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II-II.1UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAR 27 1990

OFFICE OF
WATERAnnouncement of Public Meeting to DiscussTHE STRAWMAN RULE FOR GROUND WATER DISINFECTION

The Office of Drinking Water would like to invite you to attend a public meeting on June 21, 1990 from 1:00 p.m. to 6:00 p.m. at the Andrew W. Breidenbach Environmental Research Center Auditorium located at 26 West Martin Luther King Drive, Cincinnati, Ohio 45268. If public comments or discussion warrant it, the meeting will continue at the same location on June 22, 1990 from 9:00 a.m. to 12 Noon. This meeting will focus on aspects of the development of Primary Drinking Water Regulations for disinfection of ground water supplies. Specifically, we would like to discuss the technical criteria including conditions necessary for variances.

Attached are a fact sheet with more meeting details and a copy of "Draft Ground Water Disinfection Requirements."

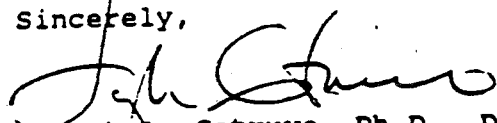
The meeting will begin with a brief summary of the approach EPA is currently considering. Members of the public will then be given an opportunity to make brief statements on issues concerning the ground water disinfection rule. Most of the program will allow informal discussion of the issues.

If you plan to attend, please contact Sharon Church (202-382-3030) as soon as possible, preferably before June 14, 1990.

Comments on the strawman rule and on the discussion in the meeting will be solicited from the public for consideration in developing the regulation.

If you wish to discuss any of these criteria, please contact Stig Regli (202-382-7379).

Sincerely,



Joseph A. Cotruvo, Ph.D., Director
Criteria and Standards Division
Office of Drinking Water

Attachments

Public Meeting to Discuss

STRAWMAN REGULATION FOR
GROUND WATER DISINFECTION REQUIREMENTS

FACT SHEET

DATE AND TIME: 1:00 p.m. to 6:00 p.m. EDT
Thursday, June 21, 1990

If warranted, the meeting will continue at:
9:00 a.m. to 12 Noon EDT
Friday, June 22, 1990

LOCATION: Andrew W. Breidenbach Environmental
Research Center Auditorium
26 West Martin Luther King Drive
Cincinnati, Ohio 45268

REGISTRATION: Call Sharon Church (202-382-3030), preferably
before June 14, 1990. We need to know total
attendance as well as who is intending to
make presentations.

BACKGROUND: "Draft Ground Water Disinfection
Requirements"

PURPOSE: To have an open public discussion of the
strawman rule. The public will be encouraged
to comment on EPA's background document and
any presentations, make relevant statements
and presentations, and discuss any
information or ideas presented. The meeting
will be informal.

COMMENTS: Written comments can be sent to:

Stig Regli
Criteria and Standards Division
U.S. Environmental Protection Agency
Office of Drinking Water (WH-550D)
401 M Street, S.W.
Washington, D.C. 20460

CONTACT: For further information contact Stig Regli at
the above address or by phone (202-382-7379).

STRAWMAN GROUND WATER DISINFECTION REQUIREMENTS (GWDR)
(4/18/90)

Fulfills Following Statutory Requirements OF Safe Drinking Water Act (SDWA)

EPA must promulgate disinfection requirements for all public water supplies by June 19, 1989. (EPA promulgated disinfection requirements for systems using surface water on June 19, 1989).

EPA must promulgate regulations for Giardia lamblia, viruses, Legionella, and heterotrophic plate count bacteria (HPC), and turbidity by June 19, 1989. (EPA promulgated treatment requirements in systems using surface water or ground water under the direct influence of surface water for Giardia lamblia, viruses, Legionella, HPC and turbidity on June 19, 1989.) Since Giardia lamblia, and turbidity are not characteristic of ground water supplies (i.e., those not under the direct influence of surface water) they do not need to be regulated in ground water supplies.

