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INDUSTRIAL HYGIENE CODES AND REGULATIONS

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Connotation and the suggested implications of a subject are unavoidable elements of very important influence on a person's thinking. When dealing with industrial hygiene codes, it is, therefore, necessary to condition the mind, by deciding whether one is to think of a code in the strictly legal and regulatory sense of being "a body of law established by the legislative authority of the state, and designed to regulate completely, so far as statutes may, the subject to which it relates."—or whether one is thinking about codes in the ordinary and more voluntary sense of being "a system of principles, rules, or regulations relating to one subject, or a formal statement of them." The preference of the speaker is the more common and voluntary sense with a minimum of regulatory provisions. There is much evidence that a desire for a concept of a maximum permissible freedom in the rules of life is shared by many persons. It is hoped that this will be a continually increasing dominant influence in the formulation and administration of all codes.

The real usefulness of codes is inherent in their compilation of good knowledge and description of good practices pertinent to a particular subject, their contribution to education and understanding, the basis they provide for measuring and comparing the results of endeavor, and their effect, whether voluntary or legal, in attaining good practice. Codes, both written and unwritten, have always been an essential factor in the progress of civilization, and are no less so to industrial hygiene.

Development of Industrial Hygiene Codes

Industrial hygiene codes of one form or another are not new in this country. Some of the trades and industries have voluntarily formulated codes of good practice. Likewise, some of the states have had rather long experience in this endeavor. A discussion of the practice and experience of the State of New York was presented by Greenburg[1] at a previous session of the present meeting of this Foundation. However, most of the industrial hygiene code endeavor among the states is a comparatively recent activity. It has paralleled the rather rapid growth and acceptance of industrial hygiene practice as a

desirable and necessary part of the maintenance of health in industry. The endeavor is a rather natural product of the accumulation of knowledge and experience in the control of occupational hazards, and the realization that the effective techniques could be promoted and applied more broadly in industry, if they were organized into systems or codes of good practice. Consequently, considerations of industrial hygiene codes are no longer those of desirability, need, and usefulness, but are those of incorporating the best knowledge into codes that are adequate, reliable, and practical. In accomplishing this, however, it must be realized that the development of these codes is necessarily based on current conceptions of need and scope, and upon current knowledge with its many existing areas of indefiniteness and deficiency. Qualities of adequacy, reliability, and practicability can be only relative and conditioned upon the current understandings. This emphasizes that the development of industrial hygiene codes must be considered from both the short range viewpoint of incorporating the best present conception and reliable knowledge, and the long range viewpoint of providing means for prompt revision to include new concepts, needs of changing conditions, and better knowledge. Further, codes must be administered with a full understanding of their limitations.

Authority for the Development of State Codes

A comprehensive review of the authority that exists among the states and other agencies in this country for promulgating and enforcing industrial hygiene codes, with a discussion of the general nature and trends of the existing codes, their weaknesses and deficiencies, and the need and suggested content of a uniform code, was presented at a former Annual Meeting of this Foundation by Bloomfield.[2] The general situation as presented at that time has not changed fundamentally. There has been an increase in the number of states that have industrial hygiene facilities with only two now remaining without them. The abundance of authority and power among the states and territories to promulgate and enforce such codes, rules and regulations, remains. In about one-half of the states the power is broad, and in the remainder it is by specific legislation. A large majority of the states have industrial hygiene codes of one form or another.

Subject Matter of Present State Codes

The subject matter of the state codes varies widely. It ranges from little more than general sanitation, to increasingly broader coverage through attention to chemical and physical agents and factors of environment. More or less singular attention is given to the

employment of minors, reporting of cases, employer and employee responsibility, and specific hazards. The majority of the codes have tables of allowable concentrations of atmospheric contaminants. These tables vary widely in scope and to some extent in the values given for the limits. The limits have legal status in about one-half of the states; in the remainder they are suggested hygienic standards.

Weaknesses of Present State Codes

There has been no very important remedy to the weaknesses and deficiencies of the codes that were pointed out by Bloomfield.[2] The variability and diversity of content continue to make it difficult to develop national policies for safeguarding the health of industrial employees. This is of particular importance to industrial concerns that operate in several states. It is also important to designers of structures, equipment, and processes, to trade associations that carry on health activities among their members in many states, and in fact, to all interests. Many of the codes do not have guiding principles to assist industry in achieving good working conditions; also they are inadequate in providing specific information which would show industry how it can comply with the code requirements. There are many areas of indefiniteness and inadequacy which hinder good administration.

