1946

HEALTH IN INDUSTRY

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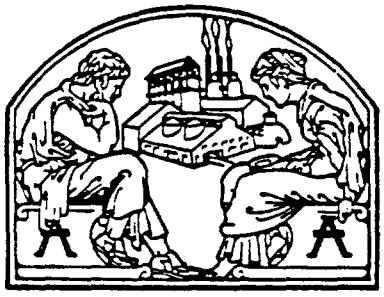

TRANSACTIONS

Bulletin No. 8

Eleventh Annual Meeting

INDUSTRIAL HYGIENE FOUNDATION
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TRANSACTIONS

of

ELEVENTH ANNUAL MEETING

of

INDUSTRIAL HYGIENE FOUNDATION OF AMERICA, INC.

NOVEMBER 7, 1946



A view of the audience at the opening of the Eleventh Annual Meeting of Members of Industrial Hygiene Foundation in the auditorium of Mellon Institute, Pittsburgh, on November 7, 1946. Approximately 450 persons attended the meeting.

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company problems, was discussed in some detail, and I think I can say that all those present learned a lot from it.

The afternoon sessions included illuminating discussion on dust collection, control of fumes from metallurgical electric furnaces, windowless factories, and a general discussion on hood design.

Frankly, I think as an engineer, I derive as much from these informal meetings and discussions as anything I can get from the Foundation, and I speak wholly selfishly. If you attend engineering meetings at any of our societies you usually listen to formal papers, formally presented, in which discussion is limited; we don't go in for that much in this country and I think it is a shame we don't.

In informal gatherings like this, when the topics are well prepared and the discussion is limited to a comparatively few minutes, men are tempted to get up and say what they think, and come away with many refreshing, new ideas. I am sure this type of meeting is going to be a fixture in the Foundation and one which, again from purely selfish motives, it is well to attend.

SUMMARY OF CONFERENCE ON CHEMISTRY AND TOXICOLOGY*

Industrial Hygiene Foundation held its first round-table Conference on Chemistry and Toxicology in connection with the Eleventh Annual Meeting of Foundation Members. Forty-eight chemists, research directors and toxicologists from Foundation-affiliated companies attended. The discussions were informal, but the following is a summary of subjects covered on the agenda:

1. Comparative Toxicity of Chlorinated Hydrocarbons

Maximum allowable concentration was defined as the maximum concentration that a man can inhale for a long period of time without injury to health. It was stressed that exact information of this nature is available for only a few substances. Therefore, our present tables of M. A. C.'s will be changed frequently as experience dictates. In the interim our present tables of limits serve as quasi-legal limits and are valuable for progress in control.

The order of toxicity of the more common chlorinated hydrocarbons was discussed from the viewpoint of recent toxicological research.

2. Warning Labels Upon Hazardous Chemicals

It is of primary importance that there be uniformity in labeling hazardous chemicals so that the exact type and degree of danger will be presented. The Manufacturing Chemists' Association Manuals L-1 and L-2 provide guidance. For mixtures, only the dangerous constituents need be mentioned. Under no circumstances should chemicals be over-labeled, i. e., the degree of hazard should not be exaggerated.

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* Held November 8

3. Evaluation of the Hazard of Siliceous Dusts

Data on the variation of composition of dust with particle size were presented. It was of interest that similar to silica, uranium becomes significantly toxic only when the particle size is fine—comparable to that of hygienically active quartz. New techniques provide data on composition of air-borne dust in relation to size that more closely parallel the effects of dust in the human lungs.

4. Chemical Burns of the Eye

Techniques for saving the sight of eyes damaged by chemicals were described. (See Dr. McLaughlin's paper, page 60 of these Transactions.) It was stressed that many neutral chemicals can damage eyes as severely as acids or alkalis. The treatment, however, is identical for all chemicals.

5. Skin Penetration of Chemicals

Extensive contact of certain chemicals with the skin for relatively short periods of time can have fatal issue. Removal from the skin at once is therefore imperative and because of availability of water it should be used copiously. Contaminated clothing should be removed immediately.

6. Evaluation of Hazard of Contact Dermatitis by Experiment

Techniques which have been used successfully by one Member Company were described. The methods are particularly applicable for study of chemicals destined for use in the cosmetic, food or textile industries.

This Conference will be continued annually and your suggestions are invited as to subject matter and mechanics of procedure that will insure the maximum benefit. It is hoped that rather than a one-day meeting once a year, the Conference will become a year around source of information and a vehicle for the exchange of data between Member Companies. The Conference is sponsored and directed by the Foundation's newly formed Committee on Chemistry and Toxicology.

