

4. Current and Future Regulatory Activities in Japan

Presenter

Mr. Kazumi KISHIBE, Ministry of Health, Labour and Welfare

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Kazumi KISHIBE
Director, Office of Drinking Water Quality Management
Ministry of Health, Labour and Welfare

Abstract

Almost ten years have passed since the comprehensive revision of the drinking water quality standards took place. In this period, several issues to be dealt with have emerged or been elaborated, for example bromate production in ozonization process, *Cryptosporidium* infection, contamination of endocrine disruptors.

With this as a background, the Ministry of Health, Labour and Welfare has decided to fully revise the drinking water quality standards as well as to consider the effective system to cope with such problems. It plans to establish new drinking water quality standards and management system next year.

1. Drinking water quality standards (DWQSs)

Drinking water quality standards (DWQSs) make a basis of drinking water quality management. The Water Works Law prescribes them in the article 4, saying that water that is provided by water supply system shall comply with the DWQSs. The DWQSs shall be set from the viewpoints of both protecting human health and assuring good quality of life, and elaborated by the Ministry's order.

Once the DWQSs have been set, every water supplier shall take necessary measures to ensure them under the provisions of the Law, for example:

- a. Necessary facilities shall be furnished and well be operated;
- b. A person in charge of technical issues shall be designated;
- c. Water quality shall be monitored on a periodical and an *ad hoc* basis;
- d. Treatment plant workers shall have health check periodically; and,
- e. Chlorination process shall be included in every treatment plant.

When incompliance with the DWQSs is found, water supplier shall review its system and improve it as soon as possible. In case of emergency, such as the case where pathogens are detected or suspected in purified water, water supplier shall stop supplying their water to consumers immediately.

Up to now, the DWQSSs have been set for 46 items, 29 for protection of human health and 17 for good quality of life. (Table 1)

In addition to the DWQSSs, the Ministry has set three kinds of guidelines and been calling for voluntary monitoring and compliance; guidelines for chemicals of priority, pesticides used in golf courses and comfortableness. They are shown in the Table 2,3 and 4, respectively.

2. Revision of the DWQSSs

Since 1992, when the current DWQSSs were set, it has been recognized clear that they could not cover new pollutants, for bromate in ozonization process, infection by chlorine-resistant pathogens, endocrine disruptors. In addition, the WHO has started to revise its Guidelines for drinking-water quality (GDWQs). The Ministry has decided to revise DWQSSs as well as to improve drinking water quality management system, taking these situations into consideration.

In July 2002, the Ministry of Health, Labour and Welfare has established the advisory committee for the drinking water quality management chaired by Prof. Magara. The mandate of the committee is to review scientific and technological aspects on drinking water quality and to recommend the Ministry the revised DWQSSs as well as improved drinking water quality management system. While the discussion of the committee has not been concluded, the main points are follows.

2.1 Flexible Application of the DWQSSs

Current DWQSSs are applied uniformly to all water works, while drinking water quality is varied by region, type and quality of source water as well as type of treatment method. Although this system has greatly contributed to the improvement of the drinking water quality in Japan, some problems, such as that chemicals of local concern could not be included in the DWQSSs, are pointed out. The committee is reviewing the advantage and disadvantage of the current system, and considering the way to attach the flexibility to it.

2.2 Rolling revision of the DWQSSs

In line with the coming WHO/GDWQs third edition, the committee is considering how rolling revision could be incorporated into Japanese system.

2.3 Good practice for assuring safe drinking water

As real-time monitoring of all contaminants is impossible, it is important to assess in advance the risk of pollution including the risk of incompliance with the DWQSSs, and to take preventive measures. Such a concept is adopted in Hazard Analysis and Critical Control Point (HACCP) for food sanitation and Water Safety Plan of the WHO. The committee is discussing how to incorporate this concept into drinking water quality management.

2.4 Biological aspects of the DWQs

2.4.1 Total coliforms and standard plate count

As indicators of fecal pollution, total coliforms and standard plate count are adopted in the DWQs. The committee is reassessing these parameters, focusing on whether to adopt *Escherichia coli* and/or Heterotrophic plate count (HPC) instead of them.

2.4.2 Chlorine-resistant pathogens

One of the greatest concerns in the field of drinking water quality management is how to deal with chlorine-resistant pathogens such as *Cryptosporidium parvum*.

The Water Works Law prescribes in the article 5 that water supplier shall establish filtration facility when it finds the risk of contamination of chlorine-resistant pathogens. The Ministry has set the guideline for chlorine-resistant pathogens at October 1996 (revised at October 2001), which shows the way of assessing the risk of pollution and preventive measures and emergency operations to be taken by water supplier.

