANN: Thank you, Dr. Wilson. As Andy mentioned, the Air Sampling Instruments Committee has submitted a report on the revised edition of Air Sampling Instruments, and he did mention we have established a price of eight dollars for a paper bound copy and nine-fifty for a hard bound copy. As previously, we did not list a price for members. This previously was five dollars, and we anticipate that we would resort to five dollars again to the members.

MR. HOSEY: The Executive Committee didn't agree to that.

MR. LIPPMANN: I had assumed that was understood. Well, I wasn't aware this was overruled, so excuse me for mentioning it then. I do want everybody to know about it. We have had a lot of work done for the Committee and by the Committee on this manual. We have eighty new instrument descriptions which about doubles the coverage of instruments. We have eleven new technical papers in the manual, and I think as soon as you get your next newsletter from the Secretary-Treasurer with more information on it and the order form, I hope you will support the Committee and the organization by getting it. Thank you.

CHAIRMAN WILSON: Thank you, Mort. I hope I am going to reflect the Executive Committee's reasoning for establishing the pricing, Mort. This happened after you left, to our regret. There is an ever-increasing burden upon our Secretary-Treasurer and Genny to try to keep straight all of the publications and prices and price scales and distribution records, and our Executive Committee yesterday in considering this felt that our total membership, once they appreciated this has been happening to where our staff is almost overwhelmed, that they would be as understanding as we felt in the Executive Committee we were of their problem.

Naturally, I think that all of us would like to save three bucks on a publication, but on the other hand we weighed it and we came up with the opinion that it was justified to establish just the two prices.

There was at one time also a proposed pricing for students, but this again created such a terrific bookkeeping problem to determine whether the applicant was truly a student, and the correspondence problem that could almost be limitless.

So, unless the membership would care to, naturally, the membership has its constitutional right to challenge the Executive Committee on that.

MR. HOSEY: May I add one thing to that? There is another important consideration. The Air Sampling Committee made an agreement with the magazine AIR ENGINEERING that they will place ads concerning this manual in issues of their magazine, but any ad or order sent to AIR ENGINEERING and in turn referred to us, they get two dollars and fifty cents. So if we sell to some students or members who order through AIR ENGINEERING, we are getting two dollars and fifty cents minus postage which runs around what? Twenty or thirty cents, so we are losing money. And I don't think Mort has given us a cost per copy price as yet, have you, Mort?

MR. LIPPMANN: The cost per copy runs about Three Dollars and Fifty Cents.

MR. HOSEY: We can't sell them under those conditions. This was a very important reason.

CHAIRMAN WILSON: Dr. Elkins, did you have a comment?

DR. ELKINS: Mr. Moskowitz sent his report on Standard Labeling Procedures and asked me to read it.

CHAIRMAN WILSON: First, is there any other comment on Mort Lippman's remarks?

MR. DAVIS: Irving Davis. I would like to suggest that as I understand the agreement with AIR ENGINEERING that they would not be selling to members or students but would be selling at the established price, so I don't think that this particular comment of Andy's was involved in the sale to AIR ENGINEERING.

CHAIRMAN WILSON: I don't personally have any other comment on that, Irving. I think that we did try to do some bookkeeping and we hope to avoid distributing several hundred copies at a loss to the organization, and it may be our calculations may be off and perhaps we should consult with you and Mort again.

MR. DAVIS: I do think we need to streamline our handling of publications and reduce the paper work, but it seems to me that it is a pretty well-established procedure in other organizations that the members of those organizations get a reduction in price in the purchase of the manuals that are produced by those organization

Now, we as a Committee discussed this and felt that this was desirable and I think that this matter should be reconsidered to determine whether or not it can be done practically.

CHAIRMAN WILSON: We will reconsider.

Jim, are you going to comment or are you going on to your Report?

MR. BARRETT: Years ago the Ventilation Committee operated for about two years with a discount for membership, and frankly, the bookkeeping got so involved and there were so few orders involved that it wasn't worth continuing, so I just add that as our past experience.

CHAIRMAN WILSON: Well, now this could go on.

MR. FREDRICK: I think the Executive Committee should consider a package deal where we try each year with a fixed fee to all publications of the Conference and not try to have to worry about requisitioning every specific item.

CHAIRMAN WILSON: Pete Schall, the new Chairman, how do you feel. That is a very good comment, but it places the burden on Schall. He asked you to consider it. Will you be willing?

MR. SCHALL: Yes, we will be.

CHAIRMAN WILSON: Good, that settles that. Are there any other comments on Mort Lippmann's report? (No response.) I hear none. Next we will hear from Jim Barrett's Committee since he had second priority.

MR. BARRETT: Mr. Chairman and officers and members, I have only two points to bring up. One is that this is the seventh edition of the Manual that was in print this February, 1962, and it will be, copies will be available at the ACGIH publication booth.

The other point is that Andy asked or indicated that from time to time our returns to the Conference vary. They do vary from year to year. I would just point out that 1962, or this last fiscal year was a year of printing, and therefore we have quite an extensive cash outgo at that time. The next fiscal year will be one of riding along on our current printing, so there will be more money coming in. I have as much difficulty reading financial reports as Andy does, but the net worth of the Committee increased this year, and it will be reflected in our returns to the Conference for the next fiscal year. We are always a year behind because of the printing costs that we have to be able to pick up at the time new books are printed.

Does that answer your question?

MR. HOSEY: Yes. I knew that, but I wanted you to say it.

CHAIRMAN WILSON: Thank you, Jim. Dr. Elkins. Is that a long report?

DR. ELKINS: I believe it has been sent in. No, it isn't.

This is the 1962 annual Report of the Committee on Standard Labeling Procedures. The Chairman, Dr. Moskowitz, asked me to read it. (See page 100).

CHAIRMAN WILSON: Thank you, Dr. Elkins. Is there any comment? (No response.)