There continues to be a multiplicity of agencies within most of the states with authority to promulgate and administer rules and regulations pertaining to industrial hygiene. There are few states that have less than two such agencies and some have five or six. In addition, a single one of these agencies may have a dozen or more separate and sometimes conflicting codes. This overlapping of authority and purpose creates duplication, confusion, and conflict among the agencies, and creates problems for the employer and all others concerned.

The variable and diverse nature of the present state codes is a rather natural product of the power that exists within the states to promulgate and administer such regulations, and the right of each state to promulgate a code of its own choosing. This has resulted in a situation which, although undesirable and irksome, has provided a grand experiment in code preparation and administration, the results of which have been very substantial. There have been contributions to better working conditions, to elicitation of attention to industrial hygiene practices, to the desired scope, character, and administration of such codes, and to the determination of areas of deficiency. It appears, however, that this naturally occurring experiment has practically served its purpose and that real attention should be given to

improving the code situation. Although some peculiarities of occupational exposure to harmful agents may occur among the states, the variety of processes and agents, and the opportunities for exposure are generally similar, and there appears to be only minor need of specialization or tailoring of codes to meet specific state requirements. Further, if the industrial hygiene codes are to be representative of the best knowledge, practices, and scientific data, it is a sound expectation that they would and should be far more uniform than they are at the present time. Their divergencies alone condemn them.

ACGIH Model Code

It has been mentioned that a part of Bloomfield's[2] discussion pertained to a pattern for a model code that was designed to remove the undesirable features of the existing code situation; also, that a Committee of the American Conference of Governmental Industrial Hygienists (ACGIH) was engaged in the drafting of a code along the lines of the pattern that he presented. The aims and objectives of this pattern were briefly, a code that was adequate, practical, and based on scientific fact; aimed to inform management what its responsibilities are, and how safe and healthy working conditions may be achieved; and so worded to take into consideration various social and economic aspects of the problems. Some of the more specific features were to provide reasonable guides or principles which would enable industry to maintain the health of its workers at a high level; to reconcile this endeavor with the aim of industry in achieving maximum production at minimum cost; to contain rules and regulations for the prevention and control of occupational disease; to consider the hygiene of both the working place and the individual; to provide a legal interpretation of the codes and show industry how these rules can be met by good industrial hygiene practice; and other information that is pertinent and necessary to the practical application and administration of the code.

The Committee of the ACGIH that has been working on this model code released a draft several months ago that embodied the results of its deliberations and study to that date. Copies were sent to representatives of a cross-section of interest in industrial hygiene for review, comment, and criticism. These reviewers included industry, labor, insurance, the public, the professions and practices involved (medicine, industrial hygiene, and safety), and the members of the ACGIH. The selection of reviewers and conveyance of the draft were made in part directly by the ACGIH and in part by asking the American Standards Association to communicate with a group of interests of that Association's selection.

It was originally suggested that the speaker direct a part of his present discussion to some of the features of this first draft of the model code. However, events have occurred which appear to make any extended discussion of the first draft inappropriate. He is informed that the many criticisms and comments that were received in response to the circulation of the draft have been given serious consideration by the Code Committee of the ACGIH at a very recent meeting, and that a revised draft has been prepared. Owing to shortness of intervening time, this draft has not become available for general distribution. However, the Chairman[3] of the ACGIH Code Committee will participate in a discussion of this code at a succeeding session of the present meeting of this Foundation's Chemical Committee, where there will be ample opportunity to go into details.

There is good reason to believe that a uniform industrial hygiene code that is adequate, practical, and factual, and so worded as to take into consideration the various social and economic aspects of the problems, should meet with great favor by everyone, especially if administered in a spirit of cooperation with management and labor. There are, however, some practical difficulties of considerable magnitude to be overcome, not only in the drafting of a code of this nature and obtaining reasonable agreement, but also in effecting its adoption by the states, territories, counties, and cities, and the variety of agencies therein, that have interest and authority pertaining to industrial hygiene codes. There are many differences of opinion and questions of alleged facts to be satisfied. Brief mention of a few of these will follow.