COMMITTEE ON CHEMISTRY AND TOXICOLOGY

H. F. SMYTH, JR., Ph. D., Chairman.
FRANCIS R. HOLDEN, Ph. D., Secretary.

LEGAL DEVELOPMENTS RESPECTING OCCUPATIONAL HEALTH

THEODORE C. WATERS*

During the past year only a few of the State Legislatures have been in regular session, with the result that there have not been many changes in state legislation relating to occupational health. In a number of states, codes of industrial hygiene have been prepared and have been proposed; hearings thereon have been held and in several instances such codes have been adopted and have become effective.

The general trend of court decisions construing compensation statutes has continued to be liberal with the result that the liability of employers to pay compensation for occupational injuries has been extended.

On behalf of our Committee, I would like to review briefly some of the legislation that has been enacted during the past year and to call the attention of members to State Codes of Industrial Hygiene that are presently effective in those states in which our member companies are operating. This subject has and will assume increasing importance with the enactment of enabling statutes, granting powers for control of potential hazards to Bureaus of Industrial Health. The Managing Director has also requested that our Committee include in our report reference to the subject of health clauses in Union Contracts.

I. OCCUPATIONAL DISEASE COMPENSATION STATUTES ENACTED OR AMENDED DURING THE YEAR 1946

A. New Occupational Disease Compensation Laws

Georgia has enacted an occupational disease compensation law which became effective April 30, 1946. This act made compensable a scheduled list of diseases caused by exposure to twenty-two named chemical poisonings, diseases caused by exposure to x-ray or radioactive substances, and the diseases of asbestosis and silicosis.

With respect to the named dust diseases, there is limitation of monetary liability of employers in the amount of $500.00 upon the effective date of the act, with monthly increases at the rate of $50.00 until full benefits of the compensation act are attained. The act created a Medical Board of five physicians appointed by the Governor from a list of nominees proposed by the Medical Association of Georgia. Provision is made that one of the members of the board is required to examine the claimant and file a report of his findings with the Medical Board. The Board then renders its decision in the case, from which an appeal may be taken to the State Board of Workmen's Compensation, provided, however, that the findings of the Medical Board upon the questions of medical fact may not be disturbed except upon the ground that the Board acted in excess of its powers or that its findings were procured by fraud, or that there was not sufficient competent evidence in the record to warrant the Medical Board in making the decision complained of, or that the decision of the Board was contrary to law.

* Mullikin, Stockbridge & Waters; Chairman, Legal Committee, Industrial Hygiene Foundation.

Another interesting feature is the requirement that the State Board of Workmen's Compensation shall, within thirty days after the effective date of the act, designate by order the specific occupations found subject to exposure of hazards of silicosis or asbestosis, and shall notify the employers of the necessity of compulsory examinations provided under the law. Thereupon it becomes the duty of every employer in the named occupations to provide, prior to employment or within thirty days after employment, a medical examination of all new and prospective employees to determine if they are in any degree affected by silicosis or asbestosis. Failure of an employer to provide such examination constitutes a misdemeanor and is punishable as such.

In cases of silicosis or asbestosis, the term "disablement" means the event of an employee becoming actually incapacitated because of silicosis or asbestosis from performing his work in the last occupation in which injuriously exposed to the hazards of silicosis or asbestosis, or from performing any work in any other occupation for remuneration. "Disability" means the state of being so totally incapacitated.

B. Amendments to State Workmen's Compensation Acts

New York State amended its compensation act to increase the maximum aggregate compensation payable for total disability or death due to silicosis from $6,500 to $7,500. The act contains the escalator clause increasing the total amount of compensation payable for disablement or death at the rate of $50.00 per month.

C. Summary of States Wherein Occupational Diseases are Compensable

There are now sixteen states,[1] the District of Columbia, one territory[2] and Federal jurisdiction wherein the Longshoremen's Act is applicable, providing general coverage for all occupational diseases. There are seventeen states[3] and one territory[4] wherein schedule coverage is provided for named occupational diseases. Therefore, in thirty-three states, as well as the District of Columbia, Hawaii and Puerto Rico, occupational diseases are now compensable.

Compensation is also provided by the Federal Employees' Compensation Act and the Longshoremen's and Harbor Workers' Act. Under the laws of eighteen states,[5] compensation payable for dust diseases is limited with respect to the employer's monetary liability, and in twelve states,[6] compensation for the dust diseases is payable only for total disability or death.

1. California, Connecticut, Florida, Illinois, Indiana, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New York, North Dakota, Ohio, Oregon, Washington and Wisconsin.

