REPUBLIC OF THE MARSHALL ISLANDS

ENVIRONMENTAL PROTECTION AUTHORITY

PUBLIC WATER SUPPLY

REGULATIONS

1994

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PART I - GENERAL PROVISIONS

1. Authority

a) These regulations are promulgated by the Republic of the Marshall Islands Environmental Protection Authority (hereafter the "Authority") with the approval of the Minister of Health and Environment pursuant to Section 21 of the National Environmental Protection Act 1984.

b) These regulations supersede all previous publications and repeal 63 Trust Territory Code Chapter 13, Subchapter II, Public Water Supply Systems Regulations.

c) These regulations have the force and effect of law.

2. Purpose

The purpose of these regulations, technical provisions and specifications is to establish certain minimum standards and requirements as determined by the Authority to be necessary for the public health and safety and to insure that public water supply systems and water supply sources are protected against contamination and pollution and do not constitute a health hazard.

3. Effective Date

These regulations shall come into force one day after their approval by the Cabinet.

4. Interpretation

In these regulations, unless the context otherwise requires:

a) "Authority" means the Republic of the Marshall Islands Environmental Protection Authority or its authorized representative.

b) "Bottled water" means water intended for human consumption that is sealed or unsealed in bottles or other containers. The term "bottled water" includes the source of the water and the water therefrom, whether derived from a spring, artesian well, drilled well, municipal water supply, or any other source. Bottled water does not include mineral water or any type of soft drink commonly known as soda water.

c) "Bottled Water Producer" means a person who manufactures or produces bottled water in the Republic for sale to the public in a quantity of at least 15 gallons of water per month.

d) "Community Water System" (CWS) means a public water system which serves at least fifteen (15) service connections used by year-round residents, or regularly serves at least twenty-five (25) year-round residents. A CWS includes all the water supply source(s) used by the community system.

e) "CT" or "CTcalc" is the product of "residual disinfectant concentration" (C) in mg/l determined before or at the first customer, and the corresponding "disinfectant contact time" (T) in minutes, i.e., "C" x "T". If a public water system applies disinfectants at more than one point prior to the first customer, it must determine the CT of each disinfectant sequence before or at the first customer to determine the total percent inactivation or "total inactivation ratio." In determining the total inactivation ratio, the public water system must determine the residual disinfectant concentration of each disinfection sequence and corresponding contact time before any subsequent disinfection application point(s). "$CT_{99.9}$" is the CT value required for 99.9 percent (3-log) inactivation of *Giardia lamblia* cysts. $CT_{99.9}$ for a variety of disinfectants and conditions appear in Tables 1, 2, and 3 at Regulation 28 below.

$$\frac{CTcalc}{CT_{99.9}}$$

is the inactivation ratio. The sum of the inactivation ratios, or total inactivation ratio shown as

$$\Sigma \frac{(CTcalc)}{(CT_{99.9})}$$

is calculated by adding together the inactivation ratio for each disinfection sequence. A total inactivation ratio equal to or greater than 1.0 is assumed to provide a 3-log inactivation of *Giardia lamblia* cysts.

f) "Contaminant" means any physical, chemical, biological or radiological substance or matter in water.

g) "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, that is intended to kill or inactivate pathogenic microorganisms.

h) "Disinfectant contact time" ("T" in CT calculations) means the time in minutes that it takes for water to move from the point of disinfectant application or the previous point of disinfectant residual measurement to a point before or at the point where residual disinfectant concentration ("C") is measured. Where only one "C" is measured, "T" is the time in minutes that it takes for water to move from the point of disinfectant application to a point before or at at the point where residual disinfectant concentration ("C") is measured. Disinfectant contact time in pipelines must be calculated based on "plug flow" by dividing the internal volume of the pipe by the maximum hourly flow rate through that pipe. Disinfectant contact time within mixing basins and storage reservoirs must be determined by tracer studies or an equivalent demonstration.

i) "Disinfection" means a process which inactivates pathogenic organisms in water by chemical oxidants or equivalent agents.

j) "Dose Equivalent" means the product of the absorbed dose from ionizing radiation and such factors as account for differences in biological effectiveness due to the type of radiation and its distribution in the body as specified in the International Commission on Radiological Units and Measurements (ICRU).

k) "Feasible" means capable of being brought about by use of the best available technology, treatment techniques and other means chosen by the Authority after examination for availability and efficacy under field and laboratory conditions.

l) "Filtration" means a process for removing particulate matter from water by passage through porous media.

m) "Gross alpha particle activity" means the total radioactivity due to alpha particle emission as inferred from measurements on a dry sample.

n) "Gross beta particle activity" means the total radioactivity due to beta particle emission as inferred from measurements on a dry sample.

o) "Ground Water" means that part of underground water that is below the water table. Ground water is in the zone of saturation within which all the pore spaces of rock materials are filled with water.

p) "Ground water under the direct influence of surface water" means any water beneath the surface of the ground with (1) significant occurrence of insects or other macroorganisms, algae, or large-diameter pathogens such as *Giardia lamblia*, or (2) significant and relatively rapid shifts in water characteristics, such as turbidity, temperature, conductivity, or pH, which closely correlate to climatological or surface water conditions. Direct influence must be determined for individual sources in accordance with criteria established by the Authority. The Authority's determinination of direct influence may be based on site specific measurements of water quality, or documentation of well construction characteristics and geology with field evaluation, or both.

q) "Heterotrophic Bacteria" means viable aerobic and facultative anaerobic bacteria in a water environment, capable of growth on the selected plating medium.

r) "Man-made Beta Particle and Photon Emitters" means all radionuclides emitting beta particles

and/or photons listed in Maximum Permissible Body Burdens and Maximum Permissible Concentration of Radionuclides in Air or Water for Occupational Exposure, NBS Handbook 69, except the daughter products of thorium-232, uranium-235 and uranium-238.

s) "Maximum Contaminant Level (MCL)" means the maximum permissible level of a contaminant delivered to the user by a PWS in drinking water, except in the case of turbidity, where the maximum permissible level is measured at the point of entry to the distribution system. Contaminants added to the water under circumstances controlled by the user, except those resulting from corrosion of piping and plumbing caused by water quality, are excluded from this definition.

t) "Non-Community water system" (NCWS) means a public water system that is not a community water system serving trasient and non-transient people.

u) "Person" means any individual, corporation, company, association, partnership, agency, authority, commission, foundation, the Republic of the Marshall Islands government or its political subdivisions, or any local, state, or foreign government or municipality, or other institution or entity, whether public or private.

v) "Picocure (pCi)" means that quantity or radioactive material producing 2.22 nuclear transformations per minute.

w) "Point of disinfectant application" is the point where the disinfectant is applied and water downstream of that point is not subject to recontamination by surface water runoff.

x) "Potable Water" means water which is of a quality that meets the requirements of these regulations.

y) "Public Water System" (PWS) means a system for the provision to the public of piped water for human consumption, if such system has at least fifteen (15) service connections or regularly serves an average of at least twenty-five (25) individuals daily at least 60 days out of the year. Such term includes:

(i) the water supply source(s) used;

(ii) any collection, treatment, storage, and distribution facilities under control of the operator of such system and used primarily in connection with such system; and,

(iii) any collection or pre-treatment storage facilities not under such control which are used primarily in connection with such system.

A public water system is either a "community water system" or a "non-community water system".

z) Rem" means the unit dose equivalent from ionizing radiation to the total body or any internal organ or organ system. A "millirem (mrem)" is 1/1000 of a rem.

aa) "Residual disinfectant concentration" ("C" in CT calculations) means the concentration of disinfectant measured in mg/l in a representative sample of water.

bb) "Sanitary Survey" means an on-site review of the water source, facilities, equipment, operation

and maintenance of a public water system for the purpose of evaluating the adequacy of such source, facilities, equipment, operation and maintenance for producing and distributing safe drinking water.

cc) "Standard Sample" means the exact portion of finished drinking water that is examined for the presence of coliform bacteria.

dd) "Supplier of Water" means any person who owns or operates a public water system.

ee) "Surface Water" means all water open to surface runoff (e.g., rivers, lakes, streams, reservoirs, impoundments).

ff) "System with a single service connection" means a system which supplies drinking water to consumers via a single service line.

gg) 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.

hh) "Waterborne disease outbreak" means the significant occurrence of acute infectious illness, epidemiologically associated with the ingestion of water from a public water system which is deficient in treatment, as determined by the Authority.

PART II - PRE-EXISTING, NEW OR MODIFIED PUBLIC WATER SYSTEMS

5. Notification of Intent and Siting Requirements

a) Before a person may enter into a financial commitment for or initiate construction of a new public water system or increase the capacity of or modify an existing public water system, the person shall notify the Authority, and submit with such notification a conceptual, descriptive plan with appropriate sketches detailing proposed location, water source capacity, budget estimates and other data as described in Regulation 6. The person shall, to the extent practicable, avoid locating part or all of the new or expanded facility at a site which:

(i) is subject to a significant risk from earthquakes, floods, fires or other disasters which could cause a breakdown of the public water system or a portion thereof; or,

(ii) except for intake structures, is within the floodplain of a 100-year flood or is lower than any recorded high tide where appropriate records exist; or,

(iii) in the case of a roof catchment, where reasonable consideration has not been given to effective typhoonization of buildings, roofs, guttering and other catchment appurtenances.

b) All public water systems which are in existence on the effective date of these regulations shall obtain a Public Water System Permit within 180 days of the effective date of these regulations. Such permit shall be obtained by the submission and approval of final drawings and specificaitons as set forth in this Part. Any planned increase in capacity or modification of an existing public water system shall be

subject to the requirements of this Part upon the effective date of these regulations.