NOTE: THIS RULE IS NOT INTENDED TO REGULATE FOR CRYPTOSPORIDIUM. EPA IS CURRENTLY EVALUATING WHETHER THE SURFACE WATER TREATMENT RULE (SWTR), WHICH REGULATES FOR GIARDIA LAMBLIA IN SYSTEMS USING SURFACE WATER OR GROUNDWATER UNDER THE DIRECT INFLUENCE OF SURFACE WATER, ALSO PROVIDES ADEQUATE PROTECTION FOR CONTROLLING CRYPTOSPORIDIUM. IF EPA DETERMINES THAT THE EXISTING SWTR DOES NOT PROVIDE ADEQUATE PROTECTION FOR CRYPTOSPORIDIUM EPA WILL PROMULGATE AMENDMENTS TO THE SWTR TO ENSURE THAT IT DOES.

Maximum Contaminant Level Goals (MCLGs)

Viruses	0
<u>Legionella</u>	0
Heterotrophic Plate Count (HPC)	none

Under the SWTR no MCLG was published for HPC because this represents both innocuous and pathogenic bacteria and therefore EPA could not set a particular HPC (other than at zero) at which no adverse health effects occur. EPA believes an MCLG of zero is inappropriate since the SDWA would then require EPA to promulgate an MCL as close to zero as feasible; the health benefits of meeting a level near zero versus some higher level (e.g., 500 per 100ml) are unquantifiable and probably negligible, if any. Also, excessive amounts of disinfectant would be needed to achieve such a level and thus could result in excessive disinfection by-products in the finished water.

General Requirements

Coverage: All public water systems (including non-community) using any ground water source must disinfect unless they obtain a variance from the State according to Section 1415 (a)(B) of the SDWA. Before a variance may be granted by the State, it must be determined that the system can meet the variance criteria of this rule (see pg. 7), and the State must provide notice and opportunity for public hearing on the proposed variance. (Note: variances to treatment technique requirements are different than those to MCL requirements in that no determination by the State of best available technology (BAT), compliance schedule, and no unreasonable risk to health is needed.)

Disinfection treatment technique requirements are established in lieu of MCLs for viruses, heterotrophic plate count bacteria, and Legionella. Treatment technique requirements are established for viruses and Legionella because it is not economically or technologically feasible to measure the levels of these contaminants. Treatment technique requirements are established for HPC to limit their growth in the distribution system; no MCL is established for the same reasons as not publishing an MCLG (see above).

All systems using disinfection must be operated by qualified operators as determined by the State. (ALTERNATIVE OPTION: requirement does not apply to non-community systems unless they serve more than 100 people.)

Specific Requirements

1) level of inactivation

Option 1 - State discretion on inactivation rate/State specifies design and operating conditions

System must provide disinfection on all water delivered to the distribution system, unless a variance is granted by the State (see pg 6). States must specify the appropriate level of disinfection and enforceable design and operating conditions for each system based on site specific characteristics. For example, depending upon the probability of risk from fecal contamination in the source water, the State would specify a minimum level of inactivation (e.g., disinfection but with no minimum rate specified, or 1 (90%), 2 (99%), 3 (99.9%), 4 (99.99%), or 5 logs (99.999%) of inactivation. The State would be required to specify enforceable design and operating conditions (e.g., appropriate contact time and dosage depending upon the disinfectant used) for the system to meet the appropriate level of inactivation.

The design and operating conditions specified by the State would depend upon CT values recommended by EPA, or other information that the system made available to the State. "CT" is the product of residual concentration (mg/l) and contact time (minutes)), and UV disinfection conditions. See Tables E7, E9, E11, E13, and E14 for CT values and UV conditions necessary to achieve different levels of inactivation for different disinfectants (Note: these CT values are taken from the 10/89 guidance manual to the Surface Water Treatment Rule. They may change depending upon new data that becomes available within the next year).

EPA will provide guidance to States for determining appropriate levels of inactivation in a Guidance Manual to the ground water disinfection requirements. EPA will define different levels of risk for different characteristics of ground water systems.