Besides, infection by *C. parvum* has been sometimes reported. The committee is considering effective measures including the introduction of new regulation.

2.4.3 Pathogens in distribution system and water tanks

Regrowth of pathogens such as *Legionella* in distribution system and water tanks is also of concern. The committee is considering introducing the HPC as an indicator of such pathogens.

2.5 Chemical aspects of the DWQs

2.5.1 Disinfectant by-product

Trihalogenated methanes were main points of discussion at the previous revision of the DWQs in terms of disinfectant by-product. Through various efforts, the level of trihalogenated methanes in drinking water has dramatically reduced.

Instead, we are facing other contaminants: bromates and halogenated acetic acids. As ozonization process is widely adopted in treatment plants, bromates contamination became a problem of concern. The reduction of trihalogenated methanes made it clear that we should deal with halogenated acetic acids accordingly.

The committee is considering setting the DWQs for these contaminants.

2.5.2 Endocrine disruptors

Endocrine disruptors have attracted global concern, however, it is not established yet how to estimate their effects, including so called low dose effects. Therefore, the committee is considering carefully how to deal with them.

2.5.3 Pesticides

Pesticides have quite different character from other chemicals in terms of their usage. Contamination of pesticides is limited as it depends on the area and period of application. However, pesticides in drinking water are of high interest. The committee is considering how to deal with them, taking into account such situation.

2.5.4 Lead

Prior to the establishment of the committee, the Ministry decided to reduce the DWQS for lead to 0.01 mg/l from 0.05 mg/l, taking into account the recommendation in 1992 made by the former advisory committee to do so in ten years. New DWQS for lead will be effective on 1 April 2003.

2.6 Quality assurance/Quality control (QA/QC)

It is needless to say that Quality assurance and control (QA/QC) of drinking water quality monitoring is very much important. Although there exists QA/QC system, it should be refined taking into account the progress made since the last revision.

The committee is reviewing QA/QC system in other fields as well as international standard such as ISO 17025, and considering the new QA/QC system in the field of drinking water quality monitoring. The discussion will be focused on the clear incorporation of Good Laboratory Practice concept, which is not familiar in Japan.

2.7 Sampling/Evaluation

The committee is reviewing the current sampling/evaluation procedures and considering renewing it, taking into full account the methods/procedures of the US, EU and WHO.

3. Conclusion

The coming revision of the DWQSs in 2003 will be the first comprehensive revision since 1992. It will substantially enhance them in both the concept and the coverage of pollutants.

Safe drinking water is vital for our life, and the stress should be focused on drinking water quality management in managing the water supply system. We are sure that the new DWQSs will greatly contribute to improve our system of drinking water quality management.

Table 1 Drinking Water Quality Standards (DWQSS)

(For protection of human health)

No	Item	Standard Value	No	Item	Standard Value
1	Standard Plate Count	100 in 1ml	16	<i>cis</i> -1,2,-Dichloroethylene	0.04mg/l
2	Coliform Group Bacterial Count	Not to be detected	17	Tetrachloroethylene	0.01mg/l
3	Cadmium	0.01mg/l	18	1,1,2-Trichloroethane	0.006mg/l
4	Mercury	0.0005mg/l	19	Trichloroethylene	0.03mg/l
5	Selenium	0.01mg/l	20	Benzene	0.01mg/l
6	Lead	0.01mg/l	21	Chloroform	0.06mg/l
7	Arsenic	0.01mg/l	22	Dibromochloromethane	0.1 mg/l
8	Chromium(VI)	0.05mg/l	23	Bromodichloromethane	0.03mg/l
9	Cyanide	0.01mg/l	24	Bromoform	0.09mg/l
10	Nitrates/Nitrites	10mg/l as nitrogen	25	Total Trihalomethanes	0.1mg/l
11	Fluoride	0.8mg/l	26	1,3-Dichloropropene	0.002mg/l
12	Carbon Tetrachloride	0.002mg/l	27	Simazine	0.003mg/l
13	1,2-dichloroethane	0.004mg/l	28	Thiram	0.006mg/l
14	1,1-Dichloroethylene	0.02mg/l	29	Thiobencarb	0.02mg/l
15	Dichloromethane	0.02mg/l			

(For good quality of life)

No	Item	Standard Value	No	Item	Standard Value
30	Zinc	1.0 mg/l	39	1,1,1-Trichloroethane	0.3mg/l
31	Iron	0.3mg/l	40	Phenols	0.005mg/l as phenol
32	Copper	1.0mg/l	41	Organic Substances (Consumption of Potassium Permanganate)	10mg/l
33	Sodium	200mg/l	42	pH Value	5.8 - 8.6
34	Manganese	0.05mg/l	43	Taste	Not abnormal
35	Chloride	200mg/l	44	Odor	Not abnormal
36	Calcium, Magnesium, etc. (Hardness)	300mg/l	45	Color	5 degree
37	Total Residue	500mg/l	46	Turbidity	2 degree
38	Methylene Blue Activated Substance	0.2mg/l			