6. Contents of Notification of Intent

The notification of intent to construct a new public water supply system or to increase the capacity of an existing public water supply system, as required in Regulation 5, shall include the following data and information:

(i) name and address of person who intends to construct or modify public water supply system;

(ii) name and address of person who will be the supplier of water to the public;

(iii) location of proposed water source or sources on a 8 1/2" x 11" portion of topographic map section;

(iv) type of source (spring, stream, well, roof catchment, ground catchment, or other);

(v) estimated capacity of source in gallons or cubic meters per day during normal rainfall conditions, with source of study stated;

(vi) horizontal area of proposed catchment in square meters or square feet;

(vii) type of roof materials, if roof catchment, or description of topography and nature of vegetative cover, if ground catchment;

(viii) planned raw water storage capacity or proposed increase in raw water storage capacity;

(ix) description & schematic diagram of water treatment proposed;

(x) number of persons to be supplied now;

(xi) anticipated population of service area ten (10) years from now;

(xii) existing method of sewage disposal and methods expected in the future;

(xiii) proposed storage capacity of treated water, if known;

(xiv) if source is to be a well or wells, estimated depth(s), measures to be taken to exclude surface water from well, kind of pump(s) to be used (electric, engine, windmill) and capacity in gallons per minute, and adjacent land uses and pollution sources;

(xv) budgeted estimate for construction;

(xvi) expected source of funds; and,

(xvii) other data as may be required by the Authority.

7. Design and Construction Review Requirements

a) No person shall cause or allow the construction of or change of any public water supply, without approval of final drawings and specifications by the Authority. Final drawings and specifications shall be reviewed on the basis that the completed facility will produce water, the quality of which meets the standards prescribed by these regulations.

b) Public Water Supply installation, modification, change, or addition, shall not include routine maintenance, service pipe connections, hydrants and valves, or replacement of equipment, pipe, and appurtenances with equivalent equipment, pipe and appurtenances.

c) All work performed on a public water supply shall be in accordance with accepted engineering practices.

d) Any pipe, solder, flux or fittings in a public water system or any building connected to a public water system shall be "lead free", in accordance with Regulation 47. Flux and solder may not contain more than 0.2% lead. Pipe and fittings may not contain more than 8% lead.

8. Review and Action Upon Notice of Intent

a) The Authority shall review a notice of intent to construct or modify a public water supply system for completeness within sixty (60) calendar days from receipt and shall either:

(i) fully or conditionally approve the notice for the preparation of final plans and specifications for the proposed facility;

(ii) notify the proposed constructor that additional information is required; or

(iii) deny the proposal to construct giving written environmental reasons for the denial.

b) After any notification is deemed complete by the Authority and seventy-five (75) days have passed without action, the proposed notification is automatically approved and the constructor may proceed with preparation of final drawings and specifications.

9. Preparation of Final Drawings and Specifications

Preparation of final drawings and specifications for a public water supply system shall be based upon accepted engineering practice and shall be directed toward construction of a facility which will produce drinking water the quality of which shall meet the standards prescribed in these regulations. The final plans and specifications shall generally follow the intent expressed in the approved notification. Preparation of final drawings and specifications will be supervised by a person experienced in the construction, operation and maintenance of water supply systems.

10. Review and Approval of Final Drawings and Specifications

a) Final drawings and specifications shall be submitted to the Authority for review.

b) The Authority shall either approve the drawings and specifications or request changes in the drawings and specifications by the constructor.

c) The action prescribed in Subregulation (b) above shall be completed within fifteen (15) working days from the time the drawings and specifications are received by the Authority. After any requested changes have been made, the Authority shall approve or disapprove within ten (10) working days of receipt of the documents.

11. Public Water System Permit

a) No person shall build, operate or modify a public water system without a valid permit from the Authority.

b) Upon approval of the final drawings and specifications submitted pursuant to Regulation 10, and upon receipt of a processing fee of $250.00, the Authority shall issue a Public Water System Permit to the person responsible for the public water system.

c) The duration of the Public Water System Permit shall be for a term of three (3) years. The commencement and expiration date shall be shown on the face of the Public Water System Permit.

12. Emergency Permits

Whenever emergencies affecting the safety or adequacy of a public water supply requires modifications or additions, the Authority shall be notified. The Authority may issue emergency construction permits by telephone or other message with whatever special conditions it deems necessary for the proper safeguarding of the health of the water consumers. Plans and specifications covering the work as constructed under the emergency permit must be submitted to the Authority as soon as reasonably possible. Modifications required by the Authority after review of the submission shall be made promptly, within ten (10) days of issuance of an emergency permit.

13. Emergency Permit Duration and Revocation

a) Violation of any permit conditions, or these regulations, shall be cause for revocation of any permit previously issued.

b) Duration of emergency permits shall be at the discretion of the Authority. Such duration shall be shown on the face of the emergency permit.

PART III - BOTTLED WATER PRODUCTION

14. General Requirements

All bottled water produced in the Republic shall be subject to these regulations, and shall conform to required maximum contaminant levels and specified treatment techniques. Bottled water producers shall be responsible for the contents and safety of bottled water produced in the Republic, and shall ensure that bottled water testing and all other required procedures shall be conducted in accordance with these regulations.

15. Inspections

a) Establishments producing bottled water shall be subject to inspection by the Authority at reasonable times, but not less than twice yearly.

b) Inspections shall be conducted to determine:

(i) whether the bottled water is in conformance with the standards set forth in these regulations;

(ii) whether the bottled water producer is in compliance with the procedures set forth herein; and

(iii) whether the public health and safety is adequately protected.

c) The Authority shall make a written report of all inspections, and make such report available to the bottled water producer and to the general public. The report shall include the findings of the Authority and state such conditions, guidelines, and standards that the Authority shall impose on the bottled water producer so that bottled water production may be brought into compliance with these regulations and other public health and safety standards.

d) Any conditions, guidelines and standards set forth pursuant to Subregulation (c), above, also shall be set forth as special conditions to a bottled water production permit, pursuant to Regulation 18 below.

16. Bottled Water Production Permit

a) Any person who produces bottled water within the Republic shall first obtain a permit from the Authority for the proposed production activity.

b) Bottled water producers in operation on the effective date of these regulations shall obtain a bottled water permit within three months of the effective date of these regulations.

c) New bottled water producers who propose to begin operations on or after the effective date of these regulations shall obtain a permit from the Authority before production of bottled water may commence.

17. Application for Permit

a) Application for permits shall be on a form approved by the Authority and shall be submitted by the person undertaking the bottled water production.

b) Applications shall be made no later than one (1) month before the proposed production activity is scheduled to begin, and shall be accompanied by such documents as the Authority may require.

c) Applications shall be accompanied by a non-refundable processing fee of $150.00.

18. Special Conditions

The Authority may, upon issuing a bottled water production permit or at any time after issuance of such a permit, impose any conditions or special requirements on the production of bottled water as it sees fit. All such conditions and requirements shall be listed on a written instrument issued by the Authority and attached to the permit.

19. Permit Expiration and Renewal

A bottled water production permit issued by the Authority shall expire one year from the date of issuance. If the bottled water production operation is ongoing at the time of permit expiration, a new permit application shall be submitted to the Authority one month before expiration of the permit. This renewal permit shall be treated as a new permit application, and shall be subject to the conditions set forth in Regulation 17 above.

PART IV - OPERATION, MAINTENANCE AND SELF-MONITORING

20. Definition and Analytical Techniques

a) This part of the regulations defines requirements to be met in the operation and

maintenance of public water supply facilities, and the requirements concerning self-monitoring by a supplier of water.

b) Permissible analytical techniques are specified herein. With the written permission of the Authority, alternative analytical techniques may be employed. An alternative technique shall be acceptable only if it is substantially equivalent to the prescribed test in both precision and accuracy as it relates to the determination of compliance with any maximum contaminant level. The use of the alternative analytical technique shall not decrease the frequency of monitoring required by this part.

21. Identification of Suppliers of Water

In cases where, for various reasons, ownership or operational responsibilities are not clearly defined for public water systems, the Minister of Health and Environment shall identify the supplier(s) of water for purposes of these regulations.

22. Multiple Systems

When a water supplier provides water to more than one public water system, the Authority may consider the systems as a single system, and modify the monitoring requirements accordingly. The modified system shall be monitored as specified by the Authority. Each of the separate water systems within the modified system shall be responsible for the modified sampling program applying to its system.