We have no other chairman of a committee that did submit a report to the Executive Committee? Yes. Ed Baier. You are going to speak on coin-operated machines?

MR. BAIER: I think Andy has filled you in pretty much with what we try to do, and he has said that you will get a copy of this and you can comment on it.

As somebody pointed out earlier, if you give it to a busy man to get done, and he gives it to his secretary, and I would like to keep mine from hitting the ceiling when these reams of paper come in.

I would like to point out two things which might clarify some philosophy and this may answer your question without having to write in for clarification, although we probably still get some with respect to it. One is that we say in here, "Establishment shall be checked daily and kept in good repair."

Now, the purpose of a coin-operated dry cleaning establishment as we understand it, is it is more or less maintenance, and checking things twice weekly. You may have some comment on that. This was the philosophy behind that change.

The other has to do with ventilation, and I am sure this is where we will get most of our comment. You are familiar with several codes as they exist in some of the states, and also in terms of some of the local municipalities. Whatever they might be, they list minimum air flow rates.

We have really wrestled with this problem, and I have lost count on the drafts, but I think this is probably number seven that you will see. And in here we make the statement that although the criterion above, and that has to do with all these requirements, may be met in a well ventilated and properly operated establishment by considerably lower ventilation rates the following are offered as a maximum which should be necessary.

And of course we list this, one to three machines and at 500 cfm. This is the approach we are using. There is the problem of how you are going to get the local people to install a fan. I don't know how you can overcome that, and I am certain this committee certainly can't do it.

On the other hand, there is another problem, not only with heating in the winter time, but air conditioning. A lot of these are going into shopping centers, this type of thing, and I want to make these two points so that it might clarify in your mind at least what our thinking was when we say drafts involved, how we came to this conclusion.

CHAIRMAN WILSON: Thank you very much, Ed. I am sure you and your Committee would hope to have all sorts of constructive comments.

This completes, I guess, all the committee chairmen who have submitted reports. Is there a Chairman of a Committee that did not submit a report that would like to volunteer to make any comments?

MR. ROBERTS: Don Roberts, Chairman of the Committee on Ionizing Radiation. In essence this is our report, which we didn't get formulated until last night. The Committee suggests that the bill of particulars relating to its activities be modified to indicate responsibility in keeping informed concerning significant development in the field of radiological health and in the dissemination of such information to ACGIH members.

In keeping with this modification the Committee proposes, on a trial basis, to make periodic announcements to members of significant developments not generally reported in periodic journals.

The Committee has developed a workable x-ray calculator, however, due to certain unsolved problems for which no satisfactory solutions are apparent, it has been decided to discontinue further activity on this project.

It is also recommended that ACGIH formerly rescind and withdraw from distribution its regulation pertaining to shoe-fitting fluoroscopes. (This has been done.)

P. W. Jacoe
D. E. VanFarowe
P. J. Valaer
Byron Keene
Donald P. Roberts, Chairman
Julian Olishifski
Charles L. Cheever
Francis W. Lanard

CHAIRMAN WILSON: Will you provide a copy of that to the Secretary? The Executive Committee will take this report under consideration.

Is there any other comment or remark? (No response.)

Is there any old business to be brought before the meeting other than already mentioned here? (No response.)

Is there any new business to report to this group at this time? (No response.)

If not, I will remind the Executive Committee that we meet at 7:30 tomorrow morning for consideration of resolutions and two or three other items here. Therefore, come early for your coffee. In the meantime any member who wishes to do so keep in mind that the Resolutions Committee is Dr. Einert, Chairman, Bales and Barrett.

Do I hear a motion for adjournment of this session?

MR. WUKASCH: So move.

VOICE: Second.

CHAIRMAN WILSON: It is unanimous I assume.

(Whereupon the meeting was adjourned at 12:00 Noon.)

BUSINESS SESSION - May 15, 1962

Dr. William L. Wilson, Chairman, Presiding

The second business session of the American Conference of Governmental Industrial Hygienists convened in the Bergundy Room, Sheraton-Park Hotel, Washington, D. C., at 11:00 A.M., Tuesday, May 15, 1962, Dr. William L. Wilson, Chairman, presiding.

CHAIRMAN WILSON: Will the meeting come to order, please? Is the Chairman of the Resolutions Committee here or any member of the Resolutions Committee: Dr. Christine Einert.

DR. EINERT: We have a number of resolutions which we hope will meet with your wishes. I had no requests, and members of my committee had no requests for any further resolutions. The first resolution reads:

Resolution #1

"WHEREAS, the Sheraton-Park Hotel undertook to house the 1962 American Industrial Hygiene Conference at relatively short notice, and,

"WHEREAS, the American Conference of Governmental Industrial Hygienists has been pleased in the facilities, arrangements, and services offered by the management and staff of this hotel,

"BE IT RESOLVED, that the American Conference of Governmental Industrial Hygienists expresses to the hotel its pleasure in conferring at the Sheraton-Park Hotel and its appreciation of the cooperation extended and the efforts made for its comfort, and,

"BE IT FURTHER RESOLVED, that the Secretary be asked to convey these sentiments to the hotel management."

I move this resolution be adopted.

(The resolution was adopted after being duly seconded and carried.)

Resolution #2

"WHEREAS, this 1962 American Industrial Hygiene Conference has been and is being enjoyed by a large attendance of American Conference of Governmental Industrial Hygienists members, and

"WHEREAS, the excellent arrangements made by the Baltimore-Washington Section of the American Industrial Hygiene Association has added immeasurably to this enjoyment, and

"WHEREAS, the membership of the American Conference of Governmental Industrial Hygienists is well aware of the effort, patience and devotion necessary to obtain the smoothly functioning arrangements of this conference,

"BE IT RESOLVED, that the membership of the American Conference of Governmental Industrial Hygienists extend to the Washington-Baltimore Section of the American Industrial Hygiene Association and to the many individual members who have contributed time and effort to this conference, their sincere appreciation and thanks, and,

"BE IT FURTHER RESOLVED, that a copy of this motion be forwarded to John M. Brown, President of the Washington-Baltimore Section as a tribute to his entire local Section of the American Industrial Hygiene Association from the American Conference of Governmental Industrial Hygienists."