Adequacy of Knowledge

A fundamental question pertains to the adequacy of knowledge. It is the speaker's opinion, which he believes is shared by a good many others, that the creation of a uniform industrial hygiene code with the broad coverage that has been attempted is confronted with the dilemma of, on one hand, the need of an adequate, practical code, based on good knowledge and scientific facts; and, on the other hand, by inadequacy of knowledge, experience, and facts for preparing one. Such inadequacies breed variations in conception, lack of unanimity of opinion, preferences, and prejudices and the like. This is not a criticism—it is a state of affairs that is believed to have considerable responsibility for the variety of codes in existence. It constitutes a real basis for difficulties in preparing a code that is adequate and practical, and meets the desired state of definiteness, conciseness, and completeness. In code making efforts, the inadequacies of knowledge are sometimes disposed of by omission of the associated requirements.

This may be the best procedure. Frequently, however, in the zeal to make the code broad in coverage and effectiveness, the procedure of using general statements, indefiniteness of requirements, and delegation of authority is followed. Such procedure may be acceptable, to some restrained degree, in the interest of having a code available, providing reasonable consideration is given to the existing deficiencies in the administration and the demands for compliance. However, delegation of such authority to each of the many agencies among the states immediately opens the possibility for differences of opinion, interpretation, and requirements, and provides a very important basis for non-uniformity of codes—thereby defeating the objective of uniformity. A mere delegation of blanket authority to a code enforcement agency for dealing with inadequacies of knowledge, is obviously not a desirable answer to the problem.

Element of Opponency

Another impediment to the preparation and adoption of codes and regulations of the type under consideration, is the element of opponency, or even mistrust, that exists between areas of interest, particularly at the present time between industry, labor, and regulatory agencies. It is no secret that, at least occasionally, industrial management believes that government is intent on bedeviling and encroaching on industrial affairs, and is without concern of industrial interests; and on the other hand, that government believes that industry needs more and more regulation and policing. As a result, some earnest differences of opinion arise. One of the criticisms that has frequently been directed to the codes of governmental origin, is the lack of opportunity given for participation by all of the interests, particularly industry, in the code work. Some code-making procedures provide for this participation; others do not. It must be agreed that an industrial hygiene code is of broad, public interest, and that its formulation should be a joint endeavor and have the benefit of the knowledge, experience, and viewpoints of all concerned. Such cooperation is essential to the development of good codes, and to their acceptance and use. Code-making procedures should provide it. It cannot be denied, however, that the leadership in initiating industrial hygiene code work has usually arisen in the governmental agencies, and that frequently industry and the other interests have not become concerned until a code has appeared, and even then their effort has often been directed more to criticism and obstruction than to attainment of good code objectives. There are many notable exceptions, but in general, industry has not fully met its responsibilities for leadership and cooperation in creating these codes. In the main the rela-

tions between industry and the governmental industrial hygiene facilities throughout the country have been good. In general there has been an endeavor to be practical and rational in establishing and administering rules and regulations, and to aid and assist industry, in providing healthy working conditions. Industry respects these facilities and values the services that are given. These relations should be very helpful in resolving any differences of opinion on codes and regulations if mechanisms for cooperative effort are provided.

In mentioning the model code that is in course of preparation by the ASSHH, it was pointed out that the comments and criticism of industry, labor, and other interests on the draft had been invited, and that a part of the review had been conducted by the American Standards Association. The plans for the future course of this model code are not known to the speaker, but it would appear to be in keeping with propriety and practicability to suggest processing it through the American Standards Association, where the participation of all interests could be formally recognized. That association is national in scope. Its code procedures provide for creating balanced committees composed of representation with good specialized knowledge for dealing with a particular subject, from all interests—labor, industry, and the public. American Standards Association Codes represent a consensus of good knowledge and good American practice. It is believed that the issuance of an industrial hygiene code under this Association's procedure, with a combined representation of all interests, would greatly assist in obtaining national recognition and approval. One way of selling an idea to a prospective customer is to share the idea. That procedure not only helps to sell the idea, but at the same time removes its faults.

Type, Scope, and Content of Codes

The type, scope, and content of industrial hygiene codes are subjects on which there is honest and sound disagreement among and between both regulatory and non-regulatory interests, from several viewpoints. A basic question pertains to whether codes should be specialized, such as specific industry, trade, occupation or product codes, or whether they should be general, all-inclusive, all-industry codes. Both practices are in use, both have advantages and disadvantages, but either one would be satisfactory if well developed and administered. The next question pertains to coverage within a particular type of code, it having been previously stated that the present coverage of codes ranges from little more than general sanitation, to moderately complete coverage of environment. It is believed that coverage should be complete to the extent that valid information is