(NOTE: UNDER THIS OPTION THE MINIMUM LEVEL OF INACTIVATION IS ONLY ENFORCEABLE BY THE STATE; IT IS NOT FEDERALLY ENFORCEABLE)

level of disinfection con'd

Option 2 - EPA specifies the minimum level of inactivation for all systems/State specifies design and operating conditions for meeting this level

This is the same as option 1 except that all systems would be required to disinfect (except those able to get a variance) to achieve at least some minimum specified level of inactivation of viruses (e.g., 4 logs). The State must specify enforceable design and operating requirements which, if met, will ensure that this minimum level of inactivation is achieved. EPA would also recommend higher levels of inactivation for very high risk source waters.

EPA will provide guidance to States for developing such criteria in a Guidance Manual to the ground water disinfection requirements.

Option 3 - hybrid of option 1 and 2
(lead)

EPA specifies the minimum level of inactivation for all systems but State can specify lower level depending upon site specific characteristics. State specifies design and operating conditions for meeting this level.

(NOTE: UNDER THIS OPTION THE MINIMUM LEVEL OF INACTIVATION IS FEDERALLY ENFORCEABLE, UNLIKE OPTION 1 WHERE IT IS NOT).

Option 4 - EPA specifies CT values rule / utilities demonstrate compliance

Systems must meet the operating conditions (CT values) specified in the rule, for the particular disinfectant that they use, to achieve at least 99.99 percent inactivation of viruses. If conditions for a disinfectant are not given, the system must demonstrate to the State that the disinfection conditions provided are achieving at least a 99.99 percent inactivation of viruses.

2) continuity of disinfection

Option 1 - State discretion on monitoring and enforceable (lead) criteria

Systems must provide continuous disinfection on all water entering the distribution system and provide adequate monitoring, as determined by the State, to demonstrate this. The State must specify enforceable criteria for ensuring that systems are providing continuous disinfection. EPA will provide guidance for States to specify such criteria.

Option 2 - EPA specifies monitoring and enforceable criteria
(adopt similar provisions to SWTR and expand to allow for UV)

Systems must provide a detectable disinfectant residual or UV dosage in the water entering the distribution system, demonstrated by continuous monitoring. If there is a failure in the continuous monitoring, the system may substitute grab sample monitoring every four hours for up to five days.

If there is an absence of a disinfectant residual or UV dosage for any time, the system must notify the State as soon as possible but no later than the end of the next business day. Notification must include whether or not the residual or UV dosage was restored within four hours. If disinfection is not restored to the required operating levels within four hours, it is a violation.

Systems serving 3300 people or less from one or more wells, and using disinfectants other than UV light, can take one daily grab sample per well per day in lieu of continuous monitoring. If at any time the residual is absent, the system must conduct grab sample monitoring every four hours until the residual is restored.

3) distribution system requirements

Option 1 - EPA specifies residual requirements (adopt same provisions as SWTR)

Disinfectant residuals in the distribution system cannot be undetectable in more than five percent of the samples, each month, for any two consecutive months. Samples must be taken at the same frequency as total coliforms under the coliform rule, but no less than one sample per month, during which the system is in operation. A system may measure for HPC in lieu of disinfectant residual. If the HPC measurement is less than 500 colonies/ml, the site is considered to have a "detectable" residual for compliance purposes. For systems which cannot maintain a residual or practically monitor for HPC, the State can judge whether adequate disinfection is provided, or is needed, in the distribution system and this requirement does not apply.

Option 2 - State discretion

No requirement unless State specifies residual or HPC monitoring is needed to demonstrate adequate protection.

Option 3 - hybrid of Option 1 and 2 (lead)

Adopt Option 1 for community systems serving greater than 3300 people. No requirement for smaller systems unless specified by State.

Variance Criteria for Avoiding Disinfection

1) Systems must not have had any waterborne disease outbreaks, or if they have, such systems must have been modified to prevent another such occurrence, as determined by the State.

2) Within every 5 years system must have a sanitary survey which indicates that the source water is not vulnerable to viral or bacterial fecal contamination as determined by the State. Guidance will be provided for determining an adequate sanitary survey in the Guidance Manual to the ground water disinfection requirements.