2. Hawaii.

3. Arizona, Arkansas, Colorado, Delaware, Georgia, Idaho, Kentucky, Maine, Maryland, New Jersey, New Mexico, North Carolina, Pennsylvania, Rhode Island, Utah, Virginia and West Virginia.

4. Puerto Rico.

5. Arizona, Arkansas, Colorado, Florida, Georgia, Idaho, Maryland, Massachusetts, Michigan, Minnesota, New Jersey, New Mexico, New York, Oregon, Pennsylvania, Rhode Island, Utah, and West Virginia

6. Colorado, Florida, Idaho, Maryland, Massachusetts, Michigan, Minnesota, New Jersey, New York, Ohio, Pennsylvania and Utah

II. CODES OF INDUSTRIAL HYGIENE

In any discussion of legislative provisions dealing with compensation of occupational diseases, there has been considerable controversy as to the form of legislation providing such compensation. However, upon one subject there seems to be general agreement among employers, employees and their insurance carriers; this is that occupational diseases can be and should be prevented. Industry has become health conscious and realizes that it has become good business to prevent the incidence of disease, rather than to pay compensation for such injuries. Since the enactment of occupational disease compensation statutes, there has been increased activity among State Departments of Health, State Departments of Labor and Industrial Commissions to effect the regulation and control of occupational hazards to prevent disease. Various State Codes of Industrial Hygiene have been promulgated and in many instances adopted, and it is probable that in all of the industrial states necessary legislative provisions will be enacted to enable proper state agencies to establish such codes.

Mr. J. J. Bloomfield of the United States Public Health Service is going to submit a report at this meeting outlining in detail the codes of industrial hygiene in the various states. I would like to make general reference to these codes and to discuss briefly the legal authority for their adoption, their scope and subject matter, with brief comment with respect to administration.

There are thirty-five states[1] that have codes of some type which are presently effective. None of these are uniform. They represent the attempt of individual State Departments to promulgate rules and regulations for the control of occupational hazards in a manner that seems proper to the particular state agency involved. In form some of these codes are applicable only to specific industries, as for example the codes in New York State. In other states the codes are inclusive of all industry, establishing permissible concentrations of dusts, fumes, gases and vapors without specific reference to a named industry.

I think it may be fairly stated that many of these codes, while well intentioned, were adopted without full consideration of the various problems of industry to which they would apply. In many instances they establish arbitrary standards of permissible concentrations of toxic dust, fumes and gases and say to industry, "Thou shalt not permit concentrations exceeding a stated limit." In most instances the codes do not attempt to advise industry of the way and means to accomplish compliance. It is submitted that one of the functions of Bureaus of Industrial Hygiene should be to assist industry to control occupational hazards and to find the best method for compliance.

Authority for Codes

The legal authority for codes may be found either in the constitution of the state or specific legislative provision authorizing the creation of Bureaus of Industrial Hygiene and the grant of authority to such Bureaus

1. Alabama, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Idaho, Illinois, Indiana, Kentucky, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New Mexico, New York, North Carolina, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Vermont, Virginia, Washington and Wisconsin.

of the act, designate by order the specific occupations found subject

to formulate codes, or the powers incident to the functions of State Departments of Health, Labor or Industrial Commissions. Most of the codes establish maximum allowable concentrations of toxic materials with penalty provisions for failure to comply. Enforcement is generally given to the State Departments of Health, Labor, Bureaus of Mines or Industrial Commissions. In most instances, no specific provision is included for methods by which industry may attain compliance.

In the administration of these codes, it would seem desirable for the administrative agency to cooperate with industry in the attempted solution of industry's problems by educational processes, rather than by police enforcement of the penalty provisions.

Industry has accepted its responsibility to provide its employees safe places in which to work and safe tools with which to work. Management is not indifferent to health hazards and is seeking to attain effective engineering methods to control hazards. Many problems are presented in the perfection of such methods, and these cannot be and will not be solved overnight.

Changes in industrial processes and newly developed uses of chemicals and other toxic materials will continue to create new problems for the control of hazards. Some large industries have adequate engineering staffs and personnel to study these problems and control potential hazards. Many small industries do not have available personnel for this purpose.

The primary object of Bureaus of Industrial Hygiene is to correct hazardous conditions in industry and by assisting management in the discovery, correction and control of hazards, this purpose will be achieved. If administration takes the form of an educational program, I believe that industry will gladly cooperate and the results obtained will be more effective than in any other manner.

It is unfortunate that there is not greater uniformity in the state codes presently effective. Under the leadership of the United States Public Health Service it should be possible to prepare some uniform code that would be suited to industry of all industrial states. If this were done, the codes now effective could be repealed and the proposed model code enacted. With the cooperation of employers, employees and the state agency administering the codes, occupational hazards could be reduced to a minimum and diseases practically eliminated.