available for defining the requirements. A third question pertains to whether the scope shall be confined to the rather general present concept of duties of industrial hygienists in effecting control of environmental factors that are directly related to health as commonly interpreted, or whether it shall include subjects of safety and health and medical services that are commonly recognized to be within the purview and province of industrial safety and industrial medicine. The proposed model ASSHH code previously referred to follows the latter pattern to some extent. For a long time the speaker has had a conviction that insofar as harmful agents of industrial environment are concerned, the knowledge, skills, procedures, and teamwork that is required to control the agents and protect workers are too similar, overlapping, and interdependent to segregate industrial health, industrial hygiene, and industrial safety into three distinct services or jurisdictions. Attempts to do this are not only difficult but also rather unreal. However, this viewpoint of broad scope and content of codes may be too idealistic for wide acceptance at the present time, owing to existing practices of industrial organization and administration of departments of medicine, hygiene, and safety.

Some Agreement on Scope

The differences of opinion relating to type and scope of industrial hygiene codes will be difficult to harmonize, at least in the near future, because there is more than one good answer to many of the questions. Perhaps the way will be open to more progress if attention would be given to relative importance of some of the questions. The speaker has previously indicated his opinion that either type of code, specific or all-industry, would serve the purpose if well developed and well administered. Of more importance is a practical definition of scope or at least some agreement on scope among both the interests and the professions that are involved in carrying out the provisions of a code. Adequate representation of all interests should be a part of any code-making body. When industrial hygiene codes transgress to a significant extent into fields of safety and medicine they should bear a title that is indicative of their scope. The most urgent present need is, that regardless of variation in scope and coverage among codes, the definition of good practices and requirements should, to the extent that they are included in codes, be more uniform than now prevails among the codes in this country.

It is rather generally agreed that a quantitative definition of hygienic environment in terms of required qualities and harmful chemical, physical, and biological agents, is a very essential part of an industrial hygiene code. Such definition is a statement of an objective which, if attained, will provide the desired result of healthy work-

ing conditions. Further, it provides a measure that is necessary for the creation of such conditions through the design of structures, equipment, and working surroundings, and the maintenance thereof. However, the endeavor to define hygienic environment has been one of the most important sources of disagreement and difficulty in the preparation of industrial hygiene codes.

Disagreement on Terminology and Definition

The points of disagreement and the problems to be resolved arise from many sources and areas of consideration. They include the existence of terminology with misleading connotation, differences of concept, deficiency of knowledge in many areas for quantitative definition, misinterpretation of information, and conference of unwarranted or unjustified reliability to alleged facts and data. A few of these will be discussed rather briefly.

The commonly used terminology, "maximum allowable concentration," "maximum permissible concentration," "toxic limit," and the like, for designating standards of hygiene are unfortunate extractions from phrases originally used to label experimental data, especially that pertaining to a maximum dosage in relation to an acute physiological or pathological response. These phrases connote a rather precise quantitation and association of environment with toxic manifestations. In becoming rather synonymous with standards of environment they convey to many persons an understanding that such standards are also rather precise critical values just below which a person is safe and above which he will be injured—or a condition which a man can tolerate but beyond which he is immediately in danger. Such a concept of a hygienic standard is unsound. Even though a fair degree of precision might be established for a small group of individuals under a specified controlled condition of contact, the precision of such homogeneous data would, in most instances, be lost immediately when applied to the heterogeneous nature of both industrial environment and the response of individuals of a group of workmen to the environment. The foregoing is not a condemnation of the use of toxicological data as an element of important consideration in deriving acceptable standards of environment. Such knowledge is a necessity for avoiding the area of danger. The purpose of the discussion is to point out the desirability of disassociating the idea of maximum tolerable stress from the concept of hygienic standards and to adopt the rationale of including factors of safety and good practice. No engineer would think of using the near failure limits of materials in designing a structure.

Another viewpoint that is receiving increasing attention in defining acceptable standards of environment, is that of more consideration

of comfort. In particular, this pertains to sensory effects of transient and, on the basis of present knowledge, harmless manifestations such as slight irritation of the eyes or nose, nauseating odors, and mild degrees of narcotic effects; also, to conditions such as uncomfortable temperature and excessive amounts of nuisance dusts.

A question that is frequently asked regarding the extended lists of M.A.C.'s that are included or suggested for inclusion in codes is: Are these "limits" reliable enough to be written into industrial hygiene codes as mandatory requirements? In the state codes that have been developed, the limits are mandatory in about half of them and suggested hygienic standards in the remainder. It is the speaker's opinion that there is adequate knowledge for deriving a reliable standard for relatively few substances. There is also some useful knowledge pertaining to most of the substances encountered in industry and appearing in current lists of standards. This knowledge is in general not believed to be adequate for a determination of standards that have the reliability and validity that mandatory requirements should possess. They should be considered to be tentative working guides pending the availability of better information. For this purpose they are useful if consideration is given to their limitations. It is believed that this opinion is shared by toxicologists that have acquaintance with the situation; also, by some of the persons that are responsible for compilation of such lists.