(NOTE: FREQUENCY OF SANITARY SURVEYS IS CONSISTENT WITH THAT REQUIRED UNDER THE TOTAL COLIFORM RULE FOR GROUND WATER SYSTEMS WHICH COLLECT FEWER THAN 5 SAMPLES PER MONTH. EPA ANTICIPATES THAT THE SANITARY SURVEY COULD ALSO BE CONDUCTED AT THE SAME TIME THAT OTHER REGULATORY NEEDS ARE MET, E.G., VULNERABILITY ASSESSMENTS TO REDUCE MONITORING FOR VOLATILE ORGANIC AND SYNTHETIC ORGANIC CHEMICALS. EPA IS DEVELOPING GUIDELINES FOR HOW BEST TO COORDINATE SUCH EFFORTS.)

3) All wells within the system must meet the well construction code(s) specified by the State. The State must have an active well construction code subject to EPA approval. Guidance will be provided for determining an adequate well construction code.

4) The system must have a cross connection control program in place which is approved by the State. Guidance will be provided for determining an adequate sanitary survey in the Guidance Manual to the ground water disinfection requirements.

5) The system must be designed, as approved by the State, to ensure high probability that a positive pressure is maintained throughout the distribution system.

6) The system must comply with monitoring requirements of the Total Coliform Rule.

Analytical Requirements

Testing and sampling must be in accordance with Standard Methods, 17th edition, or methods approved by EPA for disinfectant residuals.

Reporting

All monitoring required in the rule must be reported monthly to the State.

Compliance

All community systems must meet monitoring and performance requirements by December 29, 1995. All non-community systems must meet monitoring and performance requirements by December 29, 2001. (Note: Under the SWTR, States must determine whether all ground water sources are under the direct influence of surface water for community systems by June 29, 1994 and for noncommunity systems by June 29, 1999.

Exemptions Allowed.

TABLE E-7
CT VALUES FOR
INACTIVATION OF VIRUSES BY FREE CHLORINE (1,2)

Temperature (C)	Log Inactivation					
	2.0		3.0		4.0	
	pH		pH		pH	
	6-9	10	6-9	10	6-9	10
0.5	6	45	9	66	12	90
5	4	30	6	44	8	60
10	3	22	4	33	6	45
15	2	15	3	22	4	30
20	1	11	2	16	3	22
25	1	7	1	11	2	15

Notes:

1. Data adapted from Sobsey (1988) for inactivation of Hepatitis A Virus (HAV) at pH = 6, 7, 8, 9, and 10 and temperature = 5 C. CT values include a safety factor of 3.
2. CT values adjusted to other temperatures by doubling CT for each 10 C drop in temperature.

TABLE E-9

CT VALUES FOR
INACTIVATION OF VIRUSES
BY CHLORINE DIOXIDE pH 6-9^(1,2)

Removal	Temperature (C)					
	1	5	10	15	20	25
2 log	8.4	5.6	4.2	2.8	2.1	1.4
3 log	25.6	17.1	12.8	8.6	6.4	4.3
4 log	50.1	33.4	25.1	16.7	12.5	8.4

Notes:

1. Data adapted from Sobsey (1988) for inactivation of Hepatitis A Virus (HAV) at pH = 6.0 and temperature = 5 C. CT values include a safety factor of 2.
2. CT values adjusted to other temperatures by doubling CT for each 10 C drop in temperature.

TABLE E-11
CT VALUES FOR
INACTIVATION OF VIRUSES BY OZONE^(1,2)

Inactivation	Temperature (C)					
	<u>1</u>	<u>5</u>	<u>10</u>	<u>15</u>	<u>20</u>	<u>25</u>
2 log	0.9	0.6	0.5	0.3	0.25	0.15
3 log	1.4	0.9	0.8	0.5	0.4	0.25
4 log	1.8	1.2	1.0	0.6	0.5	0.3

Notes:

1. Data adapted from Roy (1982) for inactivation of poliovirus for pH = 7.2 and temperature = 5 C. CT values include a safety factor of 3.
2. CT values adjusted to other temperatures by doubling CT for each 10 C drop in temperature.