23. Drinking Water Quality Control

It is the responsibility of the supplier of water to assure a quality of water supply that equals or surpasses drinking water quality standards of the Authority. This includes assurance by the supplier that users do not contaminate the public supply by the use of improper plumbing or backflow of wastewater.

24. Operator Certification

The Authority shall establish a program for operator certification not later than January 1, 1996. Not later than January 1, 1998, each public water supply system shall be under the technical supervision of a certified operator, certification to be by the Authority or by another agency recognized by the Authority. Upon commencement of this program, all official operating reports submitted to the Authority are to be signed by a certified operator.

25. Bacteriological Quality

a) Standard Sample: The standard sample for the coliform test shall consist of not less than 100 milliliters ("ml").

b) Testing Methods: Suppliers of community water systems and non-community water systems shall sample and test water samples for coliform bacteria density in accordance with the analytical recommendations set forth in the latest edition of "Standard Methods for the Examination of Water and Wastewater", American Public Health Association, 1015 Fifteenth Street, N.W., Washington, D.C., 20005, except that a standard sample as defined in Subregulation (a) above must be used. Such sampling and testing shall be performed in a laboratory approved by the Authority.

c) Sampling Points: The supplier of water shall have a written sampling plan approved by the Authority. Samples shall be taken at points which are representative of the conditions within the distribution system.

d) Frequency of Coliform Density Sampling: The supplier of water for a community water system shall take coliform density samples for prompt analysis at regular intervals, and in number proportionate to the vulnerability of the system to contamination and population served by the system. In no event shall the frequency of sampling and analysis be less than as set forth below:

Population Served	Minimum Number of Samples per Month*
15 to 25	1
25 to 1,000	1
1,110 to 2,500	2
2,500 to 3,300	3
3,300 to 4,100	4
4,100 to 4,900	5
4,901 to 5,800	6
5,801 to 6,700	7
6,701 to 7,600	8
7,601 to 8,500	9
8,500 to 12,900	10
12,900 to 17,200	15
17,200 to 21,500	20
21,501 to 25,000	25
25,001 to 33,000	30
33,001 to 41,000	40
41,001 to 50,000	50

50,001 to 59,000	60
59,001 to 70,000	70
70,001 to 83,000	80
83,001 to 96,000	90
96,001 to 130,000	100
130,001 to 220,000	120
220,001 to 320,000	150
320,001 to 450,000	180
* Or as the Authority deems appropriate	

e) NCWS and Bottled Water Producer Testing: The supplier of water for a non-community water system or bottled water producer shall sample and test for coliform bacteria at least once in each month during which the system provides water to the public. Such sampling and testing shall commence before December 31, 1994. If the Authority, on the basis of a sanitary survey or inspection, determines that some other frequency is more appropriate, that frequency shall be the frequency required under these regulations. Such frequency shall be confirmed or changed on the basis of subsequent surveys or inspections.

f) Contaminant Levels: The maximum contaminant levels ("MCL") for coliform bacteria, applicable to all public water systems, are as follows -

(i) MCL for systems analyzing at least 40 samples/month: no more than 5% of the monthly samples may be total coliform-positive;

(ii) MCL for systems analyzing fewer than 40 samples/month: no more than 1 sample/month may be total coliform-positive. If only one sample is tested per month, two positive total coliform results in a row is a violation of the MCL for total coliforms;

(iii) a public water system must demonstrate compliance with the MCL for total coliforms each month it is required to monitor;

(iv) MCL violations must be reported to the Authority no later than one business day after the system learns of the violation;

g) Repeat Samples:

(i) a system must collect a set of repeat samples for each total coliform-positive routine sample and have it analyzed for Fecal Coliforms (*E. coli*), or Total Coliforms if a positive result is treated the same as a positive Fecal Coliform result;

(ii) at least one repeat sample must be from the same tap as the original sample;

(iii) other repeat samples must be collected from within five service connections of the original sample, including one upstream and one downstream sample;

(iv) system repeat samples must be collected within 24 hours of notification of original result, except in cases where reduced water hours makes it impossible. In such a case, samples shall be collected during the next scheduled water hours;

(v) if a total coliform-positive sample is at the end of the distribution system, one away from the end of the distribution system, or the system has only one tap, the Authority may waive the requirement to collect at least one repeat sample upstream or downstream of the original sampling site;

(vi) if coliforms are detected in any repeat sample, the system must collect another set of repeat samples, as above, each day the system is in operation until two successive samplings are negative for coliforms. The repeat samples may not be counted in meeting minimum frequency of sampling requirements.

h) Criteria for invalidation of sample: Because the presence of coliforms in drinking water indicates the possible presence of pathogens, the masking of coliforms by high levels of heterotrophic bacteria can prevent the detection of a potential public health threat. Three conditions indicate that high levels of heterotrophic bacteria are present:

(i) using the multiple-tube fermentation technique, the coliform sample produces a turbid culture in the absence of gas production;

(ii) using the membrane filter technique, the sample produces a confluent growth or a colony number that is too numerous to count ("confluent growth" means continuous bacterial growth covering the entire filtration area of a membrane filter or a portion of the membrane filter in which the bacterial colonies are not discrete; "too numerous to count" means that the total number of bacterial colonies exceeds 200 on a 47-mm-diameter membrane filter used for coliform detection);

(iii) using the P-A test, the sample produces a turbid culture in the absence of an acid reaction (an acid reaction is indicated when the medium changes to a yellow color).

Should any of these outcomes occur, the coliform sample is invalid. If the sample is declared invalid, the system must collect another water sample within 24 hours, or during the next water hours, from the same location as the original sample and submit it to the laboratory within 8 hours of collection (or up to 30 hours if the sample is maintained between 0 - 4°C.

26. Surface Water Treatment

a) All public water systems using surface water, or groundwater under the direct influence of surface water, or both, shall be disinfected and filtered.

b) A variance from the filtration requirement may be made in writing by the Authority upon proof by the public water supplier that the following water quality criteria are met:

(i) the source before disinfection must have a fecal coliform concentration not exceeding 20/100ml and total coliform concentration not exceeding 100/100ml in more than 10 percent of samples for the previous six months; and

(ii) the turbidity level must not exceed 5 NTU for one or more consecutive days, unless the Authority determines that the event is unusual or unpredictable (an event is unusual or unpredictable only if it occurs less than two times in any one year or five times in any consecutive ten years); and

(iii) the requirements of this Part must not be violated in any regard for two or more consecutive month; and

(iv) public water systems must maintain a watershed control program to minimize the potential for contamination by *G. lamblia* cysts and by human enteric viruses; and

(v) public water systems must prove their ability to limit and control potentially adverse activities through ownership of the watershed or through written agreements;

(vi) public water systems must not have any history of waterborne disease outbreaks created by their present water source and treatment system;

(vii) source water turbidity levels must be measured using a grab sample collected immediately before the first point of disinfectant application every four hours or by continuous monitoring. When turbidity exceeds 5 NTU, a public notification regarding the necessity of boiling drinking water, called a "Boil Water" notification, may be requested by the Authority;

(viii) the sampling frequency for surface water coliform testing for unfiltered systems must be determined by the size of the population served, as below:

Unfiltered Systems

System Population	Samples/Week*
<500	1
501-3,300	2
3,301-10,000	3
10,001-25,000	4
>25,001	5

* Or as the Authority requires

(ix) each day that the turbidity exceeds 1 NTU, a sample for coliform testing must be taken near the first service connection. When one or more turbidity measurements in any day exceed 1 NTU, the system shall collect the coliform sample within 24 hours of the first exceedance, if the system is

in operation, or during the next water hours. Results of sampling from the coliform monitoring shall be considered in determining compliance with the MCL for total coliforms;

(x) surface water disinfection must meet all the requirements of Regulation 28, as well as provide redundant components to ensure continuous disinfection of the water during plant operation, including an alternate power supply and an automatic alarm and start-up. Or, at the discretion of the Authority, the system must have an automatic shutoff of delivery of water to the distribution system whenever the disinfectant residual is less than 0.2 mg/L. The system must comply with all design and operating requirements specified by the Authority;

(xi) systems serving less than 3300 persons must take grab samples for disinfectant residual monitoring at the following frequencies:

System Population	Samples/Day
<500	1
501 -1,000	2
1,001-2,500	3
>2,501-3,300	4

Violation of any of the above criteria shall necesitate the installation of filtration equipment. The supplier of water shall immediately notify the Authority and the public if there is any waterborne disease outbreak that may possibly have resulted from an unfiltered public water system.

27. Compliance Deadlines - Unfiltered Systems

Systems with unfiltered surface water sources shall meet source water quality, disinfection, and watershed control criteria within two (2) months of the enactment of these regulations.

