

ILLINOIS POLLUTION CONTROL BOARD  
July 21, 1982

IN THE MATTER OF: )  
 )  
AMENDMENTS TO CHAPTER 6: ) R81-11  
PUBLIC WATER SUPPLIES )  
(TRIHALOMETHANES) )

PROPOSED RULE. SECOND NOTICE.

OPINION AND ORDER OF THE BOARD (By J.D. Dumelle):

On April 29, 1982 the Board adopted a Proposed Rule/ First Notice Order in this matter. First Notice was published in the Illinois Register on May 21, 1982 (#21, Vol. 6) and the First Notice period ended on July 6, 1982. During that period only James P. Shoffner filed a comment.

Trihalomethanes (THMs) are organic chemicals consisting of one carbon atom, one hydrogen atom and three halogen atoms (R.21). These are formed when free chlorine reacts with naturally occurring compounds which are generally produced by decaying vegetation (R.21).

Research by the National Cancer Institute and the National Academy of Sciences shows that THMs may be carcinogenic and can lead to liver or kidney disorders, birth defects and central nervous system damage (R.23 and Ex.9).

In recognition of these possible adverse health effects, the United States Environmental Protection Agency (USEPA) promulgated federal regulations (44 Fed. Reg. 68624, Ex.4, R. 23-24) establishing a maximum allowable concentration of total trihalomethanes (TTHMs) of 0.10 mg/l and setting up monitoring schedules. The federal regulations are part of the Interim Primary Drinking Water Regulations (40 CFR Part 141) under the Safe Drinking Water Act (42 U.S.C. 300f et seq.) Under that Act, States which adopt rules at least as stringent as the USEPA rules can assume primary enforcement responsibilities (R. 27). Illinois has assumed such primacy and must adopt THM rules in order to retain it (R27-28). If primacy is not retained, federal funding and state control of the program will be lost for the entire public water supply program (R28-29).

The result of this would be federal supervision of the State drinking water program. Since State Agency personnel are closer to the systems and have built relationships with waterworks owners and operators, they are better able to deal with problems that arise than would be USEPA personnel (R. 27-28). At a minimum public health protection would be lessened during the transition period from State to USEPA control.

The economic impact study prepared in this matter (Ex.12) concludes that the benefits of adopting the proposed amendments outweigh costs by the amount of federal funding plus any difference in analytical costs (Ex.12, p.8). The reason for this is that even if the Board were to dismiss this action, the essentially equivalent federal program would remain in place, and any upgrading and sampling costs which will be imposed upon public water supply systems in order to meet the proposed standards will be imposed regardless of Board action.

The federal grant funding which would be lost if the Board does not adopt standards at least as stringent as the federal standards is approximately \$1.2 million which represents 61% of the Agency's public water supply direct budget (Ex.12, pp.7-8 and R. 79). The difference in analytical costs should result in a savings of \$27,000 the first year and \$9,622.50 in subsequent years (Ex.12, p.7). This savings results from the fact that if the State fails to take over the federal program, analysis would have to be done at private laboratories at a cost of \$45 per sample rather than at state operated labs at a cost of \$22.50 per sample. This is based on the Agency's estimate of 1200 samples the first year and 428 samples per year thereafter (Ex.12, p.7).

Given that adoption of this regulation should result in an economic benefit as well as a public health benefit and that no one presented any evidence or testimony adverse to the Agency proposal, the Board finds that regulations should be adopted which are at least as stringent as the federal regulations. Thus, the only question remaining is whether the Board should adopt the Agency's proposal or set a more stringent standard.

The Agency's proposed THM standard of 0.10 mg/l was set on the basis of the USEPA standard which in turn was at a level which was estimated to allow for "one excess cancer death for every 10,000 to 100,000 people with a lifetime exposure to this in their drinking water" (R. 24).

Ira Markwood, Manager of the Agency's Public Water Supplies Division, testified that the results of studies of the adverse effects of THMs on humans "are quite mixed and controversial" and that apparent correlations between THM injection and adverse effects "tend to disappear" when other factors such as smoking, ethnic background and industrial exposure are taken into consideration (R. 74). He further testified that one study showed that chloroform (a THM) "may contribute to longer life" (R. 74-75). However, both he and USEPA have concluded that the USEPA standards "are probably the most reasonable compromise" and that it is "a good precautionary step to take until more evidence is available" (R. 75-76).