I move this resolution be adopted.

(The resolution was adopted after being duly seconded and carried.)

Resolution #3

"WHEREAS, the meeting of the American Conference of Governmental Industrial Hygienists with the American Industrial Hygiene Association once again has increased our knowledge of occupational health, and

"WHEREAS, the officers, Executive Secretary, and members of the American Industrial Hygiene Association have, by their efforts and by their scientific presentation, given pleasure and profit, and

"WHEREAS, we feel a special closeness to this organization,

"BE IT RESOLVED, that the American Conference of Governmental Industrial Hygienists express to Mr. Willis Hazard and George Clayton and all who have contributed to this meeting, our appreciation of their many contributions and our hope to maintain this pleasurable and rewarding relationship,

"BE IT FURTHER RESOLVED, that our Secretary convey these expressions to the President of the American Industrial Hygiene Association."

I move this resolution be adopted.

(The resolution was adopted after being duly seconded and carried.)

Resolution #4

"WHEREAS, one of our members has retired from the Public Health Service, and

"WHEREAS, during the past years he has given outstanding support, encouragement, and prestige to the field of occupational health, and,

"WHEREAS,he has now embarked on a new career which will further contribute to this field,

"BE IT RESOLVED, that the American Conference of Governmental Industrial Hygienists express to Dr. Harold Magnuson, until April 1, 1962, Chief of the Division of Occupational Health, U. S. Public Health Service, and now Director of

the Institute of Industrial Health, University of Michigan, the appreciation and good wishes of this Society.

I move this resolution be adopted.

(The resolution was adopted after being duly seconded and carried.)

Resolution #5

"WHEREAS, being Chairman of the American Conference of Governmental Industrial Hygienists is not only an honor, but inevitably places a burden upon both the professional and personal life of the person so honored, and

"WHEREAS, both during the term of office as Chairman-Elect and as Chairman, the "soon-retiring" Chairman has shown initiative, leadership, and has elevated the American Conference of Governmental Industrial Hygienists in the eyes of its members and of others, and

"WHEREAS, he has endeared himself to us during these years,

"BE IT RESOLVED, that the American Conference of Governmental Industrial Hygienists express to Dr. William L. Wilson its appreciation of his stewardship of the offices of Chairman and Chairman-Elect of the American Conference of Governmental Industrial Hygienists; its gratitude for the high quality and cheerful enthusiasm with which this service has been given; and his friendship, good will, and good wishes as he completes his contribution to the Conference, by a rising vote."

I move this resolution be adopted.

(Rising vote of thanks.)

DR. EINERT: That completes the report of the Resolutions Committee.

COL. DEHNE: I would propose a copy of this last resolution be sent to the State Health Officer of North Carolina.

CHAIRMAN WILSON: It is plain why we don't get more done in occupational health in North Carolina.

Are there any resolutions to come from the floor? Does any member propose any other resolutions? (No response.) If not, we will proceed with the business.

We have had several questions presented to the Executive Committee. We have had some comments made. The Executive Committee met this morning, and it did not care to change its position on the cost of the Air Sampling Manual. It does, however, deserve at least a comment or two to again reiterate some of the problems presented and the justification.

The Executive Committee at least has applied this justification in continuing the price structure on the two types of manuals mentioned in yesterday's session, yesterday's business meeting.

Some of our members, especially those who might have been justified in their feeling if not their opinion, don't realize that every member of this conference has expended upon him as an individual member more than two dollars a year in postage, not only to get materials out, but to inform us of many things that we need to know.

The second thing that influenced us both Sunday and this morning is this fact that there are not too many alternatives to trying to simplify the distribution of that manual. One alternative is to have four prices on the manual. That would be four times a system anyway of bookkeeping if you had just one price.

Another alternative would be, and this would be perhaps necessary, to rent a stock room, to employ a stock clerk who would inventory and maintain the records and wrap or sell and mail and post. This costs you considerably more than an additional three dollars occasionally for one of our really good manuals.

Now, the Executive Committee didn't mention anything this morning about this, or at any other time in my hearing, but leave us not forget that many of us have our own agencies buy these manuals for us for our use, and in this regard we feel that the simplification of price structure -- I feel, anyway -- ought to be a mission of every one of us.

So while this might not satisfy everybody, it is the position, and so the pricing remains. We brought up another subject, however. When a member in an open business meeting does not think of a suggestion or an opinion, we have a second business meeting where such things could be brought up if we can get time for it.

There is one other approach that our Executive Committee this morning felt would be worth-while. If one member feels that a poor judgment has been demonstrated of the Executive Committee, wouldn't it be -- let's put it this way -- a good idea for that member to try to get, not constitutionally, but try to get nine other members in good standing with their dues paid to submit a statement to the Chairman of the Conference expressing themselves? No one is going to be offended. We are all mature and don't dictate the other fellow's opinion, even though we know ahead of time he is wrong.

So let's have that as a possibility. I personally feel free from now on since we discussed this this morning, if I can find nine people that can possibly agree with me and I with them, that we might write a letter, and ten of us sign it, to the Chairman. And I am sure our Executive Committee now to be will give thoughtful consideration to any such communication.

Another point to report to you is that the Ventilation Committee has, since the Treasurer's report, turned in a check for thirteen hundred dollars as their profits, shall we say, which could not be accounted for before this morning, the check not being received until last night. So that would give you some indication of the change in the Treasury which will be reflected, won't it, Andy, in these transactions?