III. HEALTH CLAUSES IN UNION CONTRACTS

This subject is one of increasing importance and emphasizes the role of industrial hygiene in labor relations. Perhaps detailed discussion of the subject would be more appropriate in meetings that are devoted to a consideration of industrial relations. It is not the purpose of our Committee to recommend the inclusion or exclusion of clauses of this type and we believe it will be of interest to members to consider certain provisions that have been included in contracts which have been published and are fairly representative of the trend of clauses now being considered by Departments of Industrial Relations.

In the agreement, dated March 19, 1946, between General Motors Cor-

poration and the United Automobile Workers—CIO, we find the following incorporated as paragraph 146 of that agreement:

> "A report of physical examination and any laboratory tests made by physicians acting for the Corporation will be given the personal physician of the individual employee involved upon the written request of the employee."

Again in an agreement, dated March 13, 1945, between Carnegie-Illinois Steel Corporation and the United Steelworkers of America—CIO, we find Section 12, dealing with safety and health, provides as follows:

> "The Company shall continue to make reasonable provisions for the safety and health of its employees at the plant during the hours of their employment. Protective devices, wearing apparel and other equipment necessary to properly protect employees from injury shall be provided by the Company in accordance with the practices now prevailing in each separate plant. Proper heating and ventilating systems shall be installed where needed."

In the agreement, dated July 6, 1945, between Industrial Silica Corporation and the United Steelworkers of America—CIO, we find the following sections under Article 14 dealing with the subject of physical examinations:

> **"Section A. Conditions of Examination**
>
> "It is hereby mutually understood and agreed that the Corporation shall have the right, from time to time, to require employees, at its own expense, to submit to medical and physical examinations by physicians or specialists of its own choosing, and to terminate or suspend employment of any employee or transfer him to another department if such examination shows that said employee cannot with safety satisfactorily continue the kind of work he was doing at the time of such examination or is suffering from any disease which could be communicated to the other employees.
>
> **"Section B. Effect on Employee**
>
> "No such employee shall be permanently laid off, suspended or transferred as the result of any such examination until he has been given five (5) days' written notice of the intention of the Corporation so to do and the records of the Corporation with respect to any such examination shall be open to inspection by the employee's personal physician upon the written request of the employee."

In certain instances representatives of labor have made public statements in opposition to requirements by employers for pre-employment physical examinations as a prerequisite to employment. Similar opposition has been expressed with respect to recurring annual physical examinations. You will recall previous reports of our Committee pointing out statutes of various states under which in certain occupations pre-employment physical examinations were required by law, and in which annual recurring physical examinations were similarly required. Certainly in those industries where potential hazards to health exist, one of the most effective methods of con-

trol of the incidence of disease is the use of physical examinations to determine whether or not the claimant may be suffering from, or peculiarly susceptible to, a given occupational disease, and for his own protection and that of his fellow workmen, it is desirable that he should be excluded from such employment. Furthermore, the use of annual physical examinations in certain industries may well develop information as to the incidence of occupational diseases and protect employees against potential disability or ultimate serious illness.

While the use of physical examinations may have been and may be abused, they are certainly desirable for the promotion of programs of medical control. With respect to the employment of physically handicapped employees, such examinations are essential to the proper placement of these individuals so that their ability may be evaluated and they may be assigned to do those jobs where they are best fitted.

Conclusion

During the year 1947 the Legislatures of all of the States of the Union will convene except Kentucky, Louisiana, Mississippi and Virginia. It is to be anticipated that legislation relating to amendments to existing workmen's and occupational disease compensation acts will be introduced, and in many states enacted. Our Committee suggests to members that it will be to their interest to follow these legislative sessions with care to see that whatever provisions may be adopted are reasonable and suited to their industrial operations.

The promulgation of codes by the various states will proceed and it is reasonable to expect that Bureaus of Industrial Hygiene will increase their activities in an attempt to eliminate potential hazards and assist industry in effecting control of health conditions. Much has already been accomplished in the field of industrial hygiene. Much remains to be done. Let no member company minimize the importance of this subject and let constant care in your operations be your watchword so that industrial accidents and diseases may be kept at an absolute minimum.

CODES FOR THE PREVENTION AND CONTROL OF OCCUPATIONAL DISEASES

J. J. BLOOMFIELD*

One of the major causes of lost time in industry is workers' ill health, some of it caused by physical conditions in the job environment. Although industrial hygienists now have the techniques to prevent almost any kind of occupational disease, unfortunately the application of this knowledge has not progressed as rapidly as it has been acquired. The problem, then, is the promotion of industrial hygiene techniques so that they reach every industry in the country.