The Board could also propose a stricter standard by enlarging the scope of affected water supplies, e.g. by making the THM rules applicable to all supplies rather than only to those supplies

servicing more than 10,000 people. However, since these smaller supplies generally use ground water sources and have shorter transport times, they are considerably less likely to have THM levels exceeding the 0.10 mg/l standard. At the same time, universal applicability would greatly increase the number of water sample analyses which the Agency would have to perform. After more data are gathered on existing TTHM levels, the Board may consider an additional rulemaking to protect public water supplies serving less than 10,000 people.

Since a stricter standard would impose greater costs without significant improvement in public health, the Board concludes that the regulations should be adopted consistent with the Agency's proposal.

#### BOARD ACTION

Rule 104 is proposed to be amended by adding the definitions of "Halogen," "Trihalomethane (THM)," "Total Trihalomethanes (TTHM)," "Maximum Total Trihalomethane Potential (MTP)" and "Disinfectant." These definitions have been proposed by the Agency as identical to the USEPA definitions, and are necessary to clarify the language of the proposed rules. The Board will propose these definitions for Second Notice as the Agency proposed them and as they appeared in First Notice.

The Board did receive a comment regarding the definition of "Halogen" pointing out that the proposed definition differs from the commonly accepted definition. The commenter, therefore, suggests that the phrase "for purposes of this regulation" be added to the definition to be as scientifically correct as possible. This suggestion certainly has merit. However, if such a phrase is added in this case, then all definitions which differ from the commonly accepted definitions should be similarly amended. Further, the correct phrase would be "for purposes of this Chapter" which after codification would have to be amended to "for purposes of this Subtitle," and later may change again. Thus, for reasons of administrative convenience, the Board declines to make the requested amendment.

Rule 304(A)(2)(a) is proposed to be amended to make the Board's finished water Total Coliform Standard consistent with the federal standard and consistent with the Board Order in R73-13 (November 22, 1974). Apparently, part of the Rule was inadvertently deleted in the filed Rule. While unrelated to this proceeding, the Board proposes to correct this error. No one has commented adversely and the federal rule has been in effect and enforceable in any case.

Rule 304(B)(3), (4) and (5) are proposed to be amended to establish a maximum allowable concentration of 0.10 mg/l Total Trihalomethanes in finished water and to establish a sampling and monitoring program to determine whether and to what extent THMs

occur in Illinois drinking water, and phased compliance dates based upon the size of the population served by the supply [see Note (e)].

The Board proposes these amendments as proposed by the Agency and as they appeared in the Board's First Notice Order, except for a slight change in language in Rule 304(B)(5). The Board finds the proposed language concerning sampling frequency ambiguous. The language "four samples of any four consecutive quarters" could mean either four or sixteen total samples. Furthermore, the Board finds no reason to include any reference to the number of samples since sampling requirements are fully set out in Rule 309. Therefore, the Board proposes to replace the cited language with the phrase "of any twelve month period" which has the same effect of requiring compliance based upon a running twelve month average.

Rule 309 is proposed to be amended by adding headings for purposes of clarity, by adding sampling requirements for Trihalomethanes, by reducing sampling requirements for ground water supplies, and by correcting an apparent typographical error regarding gross alpha particle activity.

The sampling requirement includes all supplies serving over 10,000 individuals. Public water supplies utilizing a surface water source will initially be required to submit four samples per quarter [Rule 309(B)(1)(b)]. If samples submitted show that the trihalomethane standard is consistently met, the supply, upon application to the Agency, may be allowed to reduce the sampling frequency to once per quarter until the Maximum Allowable Concentration is exceeded, or until a significant change in the water supply source or treatment method is made.

Supplies using a ground water source need only submit one sample per treatment plant annually if an initial sample tested for maximum total trihalomethane potential and local conditions indicate that the supply is not expected to exceed standards, and if the supply requests such a sampling frequency [Rule 309 (B)(2)(b)]. Otherwise, the supply must conform with the requirements for groundwater sources. Rule 309 (B)(2)(a) has been amended to reduce the requirement for submitting representative samples of the finished water for Agency testing from once every two years to once every three years. This should help offset the additional Agency testing which is necessary under the proposed trihalomethane regulations, thus relieving some of the burden imposed. The relaxed sampling requirements for groundwater sources is justified by the fact that such sources are considerably less likely to be contaminated or to contain the organic precursors necessary for THM formation.