28. Quality with Respect to Disinfection - Filtered Systems

a) Maximum Contaminant Level: Each PWS must provide treatment of source water that complies with the following treatment-technique requirements. The treatment-technique requirements consist of installing and properly operating water treatment processes that are documented and meet the following requirements:

(i) the disinfection treatment must be sufficient to ensure that the total treatment processes of that system achieve at least 99.9 percent (3-log) inactivation and/or removal of *Giardia lamblia* cysts and at least 99.9 percent (4-log) inactivation and/or removal of viruses between a point where the raw water is not subject to contamination by surface-water runoff and a point downstream before or at the first customer, as determined by the Authority;

(ii) the disinfectant residual should be determined by the supplier of water every hour at the treatment plant(s), each day the system is in operation. If

at any time the residual falls below 0.2 mg/l for more than 4 hours, the system is in violation of these regulations. The system shall notify the Authority within one business day whenever the residual falls below 0.2 mg/l;

(iii) the supplier of water shall take samples for disinfectant residual determinations from points which are representative of the conditions within the distribution system each day the system is in operation;

(iv) the supplier of water shall maintain no less than 0.2 mg/l residual disinfectant throughout the public water distribution system. If less than 0.2mg/l occurs in more than 5% of the samples each month, the system is in violation of these regulations;

(v) when a particular sampling point has been shown to have a disinfectant residual less than 0.2 mg/l, the water at that location shall be retested immediately. If the original analysis is confirmed, the Authority shall be notified no later than the next business day. Also, if the analysis is confirmed, a sample for coliform bacterial analysis, or heterotrophic plate count as set forth in Subregulation (vi) below, or both, shall be collected from that sampling point as soon as practicable, preferably within one (l) hour, and the results of such analysis reported to the Authority by the end of the next business day after the results are known to the supplier of water;

(vi) water in the distribution system with a heterotrophic bacteria concentration less than or equal to 500/ml, measured as heterotrophic plate count (HPC), is deemed to have a detectable disinfectant residual for purposes of determining compliance with this requirement;

(vii) "$CT_{99.9}$" is the CT value required for 99.9 percent (3-log) inactivation of *Giardia lamblia* cysts. $CT_{99.9}$ for a variety of disinfectants and conditions appear in Tables 1, 2, and 3 below.

TABLE I

CT Values for Achieving 99.9 Percent Inactivation
of *Giardia lamblia* Cysts by Free Chlorine at 25° C[1] and Higher

mg/L Chlorine Residual	pH						
	< 6	6.5	7.0	7.5	8.0	8.5	<9.0

<0.4	24	29	35	42	50	59	70
0.6	25	30	36	43	51	61	73
0.8	26	31	37	44	53	63	75
1.0	26	31	37	45	54	65	78
1.2	27	32	38	46	55	67	80
1.4	27	33	39	47	57	69	82
1.6	28	33	40	48	58	70	84
1.8	29	34	41	49	60	72	86
2.0	29	35	41	50	61	74	88
2.2	30	35	42	51	62	75	90
2.4	30	36	43	52	63	77	92
2.6	31	37	44	53	65	78	94
2.8	31	37	45	54	66	80	96
3.0	32	38	46	55	67	81	97

[1]These CT values achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperature for determining $CT_{99.9}$ values between indicated temperatures.

TABLE 2

CT Values for Achieving 99.9 Percent Inactivation
of *Giardia lamblia* Cysts by Chlorine Dioxide and Ozone[1]

Temperature	<1°C	5°C	10°C	15°C	20°C	>25°C
Chlorine dioxide	63	26	23	19	15	11
Ozone	2.9	1.9	1.4	0.95	0.72	0.48

[1]These CT values achieve greater than 99.99 percent inactivation of viruses. CT values between the indicated

temperatures may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperature for determining $CT_{99.9}$ values between indicated temperatures.

TABLE 3

CT Values for Achieving 99.9 Percent Inactivation
of *Giardia lamblia* Cysts by Chloramines[1]

Temperature					
<1°C	5°C	10°C	15°C	20°C	25°C
3,800	2,200	1,850	1,500	1,100	750

[1]These values are for pH values of 6 to 9. These CT values may be assumed to achieve greater than 99.99 percent inactivation of viruses only if chlorine is added and mixed in the water prior to the addition of ammonia. If this condition is not met, the system must demonstrate, based on-site studies or other information, as approved by the Authority, that the system is achieving at least 99.99 percent inactivation of viruses. CT values between the indicated temperatures may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperature for determining $CT_{99.9}$ values between indicated temperatures.

b) Testing Methods: Analyses for residual chlorine must be measured by Method 408D (DPD Ferrous Titrimetric Method), Method 408E (DPD Ferrous Colorimetric Method), or Method 408F (Leuco Crystal Violet Method), as set forth in the latest edition of "Standard Methods for the Examination of Water and Wastewater", American Public Health Association. Residual disinfectant concentrations for free chlorine and combined chlorine may also be measured by using DPD colorimetric tests kits. Other disinfectant concentrations must be determined by methods listed in the latest edition of "Standard Methods". HPC may be determined as set forth in the latest edition of "Microbiological Methods for Monitoring the Environment", Water and Wastes Environmental Monitoring and Support Laboratory, Office of Research and Development, USEPA, or "Standard Methods for the Examination of Water and Wastewater".

c) Disinfection By-Products: For systems serving 10,000 or more people and using an oxident as a disinfectant, Total Trihalomethanes ("TTHMs") must be monitored annually. MCLs for TTHMs,

which is the total of Chloroform, Bromoform, Chlorodibromomethane, and Dichlorobromomethane, is 0.10mg/l. Sampling shall be conducted in the following manner:

(i) samples for TTHM shall be taken from the entry points at each treatment plant to the distribution system from each of the public water system sources. Sampling and analysis shall be conducted in accordance with the methods listed in the latest edition of the "Standard Methods for the Examination of Water and Wastewater";

(ii) if any sample exceeds the MCL, a repeat sample shall be taken and the result averaged with the previous result. If the average exceeds the MCL, the Authority and the public shall be notified immediately by the PWS supplier.

d) Qualified Personnel: Each public water system shall be operated by qualified personnel whose training is documented and verified in compliance with Regulation 24.

e) Variance Prohibition: No variances from these requirements are permitted.

29. Quality with Respect to Turbidity

a) Maximum Contaminant Levels: The maximum contaminant levels for turbidity are applicable to both community water systems and non-community water systems using surface water sources in whole or in part. The maximum contaminant levels for turbidity in drinking water, measured at a representative entry point(s) to the distribution system, are as follows:

(i) greater than one turbidity unit (NTU) in more than 5% of the samples taken each month or the average of two samples taken on consecutive days exceeding 5 NTU, is in violation of these regulations. The Authority may allow a turbidity value > 1 but below 5 NTU's if the supplier of water can demonstrate to the Authority that the higher turbidity does not interfere with disinfection or interfere with microbiological determinations;

(ii) if the turbidity exceeds five (5) NTUs, the system is in violation of these regulations.

b) Turbidity Sampling and Analytical Requirements

(i) the requirements of this Subregulation (b) and Subregulation (a) above shall apply only to public water systems which use water obtained in whole or in part from surface sources;

(ii) samples shall be taken by suppliers of water for both community water systems and non-community water systems at a representative entry point to the water distribution system at least once per day the system is in operation;

(iii) if the result of a turbidity analysis indicates that the maximum allowable limit has been exceeded, the sampling and measurement shall be

confirmed by re-sampling as soon as practicable or the next time the system is in operation. If the repeat sample confirms that the maximum allowable limit has been exceeded, the supplier of water shall report to the Authority and notify the public as soon as possible or by the next business day, whichever is earlier. The repeat sample shall be used for calculating the monthly average;

(iv) sampling for non-community water systems shall begin not later than December 31, 1994;

(v) the Authority may determine that a reduced sampling frequency in a non-community system will not pose a risk to public health, if the PWS practices disinfection and maintains an active residual disinfectant in the distribution system.

c) Testing Methods: Only the analytical method(s) specified in this paragraph, or otherwise approved by the Authority, may be used to demonstrate compliance with the requirements of Subregulation (a) above. Approved analytical methods may be found in "Turbidity - Method 214 A (Nephelometric Method - Nephelometric Turbidity Units)" as set forth in the latest edition of"Standard Methods for the Examination of Water and Wastewater" or "Methods of Chemical Analysis of Water and Wastes", USEPA Environmental Monitoring and Support Laboratory, March 1979, or Method 180.1 (Nephelometric Method).

30. Quality with Respect to Inorganic Chemicals and Physical Standards

a) Maximum Contaminant Levels

(i) NITRATE - The MCL for nitrate (10mg/l as N) is applicable to all public water systems.

A. Monitoring shall be at a frequency determined by the Authority and shall in no case be less than yearly;

B. Samples shall be taken from each source of water to the system entry points after conventional treatment;

C. If sampling results for nitrate indicate that the MCL has been exceeded, a confirmation sample shall be collected not later than 24 hours after the system is notified about the analytical results of the first sample;

D. Operators physically unable to comply with the 24 hour sampling requirement in Subregulation 24(a)C. above shall notify the Authority and consumers served by the system in accordance with the requirements of Regulations 28 and 29.

(ii) LEAD - The MCL for lead (0.015mg/l) is applicable to all public water systems.