TABLE E-13

CT VALUES FOR
INACTIVATION OF VIRUSES BY CHLORAMINE (1,2,3)

Inactivation	Temperature (C)					
	<u>41</u>	<u>5</u>	<u>10</u>	<u>15</u>	<u>20</u>	<u>25</u>
2 log	1,243	857	643	428	321	214
3 log	2,063	1,423	1,067	712	534	356
4 log	2,883	1,988	1,491	994	746	497

Notes:

1. Data from Sobsey (1988) for inactivation of Hepatitis A Virus (HAV) for pH = 8.0 and temperature = 5 C, and assumed to apply for pHs in the range of 6.0 to 10.0.
2. CT values adjusted to other temperatures by doubling CT for each 10 C drop in temperature.
3. This table of CT values applies for systems using combined chlorine where chlorine is added prior to ammonia in the treatment sequence. CT values in this table should not be used for estimating the adequacy of disinfection in systems applying preformed chloramines or ammonia ahead of chlorine.

TABLE E-14

CT VALUES FOR
INACTIVATION OF VIRUSES BY UV⁽¹⁾

Log Inactivation	
<u>2.0</u>	<u>3.0</u>
21	36

Note:

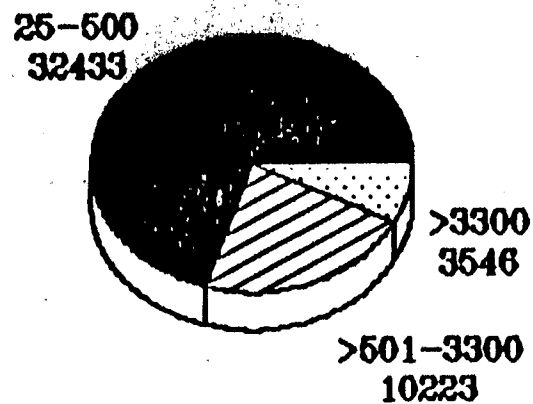
1. Data adapted from Sobsey (1988) for UV inactivation of Hepatitis A Virus (HAV). Units of CT values are mW-sec/cm². CT values include a safety factor of 3.

AFFECTED UNIVERSE

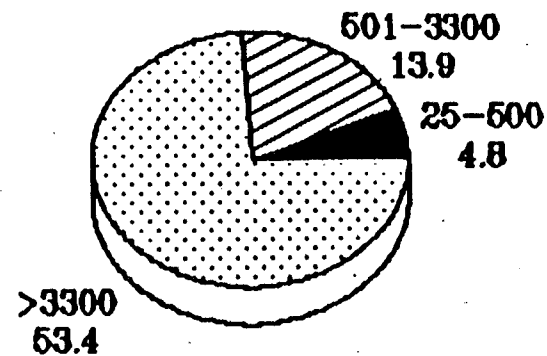
<u>SYSTEM TYPE</u>	<u>#SYSTEMS</u>	<u>POP (MIL.)</u>
COMMUNITY		
UNDISINFECTED	22,658	11.4
PARTIALLY DIS	4,323	3.9
DISINFECTED	19,221	55.7
TOTAL	46,202	71.0
NONCOMMUNITY		
UNDISINFECTED	110,052	20.6
DISINFECTED	26,489	4.5
TOTAL	136,541	25.1