Rules 309 (B)(3) and (4) have been proposed to be added to require additional testing whenever the water source or treatment method is changed or when the maximum allowable concentration is exceeded.

Finally, Rule 309(C)(1)(a)(1) is proposed to be amended to conform with the federal accuracy requirement (40 C.F.R. Sec. 141.25). The Board's present rule apparently contained a typographical error.

All of the amendments to Rule 309 are consistent with federal requirements and the Board's First Notice except as noted and minor editorial changes in Rules 309(B)(2)(b) and 309(B)(3).

#### ORDER

The Board hereby instructs the Clerk of the Board to proceed to Second Notice in this matter and proposes the amendments as below. These rules are in conformity with the Safe Drinking Water Act (P.L. 93-523) and must be adopted in order for the State to retain primacy.

The proposed amendments to Chapter 6: Water Pollution, are indicated below (added language is underlined; deleted language is stricken).

Rule 104 Definitions [note: the following definitions are to be inserted alphabetically into the present definitions.]

"Halogen" means one of the chemical elements chlorine, bromine or iodine.

"Trihalomethane (THM)" means one of the family of organic compounds, named as derivatives of methane, wherein three of the four hydrogen atoms in methane are each substituted by a halogen atom in the molecular structure.

"Total Trihalomethanes (TTHM)" means the sum of the concentration in milligrams per liter of the trihalomethane compounds trichloromethane (chloroform), dibromochloromethane, bromodichloromethane and tribromomethane (bromoform), rounded to two significant figures.

"Maximum Total Trihalomethane Potential (MTP)" means the maximum concentration of total trihalomethanes produced in a given water containing a disinfectant residual after 7 days at a temperature of 25° C or above.

"Disinfectant" means any oxidant, including but not limited to chlorine, chlorine dioxide, chloramines, and ozone, added to water in any part of the treatment or distribution process, which is intended to kill or inactivate pathogenic microorganisms.

#### 304 Finished Water Quality

##### A. Bacteriological Quality

1. Standard Sample

The standard sample for the coliform test shall consist of:

- a. For the membrane filter technique, not less than 100 milliliters.
- b. For the fermentation tube method, five standard portions of either 10 milliliters or 100 milliliters.

2. Total Coliform Limits

The number of organisms of the coliform group present in potable water, as indicated by representative samples examined, shall not exceed the following limits:

- a. When the membrane filter technique is used, arithmetic mean coliform density of all standard samples examined per month shall not exceed ~~four~~ one per 100 milliliters. Any individual standard sample shall not exceed four coliform colonies per 100 milliliters in:
  - (1) more than one standard sample when less than twenty are examined per month; or
  - (2) more than five percent of the standard samples when twenty or more are examined per month.

[note: the remaining text of subsection A remains unchanged from present rules.]

B. Chemical and Physical Quality

1. The finished water shall contain no impurity in concentrations that may be hazardous to the health of the consumer or excessively corrosive or otherwise deleterious to the water supply. Drinking water shall contain no impurity which could reasonably be expected to cause offense to the sense of sight, taste, or smell.
2. Substances used in treatment should not remain in the water in concentrations greater than required by good practice. Substances which may have a deleterious physiological effect, or for which physiological effects are not known, shall not be used in a manner that would permit them to reach the consumer.

3. If the result of an analysis made pursuant to these Rules indicates that the level of any contaminant listed in Table I, except Total Trihalomethanes, exceeds the maximum allowable concentration, the owner or operator of the public water supply shall report to the Agency within 7 days and initiate three additional analyses at the same sampling point within one month. When the average of four analyses, rounded to the same number of significant figures as the maximum allowable concentration for the substance in question, exceeds the maximum allowable concentration, the owner or operator of the public water supply shall notify the Agency pursuant to Rule 310 B and give notice to the public pursuant to Rule 313 D of these Rules. Monitoring after public notification shall be at a frequency designated by the Agency and shall continue until the maximum allowable concentration has not been exceeded in two successive samples or until a monitoring schedule as a condition to a variance or enforcement action shall become effective.

4. If the average of samples covering any twelve month period exceeds the maximum allowable concentration for Total Trihalomethanes, as listed in Table I, the owner or operator of the public water supply shall notify the Agency pursuant to Rule 310 B and give notice to the public pursuant to Rule 313 D of these Rules.