A. Samples are to be taken at the distribution system entry points after conventional treatment;

B. Sampling shall be yearly from surface water entry points to the distribution system; once every 3 years from groundwater entry points to the distribution system. If, as a result of corrosion control studies, the system is considered to be at reduced risk, the Authority may reduce these sampling frequencies;

C. A system that exceeds the MCLs for lead shall take a repeat sample and determine compliance based on the average of the two. If the repeat sample shows that the MCLs have been exceeded, water suppliers will be required to install treatment technology to reduce concentrations of lead in the source water to acceptable levels or blend water from other sources;

(iii) LEAD AND COPPER - Systems that exceed the MCL for lead and copper shall monitor at six-month intervals until two successive test results are within the MCL. After the MCLs for lead and copper are achieved, the sampling frequency may be reduced to once per year.

(iv) OTHER INORGANIC CHEMICALS - The levels for other inorganic chemicals apply only to community water systems and bottled water producers, if their source of water is other than a community water system.

A. At least one sample shall be collected either at every entry point to the distribution system after an application of treatment, or in the distribution system at a point that is representative of each source after treatment.

B. Each sample shall be collected at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.

C. If a system draws water from more than one source and the sources are combined before distribution, sampling must be performed at an entry point to the distribution system during normal operating conditions that is representative of all sources being used.

D. The following are the maximum contaminant levels for inorganic chemicals:

Contaminant	**Maximum Contaminant Level (MCL) (in mg/L or as indicated)**
Arsenic	0.05
Asbestos	7 million fibers/liter (longer than 10µµ___
Barium	1.00
Cadmium	0.005

Chromium	0.1
Copper	1.3
Fluoride	2.0
Lead	0.015
Mercury	0.002
Nitrate (as N)	10
Nitrite (as N)	1
Selenium	0.05
Silver	0.05

E. The following chemical substances shall not be present in a drinking water supply in excess of the listed concentrations, where in the judgement of the Authority, more suitable supplies are or can be made available:

Contaminant	**Maximum Desirable Contaminant Level (milligrams per liter)**
Aluminum	0.05 - 0.2
Chloride	250
Color	15 color units
Corrosivity	Noncorrosive
Fluoride	2.0
Foaming Agents	0.5
Iron	0.3
Manganese	0.05
Odor	3 threshold odor no.
pH	6.5 - 8.5
Silver	0.1
Sulfate	250
Total Dissolved Solids (TDS)	500
Zinc	5

b) Physical Standards

(i) color will preferably not exceed five (5) units and in no case shall exceed fifteen (15) units;

(ii) taste shall not be objectionable;

(iii) threshold odor number shall not exceed three (3);

(iv) pH shall be 6.5 - 8.5.

c) Inorganic Chemical and Physical Sampling and Analytical Requirements

(i) analyses for the purpose of complying with Subregulations (a) and (b), above, are required as follows:

A. Analyses for all community water systems and bottled water producers not using a community water system and utilizing surface water sources in whole or in part shall be completed before December 31, 1994. Unless otherwise stated, these analyses shall be repeated at yearly intervals or as the Authority deems appropriate;

B. Analyses for all community water systems and bottled water producers not using a community water system and utilizing only ground water sources shall be completed before December 31, 1994. These analyses shall be repeated at three-year intervals or as the Authority deems appropriate;

C. For community and non-community water systems, whether supplied by surface or ground water sources, analyses for nitrate and lead shall be completed before December 31, 1994.

(ii) if the result of an analysis made pursuant to Subregulation 24(c)(i) above indicates that the level of any contaminant listed in Subregulation 24(a)(iii) exceeds the maximum contaminant level, the supplier of water shall report to the Authority within seven (7) days and initiate one (1) additional analysis at the same sampling point within one (1) month;

(iii) when the average of the two (2) analyses made pursuant to Subregulation 24(c)(ii), rounded to the same number of significant figures as the MCL, exceeds the MCL for the substance in question, the supplier of water shall notify the Authority and the public pursuant to Regulations 28 and 29 below, which prescribe reporting and public notice. Monitoring after public notification shall be at a frequency designated by the Authority and shall continue until the MCL has not been exceeded in two (2) successive samples or until a monitoring schedule as a condition to a variance or enforcement action shall become effective.

(iv) when the MCL for Nitrate has been exceeded, the supplier shall take a second sample within 24 hours. If the mean of the two analyses exceeds the maximum contaminant level, the supplier of water shall report his findings to the Authority and notify the public pursuant to Regulations 28 and 29 below, which prescribe reporting and public notice.

d) Testing Methods: Analyses conducted to determine compliance with the maximum contaminant levels prescribed in Subregulations 24(a)(i), (ii), and (iii) shall be conducted according to methods prescribed in the latest edition of "Standard Methods for the Examination of Water and Wastewater" by the American Public Health Association, American Water Works Association, Water Pollution Control Federation, "Methods of Chemical Analysis of Water and Wastes," USEPA Environmental Monitoring and Support Laboratory, Cincinnati, OH 45268 (EPA-600/4-79-020).

31. Quality with Respect to Organic Chemicals

a) Maximum Contaminant Levels

(i) SYNTHETIC ORGANICS ("SOCs") - The following are the maximum contaminant levels for synthetic organic chemicals. They apply only to community water systems and bottled water producers if not using the community water system. Compliance with maximum contaminant levels for synthetic organic chemicals is calculated pursuant to Subregulation (ii) below.

Synthetic Chemical	mg/l
Alachlor	0.002
Atrazine	0.003
Carbonfuran	0.04
Chlordane	0.002
Chlorophenoxys: 2,4-D,(2,4-Dichlorophenoxyacetic acid)	0.071
2,4,5-TP Silvex (2,4,5-Trichloro phenoxyproprionic acid)	0.05
1,2-dibromo-3-chloropropane (DBCP)	0.0002
Endrin (1,2,3,4,10,10-hexachloro-6, 7-epoxy-1,4,4a,5,6,7,8,881-octahydro-1, 4-endo, endo-5,8-dimethanohapthalene)	0.00005
Ethylene dibromide (EDB)	0.00005
Heptachlor	0.0004
Heptachlor epoxide	0.0002
Lindane(1,2,3,4,5,6-hexachlorocyclohexane, gamma isomer)	0.0002
Methoxychlor (1,1,1-Trichloro-2,2-bis (p-methoxyphenyl) ethane)	0.04
Polychlorinated biphenyls (PCBs) (as decachlorobiphenyl)	0.0005
Total trihalomethanes: (the sum of bromodichloromethane, dibromochloromethane, tribromomethane, (bromoform) and trichloromethane (chloroform)	0.10
Toxaphene($C^{10}H^{10}Cl^{8}$ - Technical chlorinated campene, 67-69 percent chlorine)	0.003

(ii) VOLATILE ORGANICS ("VOCs") - The following are the MCLs for volatile organic chemicals. They apply to community water systems and bottled water producers not using a community water source. Compliance with MCL for VOCs is calculated pursuant to the paragraph below.

Volatile Chemical	mg/l
Benzene	0.005
Carbon tetrachloride	0.005
Ethylbenzene	0.7
cis-1,2-dichlorethylene	0.07
1,2-dichloroethane	0.005
1,2-dichlorpropane	0.005
o-dichlorobenzene	0.6
1,1-dichlorethylene	0.07
trans-1,2-dichloroethylene	0.1
monochlorobenzene	0.1
styrene	0.1
toluene	1
tetrachloroethylene	0.005
trichloroethylene	0.005
vinyl chloride	0.002
xylenes (total)	10

b) Organic chemical sampling and analytical requirements

(i) SYNTHETIC ORGANICS - An analysis of substances for the purpose of determining compliance with Subregulations 25(a)(i) above, shall be made as follows:

A. For all community water systems, and bottled water producers not using a community water source, which are utilizing surface water sources, analyses shall be performed by a laboratory approved by the Authority and shall be completed before December 31, 1994. Samples analyzed shall be collected during the period of the year designated by the Authority as the period when contamination by pesticides is most likely to occur. These analyses shall be repeated at intervals specified by the Authority but in no event less frequently than at three-year intervals;

B. For community water systems utilizing only ground water sources, analyses shall be completed by those systems specified by the Authority;

C. If the result of an analysis made pursuant to Subregulations A and B above indicates that the level of any contaminant listed in Subregulation 25(a)(i) exceeds the MCL, the supplier of water shall report to the Authority within seven (7) days and initiate three (3) additional analyses within one (1) month;

D. When the average of four (4) analyses made pursuant to Subregulation 25(b)(ii), rounded to the same number of significant figures as the maximum contaminant level for the substance in question, exceeds the maximum contaminant level, the supplier of water shall report to the Authority and give notice to the public pursuant to Regulations 28 and 29, which prescribe such reporting and public notice. Monitoring after public notification shall be at a frequency designated by the Authority and shall continue until the maximum contaminant level has not been exceeded in two (2) successive samples or until a monitoring schedule as a condition to a variance or enforcement action shall become effective;

E. Analyses made to determine compliance with Subregulation 25(a) (i) shall be made in accordance with methods approved by the Authority.