Table 2 Guidelines for chemicals of priority

No	Item	Guideline value	No	Item	Guideline value
1	<i>trans</i> -1,2-Dichloroethylene	0.04mg/l	19	Chloral Hydrate *	0.03mg/l
2	Toluene	0.6mg/l	20	Isoxathion	0.008mg/l
3	Xylenes	0.4mg/l	21	Diazinon	0.005mg/l
4	<i>p</i> -Dichlorobenzene	0.3mg/l	22	Fenitrothion(MEP)	0.003mg/l
5	1,2-Dichloropropane *	0.06mg/l	23	Isoprothiolane	0.04mg/l
6	Di (2-Ethylhexyl) Phthalate	0.06mg/l	24	Chlorothalonil (TPN)	0.05mg/l
7	Nickel *	0.01mg/l	25	Propyzamide	0.05mg/l
8	Antimony *	0.002mg/l	26	Dichlorvos (DDVP)	0.008 mg/l
9	Boron	1mg/l	27	Fenobcarb (BPMC)	0.02mg/l
10	Molybdenum	0.07mg/l	28	Chlornitrofen (CNP)	0.0001mg/l
11	Uranium *	0.002mg/l	29	Iprobenfos (IBP)	0.08mg/l
12	Nitrites *	0.05mg/l as nitrogen	30	EPN	0.06mg/l
13	Chlorine Dioxide	0.6mg/l	31	Bentazone	0.2mg/l
14	Chlorite	0.6mg/l	32	Carbofuran	0.005mg/l
15	Formaldehyde *	0.08mg/l	33	2,4-dichloro-phenoxyacetic acid	0.03mg/l
16	Dichloroacetic Acid *	0.02mg/l	34	Trichlopyr	0.06mg/l
17	Trichloroacetic Acid *	0.3mg/l	35	Dioxins *	1pg-TEQ/l
18	Dichloroacetnitrile *	0.08mg/l			

(* provisional values)

Table 3 Guidelines for pesticides used in golf courses

No	Item	Guideline value
	(Insecticides)	
1	Isofenphos	0.001 mg/l
2	Chlorpyrifos	0.004 mg/l
3	Trichlorfon	0.03 mg/l
4	Pyridaphenthion	0.002 mg/l
5	Acephate	0.08 mg/l
	(Fungicides)	
6	Iprodione	0.3 mg/l
7	Etridiazole	0.004 mg/l
8	Oxine-copper	0.04 mg/l
9	Captan	0.3 mg/l
10	Chloroneb	0.05 mg/l
11	Tolclophos-methyl	0.08 mg/l
12	Flutolanil	0.2 mg/l
13	Pencycuron	0.04 mg/l
14	Mepronil	0.1mg/l
15	Metalaxyl	0.05 mg/l
	(Herbicides)	
16	Asulam	0.2 mg / L
17	Terbucarb	0.02 mg/l
18	Napropamide	0.03 mg/l
19	Butamifos	0.004 mg/l
20	Bensulide	0.1 mg/l
21	Pendimethalin	0.05 mg/l
22	Benefin	0.08 mg/l
23	Mecoprop	0.005 mg/l
24	Methyl-dymron	0.03 mg/l
25	Dithiopyr	0.008 mg/l
26	Pyributicarb	0.02 mg/l

Table 4 Guidelines for comfortableness (13 Items)

No	Item	Guideline value	No	Item	Guideline value
1	Manganese	0.01mg/l	7	Free Carbon Dioxide	20mg/l
2	Aluminum	0.2mg/l	8	Organic Substances (Consumption of Potassium Permanganate)	3mg/l
3	Chlorine	Not more than approximately 1mg/l	9	Calcium Magnesium, etc. (Hardness)	10-100mg/l
4	2-Methylisoborneol	Powdered Activated Carbon Treatment: 0.00002mg/l Granular Activated Carbon Treatment: 0.00001mg/l	10	Total Residue	30-200mg/l
5	Geosmin	Powdered Activated Carbon Treatment: 0.00002mg/l Granular Activated Carbon Treatment: 0.00001mg/l	11	Turbidity	1degree at a tap 0.1 degree at the entrance of a distribution facilities
6	Odor Threshold (TON)	3	12	Langhelier's index (Corrosiveness)	Approximately -1 to 0
			13	pH Value	Approximately 7.5