Allowable Exposure Limits

In the past the endeavor has been, with few exceptions, to select a single "limit," "concentration" or "tolerance level" for defining the permitted exposure for a working day of eight hours. There has also been a rather general understanding among most persons that such definition was applicable to all other conditions of environment and occupational activity. It has been mentioned previously that industrial atmospheres are rarely homogeneous, with the result that in most situations the exposure levels during a day vary considerably for a number of practical reasons. This creates a very important difficulty in attempting to appraise industrial exposures in terms of a simple, single standard of hygiene. In meeting the problem, the general industrial hygiene practice varies from making a few sporadic determinations (which may be worthless or even vicious) to more extended systematic investigations, with results represented either by simple averages or by an integration of the time and concentration of exposure cycles. These procedures, especially that of integrating the time and concentration, may be a practical expedient, but even the latter may result in erroneous appraisal of either the harmless or harmful nature of the environment. For several reasons, toxicologi-

ical response cannot be expected to be a linear function of time and concentration. The amplitude and frequency of variation from a defined mean may be very important. Many other chemical, physical, and perhaps even biological agents or factors of environment—even variation in chemical nature or physical form of the same substance—may have a very significant influence on the physiological or pathological response to a specified amount of one agent, and even on another with which it is associated. In some instances the influence may be synergistic and in others antagonistic. Although time does not permit an extended discussion of toxicology, it is pertinent to the question of industrial hygiene standards to mention a few examples of these influences. The minute-volume of air inspired and of blood circulated through the lungs increase rapidly with physical activity. For strenuous work the volume of air may be of the order of 10 or more and blood circulated 5 times that for sedentary activity. The amount of most harmful airborne contaminants that are acquired through the lungs from a particular environment and its transportation into the body may vary in the same general order. For these reasons a "maximum allowable concentration" may readily have a large safety factor for one degree of activity or a large factor of "unsafety" for another. Hot environment also increases respiration and circulation. Increased pressure of atmospheric environment, such as experienced in compressed air work, increases the mass of a harmful gas in unit volume of air and can be generally expected to increase the effectiveness concentration of the environment as compared to the same air-contaminant proportions at "normal" pressures, exceptions being those in which an antagonistic agent is likewise effectively concentrated. Such increase in potency may be expected owing not only to the fact that the mass of agent is directly increased, but owing also to non-linearity of response with concentration. Little is known about the variation in response with particle size of dispersoids—their retention in the lungs, their solubility, and other elements of physical, chemical, and biological behavior that are associated with size and surface. However, enough is known to give a basis for expecting considerable differences. The foregoing pertains to the relation of only a few specific agents and factors. The situation becomes very complex when all factors are considered. It requires that more attention be given to all important agents and factors of industrial environment and occupational activity in the development and use of standards; it supports the necessity of including an ample factor of safety in standards; it suggests the possible usefulness of multiple standards; and it emphasizes an existing inadequacy of knowledge and the need of an expanded program of research. Unfortunately this need greatly exceeds the facilities that are available for supplying it.

Procedures for Solving Problems

A procedure that offers good possibilities for resolving some of the problems arising from limited knowledge is to define industrial hygiene standards for atmospheric agents in terms of an established system of zones; such as (for illustration only) Zone 1, 0-3 ppm; Zone 2, 4-10 ppm; Zone 3, 10-30 ppm, etc. A portrayal and use of the present knowledge in this manner would not only give recognition to the limitations of knowledge but also to the difficulty of accurately assessing the environment to which a standard is to be applied. It would avoid the multitude of individual numbers and hair-line decisions that industrial hygienists must deal with at the present time. A very important feature would be the possibilities for harmonizing differences of opinion on standards for particular substances and obtaining more uniformity among code-making agencies. It is apparent that the development of an acceptable schedule of zones will require considerable study, and that some later modifications may be necessary to meet individual substances and new knowledge. Also that there will be some continuance of differences of opinion relating to zone assignments. However, the inherent good possibilities for mitigating some of the present problems, invites real attention with open-minded considerations. A procedure of this kind was discussed by the American Standards Committee on Allowable Concentrations of Toxic Dusts and Gases, Z37, at its meeting on December 9, 1947, and subsequently published by Drinker and Cook.[6] ASA Committee Z37 is continuing to explore the possibilities with a view to the development of a schedule of zones.