MR. HOSEY: No, it can't, not the financial statement, the books.

CHAIRMAN WILSON: No, but it will be in the transactions.

MR. HOSEY: Right

CHAIRMAN WILSON: So that we will appreciate this.

Now we have one more important matter to discuss before we take up the final important matter. May I inquire if for no more than five minutes anybody has any old business? (No response)

If not, may I inquire if anybody has any new business? (No response)

Then let us get on with this. Several members felt that there was not adequate understanding of the newly revised Threshold Limit values. Therefore, we have the chairman, and we have several members of the Threshold Limits committee here. We would call upon Dr. Stokinger and ask him to open the discussion and continue it, we would hope, to the satisfaction of the membership, if you please, sir.

DR. STOKINGER: A number of significant and, I think, highly important developments occurred during this last year in the Committee on Threshold Limits. One of these was the increase in the membership from the past number of eight to fourteen. And this membership was increased on the basis of the increasing complexities of the industrial environment and the problems associated with set limits on many of these substances.

These members were selected on the basis of their experience and as far as possible on the regional basis. The regional basis was picked on the basis of highly industrial areas. In other words, areas from Pennsylvania and New York and other parts of the East were emphasized and individuals selected from State Health Departments to serve on this committee.

Now, the committee of course, was gratified as you heard noted by Andy yesterday to see that the efforts of the committee was pretty well disseminated to the extent of thirty-six thousand copies which I think establishes a record of some sort. And I think it is due, of course, as Andy indicated yesterday, to the format. It apparently pleased everyone. I haven't heard any adverse criticisms on this folder.

Now, to the changes that have been made in the last year's limits. The plenary committee held a two day meeting in the plush headquarters of the Department of Health, Education, and Welfare in Washington, D. C., and came up with nine revisions and eleven additions to the 1962 limits. The more important revision was the one I think on the old time level of silicate, long in need of revision, and it has now been taken seriously, and changed. I will list a formula so everybody can calculate up their own threshold limit for silica based on two hundred fifty, divided by percent of SiO_2 plus five. And that comes out in millions of particles of cubic feet of air as usual.

$$\left(\frac{250}{\% \ SiO_2 + 5} = \text{mppcf} \right)$$

As you can see, if you have forty-five percent silica, you can immediately figure what the value is, or five percent silica, and this we felt made a more equitable limit, rather than the very narrow number of classifications we had in the past. Henry?

MR. DOYLE: There has to be something else in there.

DR. STOKINGER: What?

MR. DOYLE: Where is your 250 over percent SiO_2 plus --

DR. STOKINGER: This comes out in form of dust count. It just happened this way. This conversion figure, if you want to put it in milligrams, is the particle for cubic feet. I think this will meet some of the objections in the past where we had such a limited number of classifications there was sort of inequity in certain particles -certain number of particles per cubic foot. This is the percentage of silica in the sample under question.

MR. HAMA: I think that should be in the limits. I don't believe it is. Is that right Andy?

DR. STOKINGER: What other interpretation could you put on it?

MR. HAMA: Some might figure percent in the air-borne dust.

DR. STOKINGER: That is what it is.

MR. HOSEY: Or the parent material.

MR. HAMA: No. It is the parent material you see.

DR. STOKINGER: We are sampling the air.

MR. BALIFF: How do you measure SiO_2?

DR. SMITH: You don't have any different problem than you ever had. You show -- the limit applies to air-borne dust.

MR. HAMA: If we haven't said it before we should say it now where your analysis has been taken.

DR. STOKINGER: All right. This could be added ina footnote, although I don't like to burden the list with innumerable footnotes, things that I think should be obvious to any industrial hygienist. So we will think that over and give that consideration.

CHAIRMAN WILSON: Do you wish to express exactly that thought now, or will you authorize the Chairman to insert the proper explanation, explanatory note?

MR. HAMA: He can add that later I think.

CHAIRMAN WILSON: Is that satisfactory to all concerned?

MR. COLEMAN: I don't think you need a footnote on SiO_2 to the air-borne dust. I don't think I need a footnote.

DR. STOKINGER: It could be spelled out there if necessary.

CHAIRMAN WILSON: Is that satisfactory?

VOICES: Yes.

CHAIRMAN WILSON: So ordered.

DR. STOKINGER: The next revision, carbon-tetrachloride, has been revised downward from twenty-five to ten on the basis of increasing indications that the carbon-tetrachloride at twenty-five parts per million was excessive.

Nitroglycerine has been added either alone or in combination of ethylene glycol dinitrate at two tenths of a part per million (0.2ppm). This was a necessary revision in the light of new and serious incidents in the nitroglycerine manufacture and handling.

VOICE: (Did not hear the question except the reference to the word "skin.")

DR. STOKINGER: The question was raised as to notation "skin" placed after nitroglycerine or ethylene glycol dinitrate. This has been adopted recently to indicate there may be exposure over and above the inhalation and calling attention to this. Obviously, if the skin exposure is significant in this particular instance of these organic nitrates, the inhalation level has little meaning, of course. This could be a serious means of exposure, in fact, a dominant one if you let this area of entry go uncontrolled.

We have also lowered the limit for ethylene chloride, which is 1,2 dichloroethane, to fifty parts per million (50 ppm) on the basis of new information.

There have been other changes that are less significant, less important. But a notable addition to the 1962 list has been inclusion of three cancerigens. This has been a difficult problem in terms of value and the committee felt the best way to handle these materials was to put a notation in descriptive form in an appendix to the list and the materials in question on this particular list were benzedine, beta-naphthylamine, and nitrosodimethylamine. These have had their appropriate notations placed at the end of the list in the form of an appendix. I don't want to read them unless people want to hear them. And beta-naphthylamine has been removed from the list by the State of Pennsylvania, and this is one of the major weaknesses in prompting the action for this particular compound and other changes.