One effective means of disseminating and applying information on good industrial hygiene practice has been through the promulgation and administration of reasonable rules and regulations designed to set forth systematically the principles involved in such practice. Such rules and regulations, or codes, as they are sometimes called, can be of significant aid to industry in achieving safe and healthful working conditions, if they are based on scientific fact, are practical and adequate.

It is the purpose of the present discussion to examine the subject in the light of recent trends in the enactment of codes by the States. The major features of a code are also discussed, on the principle that their aim should be to inform management what its responsibilities are and how safe and healthful working conditions may be achieved.

Present Legislation on Prevention

One of the inherent weaknesses of nearly all occupational disease legislation enacted to date in the United States is the omission of any provision for the prevention and control of occupational diseases. In nearly every instance, with but three or four notable exceptions, the desire has been to provide compensation for occupational diseases, whereas the prevention and control of such diseases should really be one of the prime considerations. As a matter of fact, even in those States where the laws make some provision for the prevention and control of occupational diseases, unsatisfactory conditions exist, simply because the powers and duties in this field are assigned to several state departments. In many instances, the laws are so worded as to be vague and indefinite; and what is most discouraging, they do not provide the essential machinery for an effective control program. Everyone will concede that no matter how well a code has been developed, its provisions are completely nullified unless the State has set up a technical agency to administer such a code. Such a technical agency is one staffed with trained industrial hygiene personnel, who can develop the necessary standards based on scientific fact, investigate the working conditions in industry in the light of such standards, and then aid industry in attaining these standards.

In view of these facts, it may be well at this point to examine the development of industrial hygiene in this country and the part which industrial hygiene divisions have been playing of late in the promulgation of industrial health codes.

* Assistant Chief, Industrial Hygiene Division, U. S. Public Health Service

The growth of industrial hygiene activities in our state governments has been phenomenal during the past decade, largely through the impetus given to this program among the states by the U. S. Public Health Service, which has assisted the states both financially and through technical consultation services. At the present time, there are 41 states with full-time industrial hygiene activities, several large cities and counties, as well as territories. In all, we have 52 industrial hygiene units and, unquestionably, there will be industrial hygiene services available to industry in every state and territory in the Union within the next year or two. Since industrial hygiene in its broad interpretation is conceded to be an integral part of public health, the development of such services in this country has been largely in state health departments. At present, there are 50 industrial health units in health departments and two in labor departments.

If we examine Table I (see pages 80, 81, 82), which summarizes industrial hygiene activities and the trend in the development of industrial hygiene codes, we will note that the basis of authority for carrying on industrial hygiene activities in the 50 health departments is evenly divided between specific legislation and that emanating from the broad powers given to health departments in their organic act. With regard to the two labor departments, specific legislation has been enacted charging these departments with the responsibility of carrying on certain activities in the industrial hygiene field. We also find that among these 52 industrial hygiene agencies, only 35 have promulgated rules and regulations, or codes, for the control and prevention of occupational diseases.

Codes Variable in Nature

A close study of these 35 codes shows a great divergence in their provisions. It is obvious that large industrial concerns operating in several states must find it difficult to develop a policy on safeguarding the health of their employees. In 17 states, obviously, there are no guides to follow, while in the 35 states which do set up certain criteria, we find that these are variable in character. For example, a study of Table II, which is an analysis of the 35 code provisions, shows that most of the codes make some reference to maximum allowable concentrations of atmospheric contaminants. In 49% of the states these M. A. C. values have legal status, while in 51% they are merely suggested guides. Only 6% of the states deal with prevention of disease through skin contact, while none of the codes so far examined by us deals with the prevention of infection from contact with certain materials employed in industry. Forty percent of the codes deal with the subject of illumination and 37% have some provision as regards temperature, humidity, and air movement. Only 6% of the codes deal with the subject of noise, while not a single one covers the effects of vibration on health. Twenty-three percent of the codes deal with the subject of excessive pressures, 12% with radiant energy, 34% discuss the subject of personal protective equipment, and 57% housekeeping. The two subjects receiving most attention in the 35 codes which have come to our attention are ventilation, which is a subject dealt with in 72% of the codes, and general sanitation, which is found in 83% of the codes.