(ii) VOLATILE ORGANICS - An analysis of substances for the purposes of determining compliance with Subregulation 25(a)(ii) above shall be made as follows:

A. For all community water systems, and bottled water providers not using a community water source, which are using surface or ground water sources, analysis of the initial sample shall be performed by a laboratory approved by the Authority and shall be completed by December 31, 1994. After the initial sample, routine samples must be collected every five (5) years from each source;

B. There are two exceptions to the five-year rule: (1) if the system uses surface water and the initial sample was within the MCL and the Authority determines that it is not vulnerable, no further routine sampling may be required; and (2) if VOCs are found in any sample, the routine samples must be collected quarterly;

C. The Authority shall re-assess the vulnerability of each system every three years. Confirmation samples may be required.

D. For systems which must sample quarterly due to positive results in the initial sample, the Authority may reduce this time to yearly after (3) three years, if results are consistently below the MCL. Compliance with the MCL is based on a running average of four quarters of sampling.

32. Radionuclides

a) Maximum Contaminant Levels for Radium-226, Radium-228, and Gross Alpha Particle Radioactivity in Community Water Systems: The following are the maximum contaminant levels for radium-226, radium-228, and gross alpha radioactivity -

(i) combined radium-226 and radium-228 -- 5 pCi/l;

(ii) gross alpha particle activity (including radium-226, but excluding radon and uranium) -- 15 pCi/l.

b) Maximum Contaminant Levels for Beta particle and photon Radioactivity from Man-Made Radionuclides in Community Water Systems:

(i) the average annual concentration of beta particle and photon radioactivity from man-made radionuclides in drinking water shall not produce and annual dose equivalent to the total body or any internal organ greater than 4 millirem/year;

(ii) except for the radionuclides listed in Table A below, the concentration of man-made radionuclides causing 4 mrem total body or organ dose equivalent shall be calculated on the basis of a 2 liter per day drinking water intake using the 168 hour data listed in "Maximum Permissible Body Burdens and Maximum Permissible Concentration of Radionuclides in Air or Water for Occupational Exposure", NBS Handbook 69, as amended August, 1963, U.S. Department of Commerce. If two or more radionuclides are present, the sum of their annual dose equivalent to the total body or to any organ shall not exceed 4 millirem/year.

TABLE A -- Average Annual Concentrations Assumed to Produce a Total Body or Organ Dose of 4 mrem/year

Radionuclide	Critical Organ	pCi Per Liter
Tritium	Total Body	20,000.
Strontium-90	Bone Marrow	8.

c) Analytical Methods for Determining Radioactivity: Methods used for the determination shall be those currently approved by the USEPA (described in Federal Register, Vol. 41, No. 133, p. 28404, July 9, 1976,as amended at 45 FR 57345, Aug 27, 1980).

d) Monitoring Frequency for Radioactivity in Community Water Systems: Monitoring requirements for gross alpha particle activity, radium-226 and radium-228 are as follows:

(i) initial sampling to determine compliance with Subregulation 26(a) shall commence before December 31, 1994. Compliance shall be based on the analysis of an annual composite of four (4) consecutive quarterly samples or the average analyses of four (4) samples obtained at quarterly intervals;

A. 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 (1.65 o- where o- is the standard deviation of the net counting rate of the sample). In localities where radium-228 may be present in drinking water, the Authority requires radium-226 and/or radium-228 analyses when the gross alpha particle activity exceeds 2 pCi/l;

B. When the gross alpha particle activity exceeds 5 pCi/l, the same or equivalent sample shall be analyzed for radium-226. If the concentration of radium-226 exceeds 3 pCi/l, the same or an equivalent sample shall be analyzed for radium-228.

(ii) suppliers of water and bottled water producers not using a community water source shall monitor at least once every four (4) years following the procedure required by Subregulation (d)(i). At the discretion of the Authority, when an annual record taken in conformance with Subregulation (d)(i) has established that the average annual concentration is less than half the maximum contaminant levels established by Subregulation 26(a), analysis of a single sample may be substituted for the quarterly sampling procedure required by Subregulation (d)(i);

A. More frequent monitoring shall be conducted when ordered by the Authority in the vicinity of mining or other operations which may contribute alpha particle radioactivity to either surface or ground water sources of drinking water;

B. A supplier of water shall monitor in conformance with Subregulation (d)(i) within one (1) year of the introduction of a new water source for a community water system. More frequent monitoring shall be conducted when ordered by the Authority in the event of possible contamination or when changes in the distribution system or treatment processing occur which may increase the concentration of radioactivity in finished water;

C. A community water system using two (2) or more sources having different concentrations of radioactivity shall monitor source water in addition to water from a free-flowing tap, when ordered by the Authority;

D. Monitoring for compliance with Subregulation 26(a) after the initial period need not include radium-228, except when required by the Authority, provided that the average annual concentration for radium-228 had been assayed at least once using the quarterly sampling procedure required by Subregulation (d)(i);

E. Suppliers of water shall conduct annual monitoring of any community water system in which the radium-228 concentration

exceeds 3 pCi/l, when ordered by the Authority.

(iii) if the average annual maximum contaminant level for gross alpha particle activity or total radium as set forth in paragraph 3.91 is exceeded, the supplier of a community water system shall give notice to the Authority pursuant to Subregulation 26(a), and notify the public as required in Regulation 35. Monitoring at quarterly intervals shall be continued until the annual average concentration no longer exceeds the maximum contaminant level or a monitoring schedule as a condition to a variance or enforcement action shall become effective.

e) Monitoring Requirements for Man-Made Radioactivity in Community Water Systems:

(i) by December 31, 1994, systems using surface water sources as may be designated by the Authority shall be monitored for compliance with Subregulation 26(b) by analysis of a composite of four (4) consecutive quarterly samples or analysis of four (4) quarterly samples. Compliance with Subregulation 26(b) may be assumed without further analysis if the average annual concentration of gross beta particle activity is less than 50 pCi/l and if the average annual concentrations of tritium and strontium-90 are less than those listed in Table A above, provided that if both radionuclides are present, the sum of their annual dose equivalents to bone marrow shall not exceed 4 millirem/year;

A. If the gross beta particle activity exceeds 50 pCi/l, an analysis of the sample must be performed to identify the major radioactive constituents present and the appropriate organ and total body doses shall be calculated to determine compliance with Subregulation 26(b);

B. Suppliers of water shall conduct additional monitoring, as ordered by the Authority, to determine the concentration of man-made radioactivity in principal water-sheds designated by the Authority;

C. At the discretion of the Authority, suppliers of water utilizing only ground waters may be required to monitor for man-made radioactivity.

(ii) after the initial analysis required by Subregulation (e)(i) above, suppliers of water shall monitor at least every four (4) years following the procedure in Subregulation (e)(i);

(iii) by December 31, 1994, the supplier of any community water system designated by the Authority as utilizing waters contaminated by effluent from nuclear facilities shall initiate quarterly monitoring for gross beta particle and iodine-131 radioactivity and annual monitoring for strontium-90 and tritium;

A. Quarterly monitoring for gross beta particle activity shall be based on the analysis of monthly samples or the analysis of a composite

of three (3) monthly samples. The former is recommended. If the gross beta particle activity in a sample exceeds 15 pCi/l, the same or equivalent sample shall be analyzed for strontium-89 and cesium-134. If the gross beta particle activity exceeds 50 pCi/l, an analysis of the sample must be performed to identify the major radioactive constituents present and the appropriate organ and total body doses shall be calculated to determine compliance with Subregulation 26(b);

B. For iodine-131, a composite of five (5) consecutive daily sample shall be analyzed once each quarter. As ordered by the Authority, more frequent monitoring shall be conducted when iodine-131 is identified in the finished water;

C. Annual monitoring for strontium-90 and tritium shall be conducted by means of the analysis of a composite of four (4) consecutive quarterly samples or analysis of four (4) quarterly samples. The latter procedure is recommended;

D. The Authority may allow the substitution of environmental surveillance data taken in conjunction with a nuclear facility for direct monitoring of man-made radioactivity by the supplier of water where the Authority determines such data is applicable to a particular community water system.

(iv) if the average annual maximum contaminant level for man-made radioactivity set forth in Subregulation 26(b) is exceeded, the operator of a community water system shall give notice to the Authority and to the public as required by Regulation 29. Monitoring at monthly intervals shall be continued until the concentration no longer exceeds the maximum contaminant level or until a monitoring schedule as a condition to a variance, exemption or enforcement action shall become effective.

PART V - APPROVED LABORATORIES, REPORTING, PUBLIC NOTIFICATION, RECORDKEEPING AND RIGHT OF ENTRY

33. Approved Laboratories

For the purpose of determining compliance with the maximum contaminant levels set forth in Part III, samples may be considered only if they have been analyzed by a laboratory approved by the Authority, except that measurements for turbidity and for chlorine residual may be performed by any person acceptable to the Authority.

34. Reporting Requirements

a) Except where a shorter reporting period is specified in these regulation, the supplier of water shall report to the Authority within forty (40) days following a test, measurement or analysis required to be made by these regulations, the results of that test, measurement or analysis.

b) The supplier of water shall report to the Authority, by the end of the next business day, the failure to comply with any drinking water regulation (including failure to comply with monitoring requirements) set forth in these regulations.

c) The supplier of water is not required to report analytical results to the Authority in cases where an Authority-approved laboratory performs the analysis and reports the results to the Authority office which would normally receive such notification from the supplier.