Benzedine is a notable urinary bladder cancerigen, and nitrosodimethylamine is a recent carcinogen owing to the fairly recent production of unsymmetrical dimethyl hydrazine, which is now used as a fuel and occurs in the preparation of that material and so it becomes a prominent industrial chemical.

I had hoped that the group would feel that this means of handling a limit on substances with cancerigenic potential is a satisfactory one. I think it is about the only way you can do it for the reason that the dosages by inhalation are affected by any other rule for these substances, and most cancerigens are not known with any certainty. There is no way of establishing a finite value, so it has to be put in the form of descriptions. This is the only satisfactory way the committee felt would be a way to place it on the list.

Now, other changes have been the addition of camphor, cobalt, epichlorhydrin, osmium tetroxide, ethylene glycol dinitrate, perchloryl fluoride, again a fuel for missiles, platinum salts, and sulfuryl fluoride.

Seventeen substances have been removed from the tentative to the recommended list. They were moved to the tentative list two years before being moved to the recommended list, and these have been there without adverse comment, and without adverse comment have thus been moved.

Now, we made one departure in the format of the limit list, and that is this. We have amalgamated all the gases and vapors and dusts and fumes into one large alphabetical list. It was getting so I couldn't even find some of the materials myself. This, then, leaves the format in this condition, the one over-all alphabetical list for all the recommended values which now total something under three hundred, and then there is a small list for the inorganic dusts, mineral dusts, which includes cristobalite, cement, and other mineral dusts; and then there is the tentative list which now we have appendices for the special materials such as carcigens or cancerigens. I think that will aid in the finding of these materials.

Now, Andy mentioned yesterday the completion of the justifications for all the substances in the recommended list, and I want to expand a little bit on the notice that Andy made.

I think a great deal of the credit is due not to me, but to Allen Coleman who spearheaded this over many years and the efforts, of course, of the committee, smaller committee, that had the work of getting many of these justifications together. I just happened to be here when the thing was published.

MR. COLEMAN: I think that is more due to your secretary than anybody else.

DR. STOKINGER: One important announcement. The committee accepts with regret the resignation of Dr. W. Clark Cooper who served for many years with distinction on this committee, particularly in the area of mineral dust, and we sincerely regret his resignation.

I think that concludes most of the important parts of the report.

CHAIRMAN WILSON: Don't go away. We have a need we think, for your approval of this report and its inclusion in the transactions. Do I hear a motion either from you or anyone else that this report be approved and included in the transactions?

SEVERAL VOICES: So move.

SEVERAL VOICES: Second.

CHAIRMAN WILSON: It has been moved and seconded. Is there any discussion?

MR. MICHAELSON: Yes, I would like to raise the question of data available to indicate that under this system we have one hundred values for threshold limits for silica, do we have information to indicate we have this, or that there is this distinction between say - twenty and twenty-one percent? Or twenty-two percent and twenty-three percent, and so forth? This percentage should have some categories in it that you can't interpret - say between ten percent, ten, twenty, thirty, or forty. Obviously to me, there is no distinction as to one hundred values for free silica.

DR. STOKINGER: Harry, do you want to answer?

MR. ASHE: Your question is the very thing that prompted the formula. In Washington when we discussed grouping or breaking up the range of one hundred values into groups we will say, from five to ten percent, ten to twenty percent, etcetera, we got into that very discussion how wide we want to make the groups, whether we want to call it zero to five and six to ten, or zero to four and five to nine, and finally we came up with this formula which is very simple, which we believe describes the whole philosophy of threshold limits.

Threshold limit for silica isn't a definite value. We don't think of threshold limits as being one percent or two percent. This is a guide for determining what an exposure is in industry, and if you determine that you have a dust exposure we will say, of about twenty-five percent or less, and Lord knows you aren't going to find dust exposures that say is twenty-five percent today and tomorrow is going to vary over a range. You are going to come up in the thinking of a dust like we do in granite dust when we say about thirty-five percent plus, so we substitute thirty-five into that formula, and we come up with a value which is our M.A.C. which is going to be what we are going to shoot at as an average in this industry. And that is what the committee intended by this formula as a guide which you can use to measure your dust exposure no matter what it is. In the past we had a range from five percent silica to fifteen percent silica and one value of twenty which was obviously erroneous, and this was the best thing, that we had to overcome the objection of trying to find a range of split values.

CHAIRMAN WILSON: Harry, you just got yourself fired from the committee for using the dirty word "M.A.C." Did that satisfy you, sir?

MR. MICHAELSON: Yes.

MR. SPRAGUE: Down at the A.C.G.I.H. booth a few minutes ago, the book that Herb mentioned, the justification for Threshold Limits was getting a great deal of review and very favorable comment.

MR. KEPPLER: Is that formula favorable for a mixed asbestos dust? Is it applicable?

MR. ASHE: Asbestos is kept separately as it always has been. We haven't changed the values for asbestos or for the other materials. They remain the same.

MR KEPPLER: I have never been able to get clarification what is meant by that five million (mppcf), whether it is asbestos that is present? Is that the limit, or is that predicated on the percent of asbestos?

MR. ASHE: I think you brought up a question the committee needs to study. I think asbestos is one of the things that really needs to be investigated. There is no answer to your question. I know what you mean. I have been in asbestos plants where it was really dusty. You would swear it was a hundred (100 mppcf), and you take a sample and only get a count of five (mppcf). As far as I could see the value of five was decided upon because that is the most anybody could ever come up with.

MR. BALIFF: Without trying to give the impression that I disagree with the concept of the M.A.C.'s ---

DR. STOKINGER: Threshold limits, if you don't mind.