-4- 5. The concentration of substances listed in Table I, except for Total Trihalomethanes, shall not exceed in the finished water the limits listed. The average of Total Trihalomethanes concentration in the finished water of any twelve month period per treatment plant or per aquifer shall not exceed the limit listed in Table I.

TABLE I

MAXIMUM ALLOWABLE CONCENTRATIONS  
FINISHED WATER QUALITY

Substance	Reported As	Maximum Concentration mg/l
Arsenic	As	0.05
Barium	Ba	1.

Cadmium	Cd	0.010
Chromium	Cr	0.05
Copper	Cu	5.
Cyanide	CN	0.2
Fluoride	F	1.8(d)
Iron	Fe	1.0(a)
Lead	Pb	0.05
Manganese	Mn	0.15(a)
Mercury	Hg	0.002
Nitrate-Nitrogen	N	10.(b)
Organics		
Total Trihalomethanes		0.10(e)
Pesticides		
Chlorinated Hydrocarbon Insecticides		
Aldrin		0.001
Chlordane		0.003
DDT		0.05
Dieldrin		0.001
Endrin		0.0002
Heptachlor Epoxide		0.0001
Lindane		0.004
Methoxychlor		0.1
Toxaphene		0.005
Chlorophenoxy Herbicides		
2,4-Dichlorophenoxyacetic acid (2,4-D)		0.1
2,4,5-Trichlorophenoxypropionic acid (2,4,5-TP or Silvex)		0.01
Selenium	Se	0.01
Silver	Ag	0.05
Turbidity	NTU	1-θ(c)
Zinc	Zn	5.

NOTES:

- a. All non-community water supplies and those community water supplies which serve a population of 1000 or less or 300 service connections or less shall be exempt from the standards for iron and manganese. All other water supplies shall comply with these standards by July 1, 1981. Iron in excess of 1.0 mg/l and manganese in excess of 0.15 mg/l may be allowed at the discretion of the Agency if sequestration tried on an experimental basis proves to be effective. If sequestering is not effective, positive iron or manganese reduction treatment as applicable must be provided. No experimental use of a sequestering agent may be tried without previous Agency approval.
- b. The provisions of Rule 304 B 3 notwithstanding, compliance with the maximum allowable concentration for nitrate shall be determined on the basis of the mean of two analyses.



When a level exceeding the maximum allowable concentration for nitrate is found, a second analysis shall be initiated within 24 hours, and if the mean of the two analyses exceeds the maximum allowable concentration, the owner or operator of the public water supply shall report his findings to the State pursuant to Rule 310 B and shall notify the public pursuant to Rule 313 D.

- c. Turbidity in drinking water shall not exceed one turbidity unit at the point where water enters the distribution system unless it can be demonstrated that a higher turbidity not exceeding 5 NTU does not:
- (1) interfere with disinfection, or
  - (2) cause tastes and odors upon disinfection, or
  - (3) prevent the maintenance of an effective disinfection agent throughout the distribution system, or
  - (4) result in deposits in the distribution system, or
  - (5) cause customers to question the safety of their drinking water.

The provisions of Rule 304 B 3 notwithstanding, if a turbidity measurement exceeds the maximum allowable concentration, a resample must be taken as soon as practicable, and preferably within one hour. If the check sample confirms that the standard has been exceeded, the Agency must be notified within 48 hours. The value of the check sample shall be the value used in calculating the monthly average. If the monthly average of the daily samples taken in accordance with Rule 309 D exceeds the maximum allowable concentration, or if the average of two samples taken on consecutive days exceeds 5 NTU, the owner or operator of the public water supply shall report to the Agency and notify the public as directed in Rule 310 B and 313 D.

- d. Those counties of the State north of and including the counties of Henderson, McDonough, Fulton, Tazewell, McLean, Ford and Iroquois shall have a maximum allowable concentration of 2.0 mg/l.

- e. Community water supplies serving 75,000 or more individuals shall comply with this standard by the effective date of these regulations. Community water supplies serving 10,000 to 74,999 individuals shall comply with this standard by November 5, 1983. This standard does not apply to supplies serving less than 10,000 individuals.

#### C. Radiological Quality

The text of Subsection C remains unchanged from present rules.