35. Public Notification

a) If a community water system fails to comply with an MCL, or fails to comply with a testing procedure prescribed in these regulations, or is granted a variance for a MCL, or fails to comply with the requirements of any schedule for a variance or fails to perform any monitoring required by the Authority, the supplier of water shall notify persons served by the system of the failure or variance or exemption grant by including a notice in the first set of water bills of the system issued after the failure or variance or exemption grant, and, in any event, by written notice within one (1) month. Public notice shall specify the type of contaminant, source, reason for contamination, effects of contamination and any steps which can be taken to reduce or avoid the contamination. Such notice shall be repeated at least once monthly so long as the system's failure continues or the variance or exemption remains in effect. If the system issues water bills less frequently than quarterly, or does not issue bills, the notice shall be made by or supplemented by another form of direct mail.

b) If a community water system has failed to comply with an applicable MCL, the supplier of water shall notify the public of such failure, in addition to the notification required by Subregulation (a) above, as follows:

(i) by publication on not less than three (3) consecutive days in a newspaper or newspaper of general circulation in the area served by the system. Such notice shall be completed within seven (7) days after the supplier of water learns of the failure;

(ii) by furnishing a copy of the notice to the radio or television stations serving the area served by the system. Such notice shall be furnished within 24 hours after the supplier of water learns of the failure.

c) If the area served by a community water system is not served by a daily newspaper of general circulation, notification by newspaper required by Subregulation (b) of this regulation shall instead be given by publication at least once and continue on each publication day the failure or variance remains in effect. If no weekly or daily newspaper of general circulation serves the area, notice shall be given by posting the notice in the post office, village office or other public place, within the area served by the system.

d) If a non-community water system fails to comply with an applicable maximum contaminant level established in these regulations, fails to comply with an applicable testing procedure in this regulation, is granted a variance from an applicable maximum contaminant level, fails to comply with the requirement of any schedule prescribed pursuant to a variance or exemption or fails to perform any monitoring required by the Authority, the supplier of water shall be given notice of such failure or grant to the persons served by the system. The form and manner of such notice shall be as prescribed by the Authority and shall insure that the public using the system is adequately informed of the failure or grant.

e) Notices given pursuant to this Regulation shall be written in a manner reasonably designated to fully inform the users of the system. The notice shall be conspicuous and shall not use unduly technical language, small print or other methods which would frustrate the purpose of the notice. The notice shall disclose all material facts regarding the subject including the nature of the problem and, when appropriate, a clear statement that a drinking water regulation has been violated and any preventive measures that should be taken by the public. In all cases, notice in English and Marshallese shall be given. Notices may include a balanced explanation of the significance or seriousness to the public health in the subject of the notice, a fair explanation of steps taken by the system to correct any problem and the results of any additional sampling.

f) Notice to the public required by this Regulation may be given by the Authority on behalf of the supplier of water.

g) In any instance in which notification by mail is required by Subregulation (a) of this Regulation, but notification by newspaper or to radio or television stations is not required by Subregulation (b) of this Regulation, the Authority may order the supplier of water to provide notification by newspaper and to radio or television stations when circumstances require more immediate or broader notice appropriate to protect the public health.

36. Record Maintenance

Any owner or operator of a public water system subject to the provisions of this Part shall retain on its premises, or at a convenient location near its premises the following records:

(i) records of bacteriological analyses made pursuant to this Part shall be kept for not less than five (5) years. Records of chemical analyses made pursuant to this part shall be kept for not less than ten (10) years. Actual laboratory reports may be kept, or data may be transferred to tabular summaries, provided that the following information is included:

A. The date, place, and time of sampling, and the name of the person who collected the sample;

B. Identification of the sample as to whether it was a routine distribution system sample, check sample, raw or process water sample or other special purpose sample;

C. Date of analysis;

D. Laboratory and person responsible for performing analysis;

E. The analytical technique/method used; and,

F. The results of the analysis.

(ii) records of action taken by the system to correct violations of these regulations shall be kept for a period not less than three (3) years after the last action taken with respect to the particular violation involved;

(iii) copies of any written reports, summaries or communications relating to sanitary surveys of the system conducted by the system itself, by a consultant, or by any local or national agency or body, shall be kept for a period not less than ten (10) years after completion of the sanitary surveys involved;

(iv) records concerning a variance granted to the system shall be kept for a period ending not less than five (5) years following the expiration of such variance;

(v) for uniformity of reporting, the Authority may prescribe forms on which specific records shall be kept.

37. Right of Entry

The Authority or its staff may at any time inspect public water systems, take water samples, or perform tests upon water quality whether or not the Authority has evidence that the system is in violation of any applicable legal requirement.

PART VI - VARIANCES

38. Requirements for a Variance

a) The Authority may issue variances from the requirements of these regulations.

b) The Authority may grant one (1) or more variances to any public water system from any requirement respecting a maximum contaminant level prescribed in these regulations upon a finding that:

(i) because of characteristics of the raw water sources which are reasonably available to the system, the system cannot meet the requirements respecting the maximum contaminant levels of such drinking water regulations despite application of the best available technology, treatment techniques, or other methods, which the Authority finds are generally available and cost-effective; and,

(ii) the granting of a variance will not result in an unreasonable risk to the health of persons served by the system.

c) The Authority may grant one (1) or more variances to any public water system from any requirement of a specified treatment technique of these regulations upon a finding that the public water system applying for the variance has demonstrated that such treatment technique is not necessary to protect the health of persons because of the nature of the raw water source of such system.

39. Variance Request

a) A supplier of water may request the granting of a variance by submitting the request in writing to the Authority. Suppliers of water may submit a joint request for variances when they seek similar variance under similar circumstances.

b) Any written request for a variance or variances shall include the following information:

(i) the nature and duration of variance requested;

(ii) relevant analytical results of water quality sampling of the system, including results of relevant tests conducted pursuant to the requirements of these regulations; and,

(iii) for any request made under Subregulation 32(b):

A. Explanation in full and evidence of the best available treatment technology and techniques;

B. Economic and legal factors relevant to ability to comply;

C. Analytical results of raw water quality relevant to the variance request; and,

D. A proposed compliance schedule, including the date each step toward compliance will be achieved. Such schedule shall include as a minimum the following dates:

I. Date by which arrangement for alternative raw water source or improvement of existing raw water source will be completed;

II. Date of initiation of the connection of the alternative raw water source of improvement of existing raw water source; and

III. Date by which final compliance is to be achieved.

E. A plan for the provision of safe drinking water in the case of an excessive rise in the contaminant level for which the variance is

requested;

F. A plan for interim control measures during the effective period of variance.

(iv) for any request made under Subregulation 32(c), a statement that the system will perform monitoring and other reasonable requirements prescribed by the Authority as a condition to the variance;

(v) other information, if any, believed to be pertinent by the applicant;

(vi) such other information as the Authority may require.

40. Consideration of Variance Request

a) The Authority shall act on any variance request submitted pursuant to Regulation 33 within ninety (90) days of receipt of the request.

b) In its consideration of whether the public water system is unable to comply with a contaminant level required by these regulations because of the nature of the raw water source, the Authority shall consider such factors as the following:

(i) the availability and effectiveness of treatment methods for the contaminant for which the variance is requested;

(ii) cost and other economic considerations such as implementing treatment, improving the quality of the source water or using an alternate source.

c) In its consideration of whether a public water system should be granted a variance to a required treatment technique because such treatment is unnecessary to protect the public health, the Authority shall consider such factors as the following:

(i) quality of the water source, including water quality data and pertinent sources of pollution;

(ii) source protection measures employed by the public water system.

41. Disposition of a Variance Request

a) If the Authority decides to deny the application for a variance, it shall notify the applicant of its' intention to issue a denial. Such notice shall include a statement of reasons for the proposed denial, and shall offer the applicant an opportunity to present, within thirty (30) days of receipt of the notice, additional information or argument to the Authority. The Authority shall make a final determination on the request within thirty (30) days after receiving any additional information or argument. If no additional information or argument is submitted by the applicant, the application shall be denied.

b) If the Authority proposes to grant a variance request submitted pursuant to Regulation 33, it shall notify the applicant of its' decision in writing. Such notice shall identify the variance, the facility covered, and shall specify the period of time for which the variance will be effective.