MR. BALIFF: I am old fashioned. I am sorry. Threshold limits. I apologize. And certainly I hope I don't give the impression that I am criticizing the committee in their effort. However, I think that Dr. Stokinger in one of his comments before hit the nail on the head as far as the problem of those using the threshold limits figures, and that is, he mentioned in commenting earlier something to the effect that this is something that any intelligent industrial hygienist, or I forget the exact words, but the point was, the impression I got was this is a fine tool if it is handled and used by somebody who knows what he is doing. But unfortunately, we are faced with the problem of having these things put into codes, and they are going to be used by people who don't know what they are all about. They are going to be used by people who will use them, use these very figures and formulas to avoid putting in controls when control is needed. And I can see something like this as in New York State at least, very effectively putting a stop to good dust control, because any time dust control was to be asked for, first we would have to go in and take an air-borne sample and analyze that air-borne sample for silica which my chemists tell me is awfully minute. The amount you get in a midget impinger isn't enough to analyze chemically. We don't have a fancy spectrograph, and we work it out and have to take another dust count and prove that dust count taken at this time is higher than this number.

And then they say, "Well, you did something wrong," and we go back and we can go back forever. Nothing will be done except we keep M.S.A. very happy by buying impingers like mad.

DR. STOKINGER: How did you do it before?

MR. BALIFF: Well, with the broad ranges we had fewer return visits because if, for example, the rock happened to be within ten and fifteen percent free silica this was it. The big problem was whether we got rock at 9.7 percent or 10.3 percent, but these were rare. As Harry said, granite was 35 percent on the average. But you don't have to determine whether this particular sample or this particular rock being used that day was 32 percent or 38 percent. You took 35 and

you know that it fell in a certain category, and this gave you a threshold limit of say 10 million particles and this was it. It may not have been perfect from the standpoint of air-borne contamination and protection to the worker, but it was something the men in the field could use. This may be perfect from the standpoint of scientific accuracy, but I don't think it can be used by people in the field. And for that reason I think it should be considered very carefully before it is actually put into the threshold limit values.

DR. STOKINGER: I would like to reply to that. Certainly this has been given very careful consideration by the committee for many years, and I think my reaction or response to you is that I would suggest that the New York State adapt and react to this progressive change. (Laughter)

MR. TUBICH: I think this is going to burden our reporting to industry. You go into a foundry and in the cleaning room it is going to be six percent and in molding it is going to be this and shake-out it is going to be different. So we take the dust counts. We have to say in the cleaning room operation your limit is 18 and the molding limit is 22, and the shake-out limit is 35. Whereas now we say the foundry operations generally run an average of twenty percent free silica, and this is our limit that we are applying.

Here we are going to have separate limits for every operation in the foundry.

MR. GRABOIS: I would like to say that in the State of New York we have a code set up for particular industries. I think the literature will show that some experts in the field believe that maximum allowable limits should be based on the industries that have been brought up to the sub-committee on mineral dust. And answering Mr. Jack Baliff who happens to be my boss, I might say that we have limestones in New York, Jack, where we have been quite broadminded when it ran around that ten percent, and we have quite a few limestomes like that. Now, with this formula it wouldn't make much difference if it were nine percent or eleven percent.

MR. DOYLE: Soon I will have enough years in Public Health Service to retire. I see what I am going to do. You are going to throw the compensation courts into total confusion. I think all of us ought to resign our jobs and go in for consultants for compensation, because here the lawyers have a wonderful tool.

MR. BALES: I would like to ask about what is disturbing to me when I read in the literature a threshold limit list without the philosophy or foreword given with it. I think Andy alluded to this yesterday, and my question would be -- what action, firm action, has this organization taken to prevent this sort of thing?

DR. STOKINGER: As far as I know, we have taken none, but I think we could, in the light of your remarks put in with the notation of the copyright a statement that it shall not be printed in any abbreviated form but in total.

DR. REINDOLLAR: I do see the problem of codes that are in your state and in ours. I think this is immaterial. The state chooses to make its codes and make them as absolute or as relative as it chooses. It is not the manipulation of codes and number of rocks you have to pick out to decide what percentage it is. It is what is safe for the workers, and, if it is safe for the worker, if a sliding scale is in favor of the worker, I am in favor of it.

MR. BALIFF: I was very much surprised and upset to see in a national magazine they recently listed the T.L.V.'s -- I'm learning -- but they completely omitted the preface, and they said it was with the permission of the Conference.

CHAIRMAN WILSON: The Executive Committee. We have time for one more. Dr. McCammon.

DR. McCAMMON: In the light of documentation of the threshold limits that came out recently, I would like to know what is going into documentation of the adoption of this particular formula?

DR. STOKINGER: This is being developed at the present time and will come out in due course.

CHAIRMAN WILSON: It is being readied for publication.

MR. HOSEY: It is already published.

CHAIRMAN WILSON: Not the justification.

DR. McCAMMON: Is the documentation separate and apart from the threshold limit committee?

DR. STOKINGER: No, sir. It is a function of the threshold committee. This will come out as new values come out, and as I said, the tentative list.

DR. McCAMMON: I am expressing this because of what Dr. Einert says and someone else said as to what the justification is from the clinical point of view to change this particular thing.

DR. STOKINGER: This justification sheet will appear.

CHAIRMAN WILSON: It will be published.

DR. McCAMMON: Before it comes out who did the work to correlate these dust exposures with hazards from silica dust?

DR. STOKINGER: This is the function of the sub-committee on mineral dust which reviews the evidence and writes up the justification for the choice of the formula in this case or value in other cases.

CHAIRMAN WILSON: Unless someone has some other really important point, we should push on. Don't go away. We have one more point here. We have a motion and a second. All in favor say "aye." (Chorus of "aye's.") Opposed? (Chorus of "no's.")

We will have to have a stand-up count. All in favor please stand up. (Count made) Twenty-three in favor.

All opposed stand. (Count made.) Twenty.