It is patent, therefore, that the entire situation with regard to industrial hygiene codes leaves much to be desired in the way of uniformity, adequacy, and preciseness as to administration. In summing up the entire subject, the major weaknesses of present-day codes, as we see it, are

TABLE II

ANALYSIS OF STATE INDUSTRIAL HYGIENE ACTIVITIES, CODES AND THEIR PROVISIONS

Total number of industrial hygiene units 52

Agencies conducting industrial hygiene activities:

- Health departments 50
- Labor departments 2

Authority for carrying on industrial hygiene activities:

Health departments

- a. Broad power 25
- b. Specific legislation 25

Labor departments

- Specific legislation 2

Total number of codes 35

Code provisions

		Percent
1.	Maximum allowable concentration	
	a. Legal status	49
	b. Guide	51
2.	Skin contact	6
3.	Infectious material	0
4.	Illumination	40
5.	Temperature, humidity, air movement	37
6.	Noise	6
7.	Vibration	0
8.	Pressure	23
9.	Radiant energy	12
10.	Ventilation	72
11.	Personal protective equipment	34
12.	Housekeeping	57
13.	Sanitation	83

(1) our present state laws give authority to several agencies in the field of rule making and enforcement, which makes for confusion and, at times, duplication and conflict among the several agencies; (2) 17 of the states have as yet not set up guiding principles to assist industry in achieving good working conditions; and (3) the codes which have been promulgated to date are inadequate in providing any specific information which would show industry how it can comply with the rules and regulations promulgated.

What we need in industrial hygiene today, and we need it badly, is a code which would be patterned after the U. S. Public Health Service Standard Milk Code.[1] This particular code, which was developed after many years of arduous effort, contains but one page in the way of an enabling ordinance, but approximately one hundred pages of detailed and specific information, which shows clearly what the milk industry must do to comply with the ordinance. For these reasons, it may be well to consider the possibility of re-orienting our thoughts regarding codes in industrial hygiene as to their purpose and content.

Principal Features of a Code

In our opinion, the main purpose of a code is to provide reasonable guides or principles which would enable industry to maintain the health of its workers at a high level. If a code is to accomplish this purpose, it must also be reconciled with the chief aim of industry, which is to turn out goods and services in the most efficient way possible so as to achieve maximum production at minimum cost. To accomplish all this, a code of the type envisaged in this discussion should contain rules and regulations for the prevention and control of occupational diseases. This should be the first section of the code and should be brief and the terms well defined. The second part of the code would be in greater detail and would repeat the rule, state the public health reason behind it, and then show industry how it can satisfactorily comply with the rule by an informative discussion of the subject at hand. Perhaps this will be made clearer if we indicate some of the principal features which such a code should contain.

In the introductory material to the code itself, there should be a definite statement indicating the authority or law behind the code. The purpose of the code should be stated and the industries to which the code applies. The code should contain a statement as to who is to administer it, in other words, the enforcement agency should be named. It should also contain a provision for appeal, or a modification of any of the rules when conditions warrant such action, and a penalty for violation of any of the rules. This material should be followed by clear definitions of the various major terms employed throughout the entire code.

What Rules Should Cover

The rules themselves should cover the following subjects, which can be conveniently divided into two parts. Part one of the rules should deal with those regulations pertaining to environmental hygiene, while the second part should deal with the hygiene of the individual. In this way, all factors involved in industrial hygiene practice will be treated. Under environmental hygiene regulations, the rules should cover such subjects as (1) maximum allowable concentrations for atmospheric contaminants, (2) skin contact with hazardous materials, (3) infectious materials, (4) illumination, (5)

1. Public Health Service Milk Ordinance and Code: 1935. U. S. Public Health Service. Public Health Bulletin No. 220. July, 1935.

temperature, humidity, and air movement, (6) noise, (7) vibration, (8) abnormal atmospheric pressure, (9) radiant energy, (10) ventilation, (11) personal protective equipment, (12) housekeeping, and (13) sanitation.

Part two of the rules, dealing with personal hygiene, should contain material on (1) first-aid emergency services, (2) prompt and early treatment of all illnesses resulting from occupational exposures, (3) impartial health appraisals of all workers, (4) recording and reducing absences due to all types of disability, and (5) health education programs.

The last part of the code, and the one which will require considerable detail and, needless to say, careful thought, effort, and much labor, will be that portion dealing with the legal interpretation of the rules or, better still, information of the most up-to-date character which would actually show how these rules can be met through good industrial hygiene practice.