309 Frequency of Sampling

A. Bacteriological

Text of Subsection A remains unchanged.

B. Chemical

1. Community Water Supplies -- Surface Water Sources

a. A minimum of one representative sample each of the raw and finished water is to be submitted at least annually to the Agency for chemical analysis. ~~from community-water-supplies-which-utilize-a-surface water-source. Community-water-supplies-which utilize-a-ground-water-source-are-to-submit-such-samples-to-the-Agency-for-analysis-at-least-every two-years.--Sampling-for-specific-parameters-are or-may-be-in-excess-of-the-limits-listed-in-Table 17-or-if-the-presence-of-other-dangerous-or potentially-dangerous-substances-is-suspected.- Non-community-water-supplies-shall-submit-represent-ative-samples-of-raw-and-finished-water-to-the Agency's-laboratory-for-chemical-analysis-at frequencies-required-by-the-Agency.~~

b. Public water supplies serving over 10,000 individuals shall submit at least four samples per treatment plant per quarter for analysis or analytical results from a certified laboratory for total trihalomethanes to the Agency. After results of four consecutive quarters demonstrate consistent total trihalomethane concentrations below the Maximum Allowable Concentration, and upon written application by the public water supply the Agency may reduce the sample frequency to one sample per quarter until the Maximum Allowable Concentration is exceeded or until a significant change in source or treatment method is made.

2. Community Water Supplies -- Ground Water Sources

a. A minimum of one representative sample of the finished water is to be submitted at least every three years to the Agency for chemical analysis. Community-water-supplies-which utilize-a-ground-water-source-are-to-submit such-samples-to-the-Agency-at-least-every-two years.

b. Public water supplies serving 10,000 individuals or more shall submit at least one sample per treatment plant for maximum total trihalomethane

potential analysis. After written request by the public water supply and the determination by the Agency that the results of the sample and local conditions indicate that the supply is not likely to approach or exceed the Maximum Allowable Concentration, the public water supply shall continue to submit one annual sample per treatment plant, or report of analysis by a certified laboratory to the Agency. If the sample exceeds the Maximum Allowable Concentration or cannot be analyzed for maximum total trihalomethane potential, the public water supply shall submit samples in accordance with Sec. 309 B 1.

3. Significant changes in water sources or treatment will require testing in accordance with Sec. 309 B 1 b.
  4. If the result of an analysis made pursuant to the reduced monitoring schedules provided by this Rule indicates that the level of Total Trihalomethanes exceeds the maximum allowable concentration listed in Table I, the owner or operator of the public water supply shall initiate analysis of one check sample promptly after the exceedance is reported to the public water supply. If the check sample confirms that the level of Total Trihalomethanes exceeds the maximum allowable concentration, the public water supply shall sample in accordance with the frequency set out in Rule 309 B 1 b, for at least one year.
  5. Sampling for specific parameters may be required by the Agency more frequently whenever there is reason to believe that these parameters are or may be in excess of the limits listed in Table I or if the presence of other dangerous or potentially dangerous substances is suspected.
  6. Non-Community water supplies shall submit representative samples of raw and finished water to the Agency laboratory for chemical analysis at frequencies required by the Agency.
- C. Monitoring Frequency for Radioactivity in Community Water Supplies
1. Monitoring requirements for gross alpha particle activity, radium-226 and radium-228.
    - a. Compliance shall be based on the analysis of an annual composite of four consecutive quarterly samples or the average of the analysis of four samples obtained at quarterly intervals.

- (1) A gross alpha particle activity measurement may be substituted for the required radium-226 and radium-228 analysis, provided that the measured gross alpha particle activity does not exceed 5 pCi/l at a confidence level of 95 percent (~~1.65~~  $1.96 \sigma$  where  $\sigma$  is the standard deviation of the net counting rate of the sample). In localities where radium-228 may be present in drinking water radium-226 and/or radium-228 analyses may be required by the Agency when the gross alpha particle activity exceeds 2 pCi/l.

[note: the remaining text of Subsection C remains unchanged from the present rules.]

IT IS SO ORDERED.

I, Christan L. Moffett, Clerk of the Illinois Pollution Control Board hereby certify that the above Order was adopted on the 21<sup>st</sup> day of July, 1982 by a vote of 5-0.

Christan L. Moffett  
Christan L. Moffett, Clerk  
Illinois Pollution Control Board