Now we are really going to work on him. Herb has three members of his committee who are not members of the A.C.G.I.H. The question is, are you going to be able to bring them in as members of A.C.G.I.H.? They all three would qualify, but under the ground rules they can't be members of this committee unless they are members of the A.C.G.I.H.

DR. STOKINGER: We have an alternative. We can have them as consultants.

CHAIRMAN WILSON: You can have them as consultants, but we wouldn't publish it in this form.

DR. STOKINGER: That's right.

CHAIRMAN WILSON: We don't want to embarrass anybody.

DR. STOKINGER: I made that notation.

CHAIRMAN WILSON: All set. Is that satisfactory? (No response.)

MR. CHANLETT: I presume this division which was just indicated by the vote hinges on this particular matter of the formula.

CHAIRMAN WILSON: That vote wasn't on the formula. That was on the total report.

MR. CHANLETT: Therefore this report is adopted.

CHAIRMAN WILSON: It is adopted according to the motion and second and the vote incorporated into the transactions.

MR. CHANLETT: Granted all this is in due process, parliamentary procedure. It seems to me if it is correct that the reason for this division just shown by the vote hinges on this formula, I think it would be undesirable to go ahead and say we voted twenty-three to twenty, therefore it is in. Because this is a matter of contention within this professional group, And if such be the case, what is going to be the impact as it is put in circulation beyond the forty-three who just recorded a vote? This is only one-tenth of the total membership.

In addition, I think I just voted illegally. I am an associate member.

MR. HOSEY: You qualified.

CHAIRMAN WILSON: This is constitutional. You can vote on this.

MR. CHANLETT: Good. My conscience feels a little bit better, but I do think despite the time and pressure, and so forth, in schedules, that it would be very undesirable to go forward with the adoption of this formula at this time when there is such widespread division of judgment and so much feeling as I gather, of uncertainty about how it would function.

CHAIRMAN WILSON: One parliamentary procedure would be to have a motion.

MR. COUCHMAN: May I make a motion that on the formula phase of the question that any opinion or decision be reserved for another year of study?

CHAIRMAN WILSON: Is this a motion?

MR. COUCHMAN: This will be a motion. I move that before any definitive action be taken at this meeting on the formula that it be withheld for a further study for a period of one year.

MR. KEPPLER: Second.

CHAIRMAN WILSON: Is there any discussion?

MR. ASHE: I would like to ask just one question. To me the argument is something that I think the formula is too simple. But let me bring out the specific case of an industry that is very close to Vermont, happens to be in New York, and happens to be out of business now. It went on for a long time. And the material that the industry was pulverizing was slate, making slate grinders. And that slate had thirty-five percent quartz content, the same quartz content as granite, and the existing feeling was toward threshold limit of twenty million dust particles per cubic foot of air was acceptable, and that industry accepted that, and they fought like hell to reduce it even to twenty. And we have a sanatorium that has many men who have died of silica tuberculosis because of an M.A.C. that was too high.

This formula doesn't take and pinpoint an exact figure for threshold limit. I ask all of you to accept our basic philosophy on threshold limits. It is a guide. It isn't an actual figure. This allows each of you in your own state or any place to take and set your own code if you will, based on this general formula.

To me it is the simplest approach to a threshold limit that you can possibly have, and I just hate to see you go back to a range of values from five to fifty percent with a 20 mppcf limit, because that is not sufficient to prevent your men from getting silicosis. I have an x-ray file full of x-rays of men who are dead that will prove twenty million particles of granite per cubic foot of air is too much for them to live and work.

CHAIRMAN WILSON: We would like to have a real clear statement of the motion to see if we understood it correctly.

(The Reporter read back the motion as follows:)

"MR COUCHMAN: This will be a motion. I move that before any definitive action be taken at this meeting on the formula that it be withheld for a further study for a period of one year."

MR. DOYLE: I don't quite agree with Charlie's motion, because it indicates no action. It lets the matter sit for a year and then reconsider it. I might point out to you that the Public Health Service and the U. S. Bureau of Mines has completed a study of silicosis in the metal mining industry. We have medical

histories, occupational histories on approximately fifteen thousand miners. We will have in addition to this a great deal of data on the Saronac Lake findings in the Lake Superior Mining District. We will have hundreds of thousands of dust counts. Although this study pertains to the mining industry, and I realize there are many other kinds of exposures, it is quite possible this study, if evaluated properly, will throw a great deal of information, make a great deal of information available in the evaluation of this whole problem.

CHAIRMAN WILSON: You mean evaluation by the committee and the membership when this study is available to them.

MR. COUCHMAN: Mr. Chairman, I would like to point out that I think the motion carries definitive action be delayed for a period of one year for study, so that it just wasn't a delayed action. Harry, the reason I took this stand the way I did was because -- it is controversial in acceptance among our group, it is going to be much worse perhaps in a year's time as the idea is projected outwards. We will have a clearer viewpoint.

CHAIRMAN WILSON: As Chairman I would like to point out that one of the real strengths of it is the almost unanimous front of this conference when it is once published.

DR. COOPER: I am not sure there was a second.

CHAIRMAN WILSON: There was a second. We are going to have to take a vote pretty soon.

DR. COOPER: It seems this year could be important in determining the impact reaction among the people who will have to do this. It seems to me the motion should be amended to indicate what action we are taking on the entire list, what we plan to do. Someone would have to make a motion as to what is going in the report with regard to dust, so I suggest perhaps you want to ask for the question on this and probably another motion would be in order what is to be done for the entire list, what we are going to substitute for it.

CHAIRMAN WILSON: We could do it either way, amend his motion and take a vote on that, or vote now on the motion and then have some other motion about what the committee is instructed by the membership to do.

VOICE: Question on the motion.

MR. ASHE: Can I have just one last word?

CHAIRMAN WILSON: Yes.

MR. ASHE: If we turn this down and wait another year, it means another year of doing nothing. If we let it go for another year, it creates a confusion, you say, and you have a year you can correct it.