Some of the other comments that are pertinent to many of the lists of limits may be mentioned, briefly. The first of these has been discussed, namely, the labeling of the limits as "maximum allowable" or "maximum permissible," or the like. Another is the mixture of concepts represented by the limits; in some it is that of maximum tolerable, in others it is a mental concept of hygienic standards. A real deficiency is failure to designate whether the definition is related to toxicological effects or to sensory effects—to maintenance of good health or comfort. In many instances the origin of the limit is obscure and validity is difficult to assess. However, notwithstanding their deficiencies and limitations, these limits appear to be gaining in prestige and authority through mere copying and repetition. It should be realized that repetition does not improve validity. Again, this is not a condemnation of the use of such information as guides (even though recognized as being inadequate), if it represents the best information and is used with consideration of its limitations.

A very broad basic question relating to specific mandatory requirements of any nature, is that of desirability, even though reliable. Mandatory requirements are usually minimum requirements, or representative of the worst permissible conditions. From one viewpoint such requirements are a necessary aid to code administration for dealing with recalcitrants; from another viewpoint, they tend to stifle progress and freeze endeavor at the established minimum.

Determination of Compliance with Environmental Standards

Procedure for a reliable determination of compliance with the requirement of a code is an essential component of the requirement. Frequently the numerical value is a product of a specific technique. An understanding of the necessary technique should always be provided by text or by reference. The mere choosing of a sample or series of samples that will reliably represent the air breathed by workmen and provide a quantitative result that can be integrated with a standard of hygiene is not only difficult, but at best involves much uncertainty. A few inches variation in position or time in production cycle, or from day to day, season to season, or other facts may change the composition many fold. Both theoretically and practically, a sample of air can be relied on to represent only the air that existed at the exact point of sampling at the time the sample was taken, and the same condition may never again occur. This situation can be the cause of large error in the conclusions drawn from investigations made for determining compliance with code requirements, or for quantitating the agent that is responsible for the occurrence of ill health arising out of industrial exposure. The conditions that were responsible for the episode may differ greatly from those found at some previous or subsequent time. Since standards or changes in standards are often based on such investigations, the possible lack of reliability is very apparent. Although major attention is usually given to precision and accuracy of methods of determination, the real possibilities of error are inherent in obtaining a sample or a physical observation that represents the exposure.

Some Problems Relating to Adoption of a Uniform Code

There are some knotty problems to be solved in an endeavor to obtain wide acceptance of any kind of uniform code practice among the states and agencies within a state. Much harmonizing of viewpoints and integration with existing codes and code administration will be necessary. Nearly all of the states have two or more separate agencies with code prerogatives that are related to matters of health and safety. The reluctance of such agencies to relinquish authority

has been demonstrated repeatedly. The problems that are presented will probably be more difficult to solve than those of developing an acceptable form of code. An approach to the problems might well be for the several agencies within a state to first endeavor to eliminate existing differences in specific requirements of their codes and then agree upon a single administrator for all items relating to industrial hygiene. Agreement among the many states presents a more difficult problem. The existence of states' rights, with opportunity for independent thought and action, remains potent in many areas.

Summary

In this discussion there has been an endeavor to deal, rather generally and briefly, with some of the objectives of industrial hygiene codes, their desirable features, particularly those pertaining to more uniformity of practice. Attention has been given to some of the deficiencies of present codes and to some of the obstacles to the development and use of better codes. The treatment of these subjects is not only inadequate, but many other pertinent ones have necessarily been omitted from this relatively short discussion. A general appraisal of the code situation as portrayed may create some doubt as to whether any of the existing codes are very useful, or if an adequate uniform code can be developed. That is not a proper inference or conclusion. The broad underlying thesis that an attempt has been made to contribute, is that of encouraging endeavor to improve codes from the over-all viewpoints of validity, adequacy, and practicability. Where critical, the endeavor has been either that of re-orienting thought or to pointing out areas for improvement. Many of the problems have real elements of difficulty, but are amenable to solution through the good faith and cooperation of all concerned, supplemented with investigation and research for improving knowledge and removing areas of deficiency. It is believed that most of the problems and difficulties arise out of a lack of knowledge for preparing a broad homogeneous definition for an indefinite heterogeneous situation.

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