

Development of occupational hygiene standards in the People's Republic of China

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GANG BQ. Development of occupational hygiene standards in the People's Republic of China. *Scand J Work Environ Health* 11 (1985): suppl 4, 10–12. This article reviews the history and implementation of the development of occupational hygiene standard setting in the People's Republic of China. The author raises questions concerned with standard setting and gives examples of toxicants for which the scientific basis of revision is given. The principles and approaches used to set or revise hygiene standards in China are explained, and suggestions to help speed up the standard setting are also given. As a rule, field and epidemiologic surveys and the utilization of existing toxicologic information are emphasized. Repetitions of animal experimentation should be avoided.

Key terms: occupational limit values.

Before the founding of the People's Republic of China, there was no occupational hygiene standard.

In 1956, the first hygiene standard for industries was published under the title of "Tentative Hygiene Standards for the Design of Industrial Enterprise." Part of it is a list of maximum allowable concentration (MAC) values for 85 hazardous substances, including chemical agents and mineral dusts. The standard was designated as standard 101-56. Fundamentally, it was a standard adopted from the Union of the Soviet Socialist Republics.

The first official document, "Hygiene Standard for the Design of Industrial Enterprise" was promulgated in 1962 and was designated as GBJ 1-62. It contained 116 kinds of materials. It was approved by the Ministry of Public Health, the State Planning Commission, the State Capital Construction Commission, and the All-China Federation of Trade Unions.

Further work on standard setting was delayed for a rather long period, although a special work group was organized in 1972 to review the first document. The revised one was promulgated in 1979, designated as TJ 36-79 under the same title as GBJ 1-62. It contains a MAC list for 134 kinds of materials (111 toxicants and 9 dusts by serial number). In TJ 36-79, some of the MAC values were changed on the basis of our own experience.

In addition to the MAC values for hazardous substances, the "Hygiene Standard of Noise for Industrial Enterprises (Interim)" was promulgated by the Ministry of Public Health and the Ministry of Labour in 1980, the "Hygiene Standard of Microwave Radiation in Industry (Interim)" was promulgated by the Ministry of Public Health and the fourth Ministry of Machine Building in 1980.

Some occupational hygiene standards have not been promulgated by the Ministry of Public Health yet, although they have been adopted by the Subcommittee of Occupational Hygiene Standards. They are a hygienic standard for high-frequency electromagnetic fields, a meteorological standard for coal mining faces, and exposure limits for some toxicants and particulates.

A review of the process of occupational hygiene standard setting in China indicates that there are too few standards, they are too slow in developing, and they are too narrow in coverage.

Protection given by standards

There are a number of scientific difficulties involved in standard setting. One of them is the defining of the health effects on which to base a standard. The definition of the "health effect" will alter the protection given by the standards. The protection given by occupational exposure limits of airborne toxicants could always be found from this definition.

The occupational exposure limit of a hazardous substance is designated as the MAC in China. The MAC is defined as a concentration at or below which the acute or chronic occupational health effect would not occur in exposed workers for a long period. It is not a shift average concentration but is a ceiling level that should not be exceeded at any representative sampling to determine airborne toxicants in the workshop.

After all, what are the "acute or chronic occupational health effects"? We could not find a precise answer to this question in official documents. However, we may understand the meaning of "acute or chronic occupational health effect" from our practical experience, on the basis of which the exposure limit values in TJ 36-79 were revised. The examples of some

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of the revised or newly set exposure limits listed in table 1 indicate the scientific basis for the revision in detail.

Organization and planning

Nowadays, we have strengthened the organization and accelerated the work in establishing standards for various occupational agents. Under the leadership of the Ministry of Public Health, the National Technical Committee of Hygiene Standard was established in 1981. It includes nine subcommittees, one of them being the Subcommittee of Occupational Hygiene Standard, which is a standing committee on the work. The members of this subcommittee are experts coming from several disciplines including hygienists, analytical chemists, engineers, official representatives, and so forth. They are teaching staff of medical colleges, research fellows of research institutes, and senior professionals of health and antiepidemic stations. Chairman of the Subcommittee is Professor Gu Xueqi. The main tasks of the National Technical Committee of Hygiene Standard are as follows: (i) to recommend the working program and scientific research plan for standard setting; (ii) to review the established or revised standards, to present a conclusive opinion for the technical examination; (iii) to consider the scientific achievements directly relevant to standard setting and present a recommendation, and (iv) to take part in the corresponding activities of international standardization.