Controversial Features

Perhaps one of the most controversial features of present-day codes has been the matter of maximum allowable concentrations and the divergencies in the limits set among the various states which have labored with this subject. It seems to us that one of the first considerations among those responsible for the development and promulgation of codes is whether we are going to consider merely the toxicity of substances when setting a limit or if attention will also be directed to their nuisance aspect. This is especially applicable to those fumes, smokes, gases, vapors, and dusts that are not necessarily toxic in nature and to other contaminants which may be present in nontoxic concentrations. We, as industrial hygienists, feel that our job is not only to prevent injury to the worker's health, but also to make him reasonably comfortable and efficient in his work environment. It is in this border-line stage that the most controversy exists, that is, where there are incipient poisonings of physiological responses causing discomfort and unpleasantness, but not necessarily injury to health. Enlightened management finds it good operating practice to control the working environment, so that even the mild physiological responses that are causing discomfort are kept at a minimum. In fact, it is a good practice to keep them at a minimum because quite frequently such uncomfortable conditions make a worker accident-prone, as, for example, when a worker becomes inebriated from inhaling trichlorethylene or petroleum solvent vapors. Certainly, no one in industry has questioned, for example, the standard universally adopted in this country for chromic acid mists resulting from chromium electroplating operations. These mists do not cause systemic injury, but do produce, under certain conditions, irritation of the mucous membranes and destruction of a part of the nasal septum. Through educational efforts within the electroplating industry itself, it has been a relatively simple matter to obtain good operating techniques, so that chromic acid levels are kept well below the point where these minor injuries and discomforts can occur.

At the present time, there is a committee within the American Conference of Governmental Industrial Hygienists which is concerned with developing maximum allowable concentrations which can be adopted by all the states. This committee recently inquired into the subject, and at the moment has received replies from 24 states and three cities as to maximum allowable concentration values. Table III shows the variation of maximum allowable concentration values among these 27 jurisdictions for some 21

TABLE III

VARIATION OF MAXIMUM ALLOWABLE CONCENTRATION VALUES (24 STATES, 3 CITIES REPORTING)

SUBSTANCE	Agencies reporting MAC values		Values Reported and Number of Agencies Reporting									
			Maximum Allowable Concentration									
	Established values	No values reported	Value in ppm*	Number	Value in ppm	Number	Value in ppm	Number	Value in ppm	Number	Value in ppm	Number
Acetone	14	13	200	4	400	3	500	6	1000	1	—	—
Amyl acetate	20	7	100	1	150	1	200	2	400	16	—	—
Benzene	25	2	75	8	100	17	—	—	—	—	—	—
n-Butanol	16	11	25	1	50	2	100	9	200	3	300	1
n-Butyl acetate	19	8	100	1	150	1	200	2	400	15	—	—
Carbon disufide	23	4	15	3	20	20	—	—	—	—	—	—
Ethyl alcohol	10	17	100	1	250	4	500	1	1000	4	—	—
Ethyl bromide	6	21	400	2	1500	1	1700	3	—	—	—	—
Fluorine (HF)	24	3	3	24	—	—	—	—	—	—	—	—
Formaldehyde	22	5	10	16	20	6	—	—	—	—	—	—
Gasolene	20	7	500	2	1000	18	—	—	—	—	—	—
Methanol	24	3	100	6	200	17	300	1	—	—	—	—
Methyl chloride	11	16	100	2	200	5	250	1	500	3	—	—
Naphtha (petr.)	15	12	500	2	1000	10	5000	3	—	—	—	—
Nitrobenzene	19	8	1	2	2.5	1	5	16	—	—	—	—
Nitrogen oxides	25	2	10	6	20	2	25	16	40	1	—	—
Phosphine	19	8	1	11	2	8	—	—	—	—	—	—
Sulfur dioxide	25	2	3	1	5	1	10	23	—	—	—	—
Turpentine	21	6	100	2	200	16	400	1	700	2	—	—
Xylene	22	5	100	4	200	18	—	—	—	—	—	—
Carbon tetrachloride	26	1	50	7	75	5	100	14	—	—	—	—

* Parts of substance per million parts of air by volume.

commonly used substances in industry. In most cases, the variations are not too great, and it is felt that perhaps too much emphasis has been placed on this point. In those instances where there is a divergence, the error has been on the safe side. For example, in dealing with the highly toxic substance of benzene, of the 27 jurisdictions which have reported to the committee, 25 had established values and two had none. Of the 25 which had established a value for this substance, 17 used the American Standards Association value of 100 parts per million, while 8 used the slightly lesser value of 75 parts per million. Again, with regard to carbon tetrachloride, a substance which has received considerable attention of late and one on which it has been difficult to obtain unanimity on a threshold value, we find that only one of the 27 jurisdictions has no value for this chemical, while 26 have established a criterion. Of these 26, 14 employ the value of 100 parts per million, five use 75, and seven use 50 parts per million. Altogether, there are not too many substances which we find have variable limits among the states, whereas, on the other hand, there are many materials for which there is complete unanimity. Among some of the commoner toxic substances employed in industry, such as lead, mercury, TNT, zinc oxide, and cadmium, there is complete unanimity among the states as to maximum allowable concentrations for these substances. (See Table IV.)