COMMUNITY GW. SYSTEMS

NUMBERS OF SYSTEMS AND POPULATION BY SIZE CATEGORY

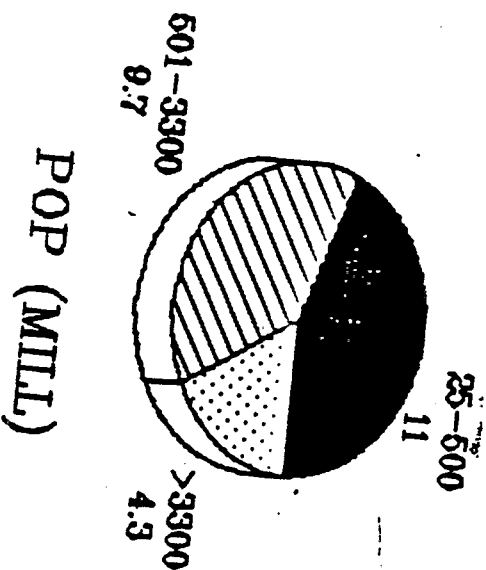
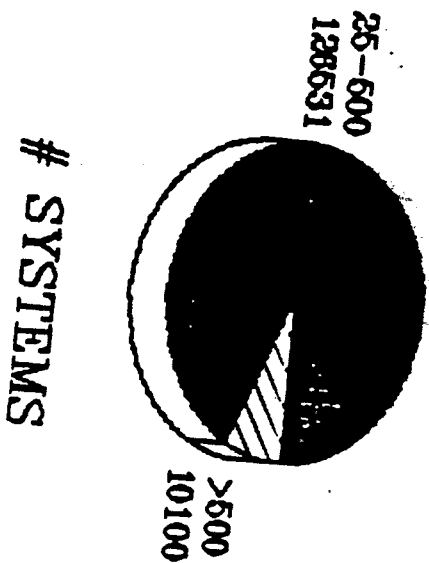


#'S OF SYSTEMS



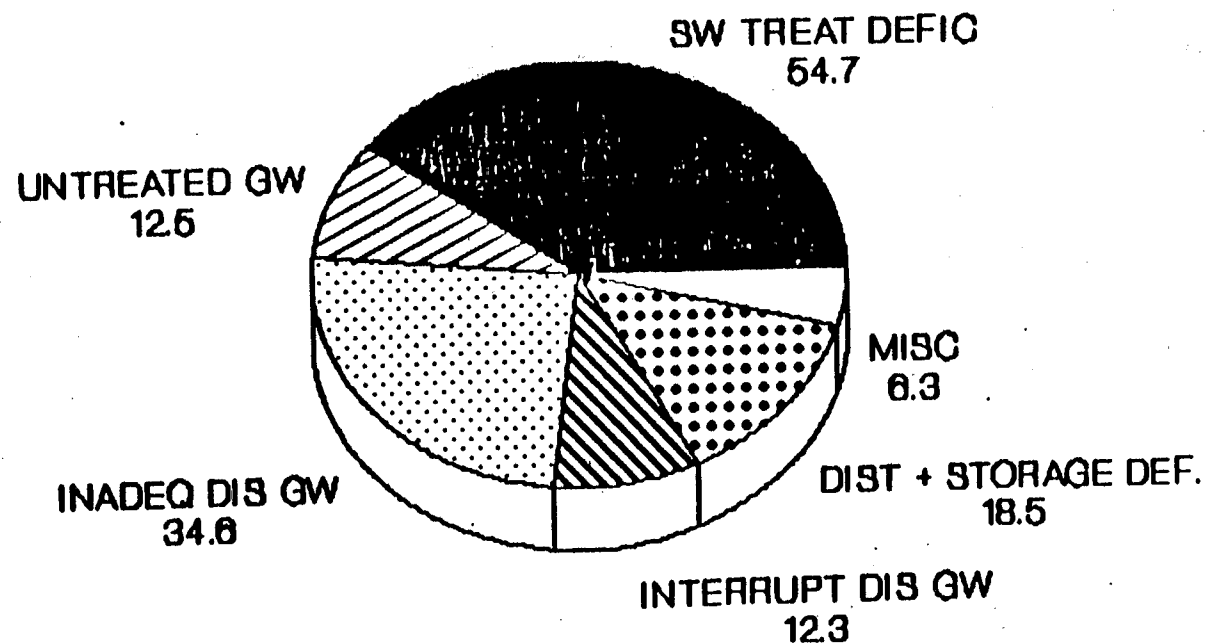
POP (MILLIONS)

NONCOMMUNITY GW SYSTEMS #S OF SYSTEMS AND POPULATION BY SIZE CATEGORY



Waterborne Disease 71-88

Cases (reported) in Thous. by Etiology



compiled by Craun 3/27/90