The meeting of the Subcommittee on Occupational Hygiene Standard has been held once every year since 1981. In these meetings the standard recommendations of chemical and physical agents are reviewed and adopted; the research projects for setting standards in the sixth five-year plan have been discussed as well.

Fifty-three projects for setting standards for toxicants and particulates will be completed within the next five years.

Principle and approaches

The principle for setting or revising a hygiene standard in China is that, under the prerequisite of safeguarding people's health, the standard should be economically reasonable and technologically feasible. The usual approaches used to obtain the scientific basis for setting standards are field and epidemiologic surveys integrated with laboratory experiments. However, the former is emphasized. There are 111 kinds of toxicants in the MAC list in TJ 36-79; 51.3 % of them are based on industrial (human) experience.

What is our attitude toward the hygiene standards in other countries? Foreign standards coinciding with the special conditions in our country may be actively adopted after concrete analysis and necessary verification.

Some suggestions

There is an urgent need to speed up standard setting in China. To achieve this aim, in my opinion, we should start with the following approaches.

1. Make full use of the scientific information that is useful for standard setting whether it is a native or a foreign source, including the health-based exposure limits of the World Health Organization. Ineffective duplication of animal experiments should be avoided.
2. Request the professionals who serve in the occupational health or occupational disease control agencies to participate in the work of standard setting. There

Table 1. Revised exposure limits of some substances and the scientific basis for the revision.

Chemical agents	MAC (mg/m ³) ^a		Scientific basis for the revision
	GBJ 1-62	TJ 36-79	
Benzene	50	40	Hematological changes occurred after exposure to 50 mg/m ³ for a long period
Zinc oxide	7	5	Few cases of metal fever took place under the concentration of 1-6 mg/m ³ , or below this level no such case could be found
Manganese	0.3	0.2	At exposure to 0.3 mg/m ³ or so for a long period manganese poisoning still took place
Lead	0.01	{ 0.03 (fume) 0.05 (dust)	At lead concentrations above 0.05 mg/m ³ plumbism or lead absorption occurred; at lead fume concentrations below 0.03 mg/m ³ no plumbism or lead absorption has been seen
Chlorine	2	1	During exposure to 0-2.5 mg/m ³ the prevalence of chronic bronchitis, rhinitis, and pharyngitis was higher than that under control conditions
Sulfur dioxide	20	15	Exposure to 20 mg/m ³ causes irritation to mucous membranes
Dichlorvos	.	0.3	During long-term inhalation of 1-2 mg/m ³ cholinesterase activity decreased in animals, while inhalation of 0.11 mg/m ³ (average) did not produce any changes

^a MAC = maximum allowable concentration, GBJ 1-62 = earlier standard; TJ 36-79 = revised standard.

are quite a number of such agencies in China and hundreds of occupational hygienists and medical workers of other specialities are in these agencies. They work at the grassroots, in factories, mines or other firms. They know well the work environment and workers' health conditions. It is very convenient for them to utilize data from routine environmental monitoring and health surveillance for standard setting.

3. Put emphasis on field and epidemiologic surveys. For toxicants that have been produced or utilized for a rather long period in China but which do not yet have exposure limits, it is easier to obtain industrial hygiene data. It is useless to consider animal experimentation as the only or main basis for standard setting. However, we may still find a few professionals wishing to do so in China.

4. Develop occupational hygiene standards on the basis of our own experience and through reasonable adoption of foreign standards simultaneously.

It is believed that the development of occupational hygiene standards in China will be promoted substantially within the near future.

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