Realistic Approach

It is our desire to emphasize the need for a realistic approach to this whole subject. To begin with, we feel that there is a definite responsibility upon the governmental agencies administering industrial hygiene to establish M. A. C. (maximum allowable concentration) values only after a great deal of study and thought have been given the subject. So far, on the whole, these have been established in such a manner as to cause no serious handicap to industry. Furthermore, administrative agencies should realize that the determination of whether a working condition is safe or unsafe depends on other factors besides that of maximum allowable concentrations in the atmosphere. Of late, more and more reliance has been placed by industrial hygienists upon the exposure determinations alone, without regard to other factors in the working environment. It seems to us that before an industry is told that it should make certain provisions to control a condition suspected of being inimical to health, a complete health survey is in order. Such a health survey should involve at least two criteria in determining the safety of an operation. First, it is essential that the health of those workers exposed to a certain material or condition should be carefully inquired into. This may involve not only an examination of the worker's health record, but also an examination of the worker himself. Second, careful environmental studies should be made, which would not only include certain determinations of the atmosphere, but also a thorough sanitary survey and occupational analysis. All these put together should yield data of real value in helping to control industrial health hazards.

Developing Standards

At the present time, we have several agencies concerned with the development of standards on limiting atmospheric contaminants. All of us are familiar with the splendid work of the American Standards Association on this subject. The American Conference of Governmental Industrial Hygienists, whose membership consists of those responsible for administering indus-

TABLE IV

MAXIMUM ALLOWABLE CONCENTRATION VALUES FOR WHICH GOOD AGREEMENT EXISTS

Gases and Vapors

Substance	Number Agreeing	Number Disagreeing	Percent Agreeing	M. A. C. (ppm)*
Acetic acid	3	0	100	10
Acrylonitrile	12	0	100	20
Ammonia	21	0	100	100
Aniline	22	0	100	5
Arsine	21	1	95	1
Carbon monoxide	27	0	100	100
Chloroform	9	1	90	100
1-Chloro-1-nitropropane	4	0	100	20
Cyclohexane	3	0	100	400
0-Dichlorobenzene	21	0	100	75
1, 1-Dichloroethane	4	0	100	100
1, 2-Dichloroethane	16	0	100	100
Dichloroethyl ether	13	0	100	15
Dimethylaniline	11	0	100	5
Hydrogen chloride	24	0	100	10
Hydrogen cyanide	25	0	100	20
Hydrogen fluoride	25	0	100	3
Hydrogen selenide	3	0	100	0.1
Hydrogen sulfide	26	0	100	20
Monochlorobenzene	15	1	94	75
Mononitrotoluene	9	0	100	5
Phosgene	23	0	100	1
iso-Propyl ether	3	0	100	500
Styrene	11	1	92	400
Tetrachloroethylene	22	0	100	200
Toluene	22	2	92	200
Trichlorethylene	24	2	92	200
Toxic Dusts and Fumes Mg/M³†				
Barium peroxide	6	0	100	0.5
Cadmium	24	0	100	0.1
Chlorodiphenyls	12	1	92	0.1
Chromic acid	23	0	100	0.1
Dinitrotoluene	7	0	100	1.5
Lead	26	0	100	0.15
Mercury	22	0	100	0.1
Tetranitromethylaniline	10	0	100	1.5
Trinitrotoluene	11	0	100	1.5
Zinc oxide	20	1	95	15.0
Asbestos	17	0	100	5‡

* Parts of substance per million parts of air by volume.
† Milligrams of substance per cubic meter of air.
‡ Millions of particles of substance per cubic foot of air.

trial hygiene in this hemisphere, has recognized the importance of the subject of codes, and has a committee working on the development of a uniform code, one which could be adopted by all the states. The Industrial Hygiene Division of the U. S. Public Health Service, which is intimately concerned with the activities of this Conference, as well as with the state agencies administering industrial hygiene, is urging the development of a code of the type outlined in the present discussion. Such a code will probably take several years of effort, although a considerable amount of information is already at hand for inclusion. The main problem, as we see it, will be to obtain unanimity among the various states. It is felt that if such a code is based on scientific fact and is so worded that it takes into consideration the various social and economic aspects of the problem, then it should meet with great favor among the state agencies and the public. This will be especially true if it is administered in a spirit of cooperation with management and labor.

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