I would just like to tell all of you that this was very seriously considered by myself, Mr. Edward Baier from Pennsylvania, Mr. Barrett from Michigan, representatives of Public Health, Dr. Cooper of the Public Health Service, and others. This was agreed on unanimously, and you voted to accept it.

CHAIRMAN WILSON: Are you ready for the question?

MR. GRABOIS: In view of the serious objections raised and the possibility that not all of us are being heard, I think we should extend the time allowance so there can be further discussion on the subject. I would perhaps like to say a few words on it myself because I don't like that time limitation.

CHAIRMAN WILSON: I didn't establish the time. I can appreciate your feelings, but we do have a schedule to maintain.

MR. GRABOIS: I would like to say something.

CHAIRMAN WILSON: Go ahead sir. Those who must go can leave the meeting, but I feel this is important enough to get enough here that we leave here as a conference satisfied that we took the correct action.

MR. GRABOIS: It is our understanding that with certain exceptions the hazardous nature of dust depends on the free silica content. Now, with that understanding, and with several tables giving us different categories, and we try to set up different categories, five to ten percent, fifteen to thirty percent, and so forth and so on, and what were we doing? We were doing the same thing. We were working to some formula. That is all that mattered, and we decided to avoid a cleavage like when you go from under five percent free silica we allow fifty million particles per cubic foot, over five percent we allow twenty million. There is a difference of thirty million particles within a one percent difference in the free silica content. Those of you who have studied mineral dust know that in quarries, in foundries, in every particular field, the concentration, the percentage of free silica will vary easily within five percent. Now, that concentration in the formula does not affect considerably to a substantial amount of allowable limit of so many million particles per cubic foot of air, and that is where we developed the formula.

We are a scientific body. We have to have figures to show fifty million particles per cubic foot, but the threshold levels are supposed to be used by trained industrial hygienists, and regardless of the fact that we do have a level let's say, of fifty million, we in the field who have found forty-five million or fifty-two million use it the way we see fit. We evaluate it based on our experience. It isn't a precise concentration that you are aiming at. You have to use your judgment in using anything, and I think the sub-committee did a considerable amount of work and went through a lot of labor to develop this formula. We had all the evidence which was presented here, and we had evidence from other people in the field. As a matter of fact, Professor Hatch was one hundred percent behind the formula. So you must realize that in developing the formula, the sub-committee considered everything. It didn't just sit down and talk about it.

DR. STOKINGER: I would like to add one substantiating point, as to the fears raised. The essential elements of this formula have been accepted and are in use in the Department of Labor, Division of Industrial Hygiene in Massachusetts, and caused no furor.

MR. COLEMAN: A basic figure nobody talked about is regarded as substantially reducing the limit one hundred percent, namely fifty-five to two and a half. Is anybody opposed to that? I think there is plenty of evidence showing five percent free silica might be too high. Does anybody have any other comment?

MR. BALIFF: I object to the formula not as a formula because I think it is good used by industrial hygienists. My objection is this type of thing put into a code. For example, if this committee, this conference, would make a strong statement against the use of this type of thing, the whole list of T.L.V.'s, in a code and would do something constructive to get it out of existing codes. I will back this formula and the committee one hundred percent. It is not the formula I am concerned with. It is the use of it.

MR. BARRETT: I was trying to say that I have no quarrel with reducing the limit of silica. Certainly, the broad limits we have of over fifty percent have been too high, and this very broad range between twenty and fifty percent has been ridiculous. But I believe that the formula applies a certain amount of precision in this that we don't have.

Furthermore, in our introductions to our T.L.V.'s we indicate that these are guides. We are not trying to pinpoint a specific number, and yet you can take that formula and come out with 22.5, or 87.3, or some other magic number. I would favor a block stepping stone arrangement again to narrow stepping stones. It would be a little more significant.

DR. REINDOLLAR: Threshold limit values are not amenable to revision. As Harry Ashe has pointed out, it would very likely mean nothing will be done for a year. The uncertainty here seems to depend upon the division in the group present, Let's turn it around the other way. Let's let the formula value prevail. If there are people opposed to it, they will get active and see that something is done about it. Meanwhile, the individuals whom Mr. Ashe and other people had spoken about that are being exposed unduly will be protected for the next year at least.

CHAIRMAN WILSON: To me, a physician, this is a very important point for you to consider, but I do believe we must go ahead and take a vote here on the motion unless someone has some very pertinent comment to make. Do we need to read that again?

(The Reporter read back the motion as follows:)

"MR. COUCHMAN: This will be a motion. I move that before any definitive action be taken at this meeting on the formula that it be withheld for a further study for a period of one year."

CHAIRMAN WILSON: All of you have heard the motion. All in favor of the motion stand. (Count taken) Sixteen is what I count.

All opposed to the motion stand. (Count taken) Twenty-four I count.

Well, for whatever we have to live with, the threshold limit values have been approved, stand, and are incorporated into the transaction.

Unless someone has any further business, I am already overdue. I wish to express to the membership my real appreciation for the valuable opportunity and privilege you gave me to serve you. I shall continue to try to serve in every way I can. I want to promise our incoming chairman that he shall have my full and loyal support, and I will do anything I can to help your tenure to be a success. Come up here, E. Lynn Schall.

MR. SCHALL: I would just like to thank the membership for the honor bestowed, and we will make every effort to maintain the high standards of the conference that have existed for many years. We are going to rely very much on your help. Thank you. Are there any further items that should be mentioned?

MR. CHANLETT: I move there be placed on record a vote of thanks of the American Conference of Governmental Industrial Hygienists to Dr. W. L. Wilson for his leadership.

VOICE: A resolution has been submitted.

MR. SCHALL: We have a resolution. If there is nothing further, I declare the meeting, the conference, closed.

(Whereupon at 12:15 p.m., the meeting was adjourned.)