(i) for the type of variance specified in Subregulation 32(b), such notice shall provide that the variance will be terminated when the system comes into compliance with the applicable regulation, and may be terminated upon finding by the Authority that the system has failed to comply with any requirements of final schedule pursuant to the terms and conditions of the variance;

(ii) for the type of variance specified in Subregulation 32(c), such notice shall provide that the variance may be terminated at any time upon a finding that the nature of the raw water is such that the specified treatment technique for which the variance was granted is necessary to protect the health of persons or upon a finding that the public water system has failed to comply with monitoring and other requirements prescribed by the Authority as a condition of the granting of the variance.

c) For a variance specified in Subregulation 32(b)(i), the Authority shall propose a schedule for:

(i) compliance, including increments of progress, by the public water system with each contaminant level requirement covered by the variance; and,

(ii) implementation by the public water system of such control measures as the Authority may require for each contaminant covered by the variance.

d) The proposed schedule for compliance shall specify dates by which steps towards compliance are to be taken,including at the minimum, where applicable:

(i) date by which arrangement for an alternative raw water source or improvement of existing raw water source will be completed;

(ii) date of initiation of the connection for the alternative raw water source or improvement of the existing raw water source; and,

(iii) date by which final compliance is to be achieved.

e) The proposed schedule may, if the public water system has no access to an alternative raw water source, and can effect or anticipate no adequate improvement of the existing raw water source, specify an indefinite time period for compliance until a new and effective treatment technology is developed at which time a new compliance schedule shall be prescribed by the Authority.

f) The proposed schedule for implementation of interim control measures during the period of variance shall specify interim treatment techniques, methods and equipment, and dates by which steps towards meeting the interim control measures are to be met.

g) The schedule shall be prescribed by the Authority within one (1) year after the granting of the variance, subsequent to provision of opportunity for hearing pursuant to Regulation 42.

42. Public Hearing on Variance, Schedules and Final Action

a) Before a variance or a schedule pursuant to Regulation 41 may take effect, the Authority shall provide notice and opportunity for public hearing on the variance or schedule. A notice given pursuant to the preceding sentence may cover more than one (1) such schedule and a hearing held pursuant to such notice shall include each of the variances covered by the notice.

b) Public notice of a proposed variance or schedule and opportunity for public hearing on such shall be circulated in a manner designed to inform interested and potentially interested peter supply system and shall be announced over the radio or television station serving the area of the public water supply system. Requests for hearing may be submitted by any interested person. Frivolous, insubstantial requests for hearing may be denied by the Authority. Requests must be submitted to the Authority within twenty (20) days after issuance of the public notice mentioned above. Hearing requests shall include the following information:

(i) the name, address and telephone number of the individual, organization or other entity requesting a hearing;

(ii) a brief statement of the interest of the person making the request in the proposed variance or schedule and of information that the requesting person intends to submit at such hearing; and,

(iii) the signature of the individual making the request, or, if the request is made on behalf of an organization or other entity, the signature of a responsible official of the organization or other entity.

c) The Authority shall give notice in the manner set forth in Subregulation (b) of this Regulation of any hearing to be held at the request of an interested person. Notice of the hearing shall also be sent to the person requesting the hearing, if any. Notice of the hearing shall include a statement of the purpose, information regarding the time and location for the hearing, and the address and telephone number of an office at which interested persons may obtain further information concerning the hearing. The hearing location specified in the public notice shall be within an involved area. Notice of the hearing shall be given not less than five (5) days to the time scheduled for the hearing.

d) The Authority shall have the authority to call witnesses, receive written and oral testimony, compel necessary attendance through subpoena, and take such action as may be necessary to assure the fair and efficient conduct of the hearing.

e) Within thirty (30) days after termination of the public hearing process prescribed above, the Authority shall, taking into consideration information obtained during the hearing and other relevant information, grant, deny, or grant as modified a proposed variance or schedule.

43. Alternative Treatment Techniques

The Authority may grant a variance from any treatment technique requirement of these regulations to a supplier of water, upon a showing from any person that an alternative treatment technique not included in such requirement is at least as efficient in lowering the level of the contaminant with respect to which such requirement was prescribed. A variance under this paragraph shall be conditioned on the use of the

alternative treatment technique which is the basis of the variance.

PART VII - SUPPLY OF DRINKING WATER DURING EMERGENCIES

44. Foreign Substance in Water Supply

a) The first type of emergency which is recognized with respect to water supply systems is non-potability by reason of the presence of toxic or other substances in the supply which cannot be removed by existing treatment methods and which, if ingested, might be injurious to the health of consumers. The presence of such substances might be identified by such parameters as odor, taste, color, chemical tests, the presence of extensive fish kills in the water source, or by other evidence.

b) In the case of occurance of a potentially injurious substance in the water supply pursuant to Subregulation (a) above, the supplier of water shall immediately close off the supply to distribution, and notify the Authority and the water consumers by the quickest available means of communication. The supplier shall also:

(i) deliver disinfected water from other suitable sources to such public consumers at hospitals, clinics and similar institutions. The water so delivered shall be disinfected to the satisfaction of the Authority;

(ii) take appropriate steps under the supervision of the Authority to properly identify the nature and source of the pollutant;

(iii) advise individual consumers to find other emergency sources of water until notified by the Authority that the public water supply is potable;

(iv) advise individual consumers to disinfect their emergency water supply by either boiling at a rolling boil for one (1) minute or more, or adding one/half teaspoon of near 5% strength sodium hypochlorite solution (for example, Chlorox or Purex) to one gallon of clear odorless water, stir and letting it set thirty (30) minutes before using, or as may be prescribed by the Authority.

c) In this type of emergency, the Authority shall:

(i) supervise the operations described in this Regulation; and,

(ii) document circumstances surrounding the contamination, including its cause and identification of any person(s) implicated in such contamination.

45. Disaster

a) The second type of emergency which is recognized with respect to water supply systems is non-potability by reason of the inactivation of the system due to major mechanical failure, typhoon, earthquake or similar disaster.

b) In this case, the supplier shall notify the Authority and the water consumers by the quickest available means of communication. The supplier shall also:

(i) deliver disinfected water from suitable sources to such public consumers at hospitals, clinics and similar institutions. The water so delivered shall be disinfected to the satisfaction of the Authority;

(ii) advise consumers as to where potable water from the plant or system may be obtained if such is obtainable;

(iii) if potable water is not available from the system, the supplier will advise the consumers by the fastest available media where other water sources may be found in the immediate vicinity. The supplier shall also recommend disinfection as prescribed in Regulation 44(b)(iv). The supplier shall keep on hand sufficient disinfectant (sodium or calcium hypochlorite) for the use of those consumers during the emergency who may not have access to such disinfectants.

c) In this type of emergency, the Authority shall supervise the operations described in this Regulation.

46. Water Rationing

a) The third type of emergency which is recognized with respect to water supply systems is non-potability of water supply by reason of the necessity to ration water by emptying mains and distribution lines daily or more frequently.

b) In this type of emergency, the system is assumed to be contaminated by infiltration of ground waters and the supply does not, therefore, meet the standard bacteriological quality prescribed in Part IV of these regulations. The Authority and the public shall, therefore, be notified by the supplier as prescribed in Regulation 34 during the entire period of emergency rationing.

c) In this type of emergency, the Authority shall supervise the operations described in this Regulation.

PART VIII - ENFORCEMENT

47. Prohibitions on Use of Lead Pipes, Solder, and Flux

a) Any pipe, solder, or flux that is used in installing or repairing:

(i) any public water system, or

(ii) any plumbing in a residential or nonresidential facility that supplies water for human comsumption and that is connected to a public water system,

shall be lead-free. Leaded joints that are necessary for repairing cast-iron pipes are exempt from this Regulation.

b) The person responsible for the public water system shall immediately identify and notify persons who may be affected by lead contamination of their drinking water if such contamination results from the following:

(i) the lead content in the construction materials of the water-distribution system; or

(ii) corrosivity of the water supply that is sufficient to cause leaching of lead.

c) The person responsible for the public water system shall immediately notify all persons who may be affected by lead contamination of their drinking water if there is a violation of a drinking water standard.

d) For purposes of these regulations, the term "lead-free" is defined as follows:

(i) when used for solders and flux, "lead-free" refers to solders and flux containing not more than 0.2 percent lead;

(ii) when used for pipes and pipe fittings, "lead-free" refers to pipes and pipe fittings containing not more than 8.0 percent lead.

48. Contamination of Public Water Supply

Person(s) who, either willfully or by negligence, contaminate public water supplies with toxic or poison materials which are not removable by normal treatment methods in use by the system, are subject to criminal prosecution as well as the penalties prescribed under this Part. The civil penalty, determined pursuant to Regulation 47(b)(iii), shall be for the number of days the public water supply remains contaminated or the number of days between the time of contamination and the time the Authority declares the water supply potable again.

49. Violations

a) A person who violates any criteria, standard, requirement, or provision of these regulations or any permit, requirement or order issued thereunder, shall be subject to enforcement action by the Authority.

b) The enforcement action may be any or all of the following:

(i) revocation of a permit issued under these regulations;

(ii) the making of a cease and desist order in relation to the subject matter of the violation;

(iii) the imposition of a civil penalty, fixed by the Authority, not exceeding $10,000.00 for each day on which the violation continues; and

(iv) any other action authorized by the National Environmental Protection Act 1984 or any other law.

50. Public Hearing

a) When the Authority revokes a permit under Subregulation 49(b)(i) or makes a cease and desist order under Subregulation 49(b)(ii), a public hearing shall be conducted by the Authority to determine the authenticity of the facts upon which the order was made.

b) Adequate notice of the hearing, and an adequate opportunity to appear and be heard at the hearing, shall be given to all interested persons.

51. Right to Enter

For the purposes of enforcing the provisions of these regulations, the Authority may, at reasonable times, enter any establishment, building, vessel or other premises or upon or into any land or water, public or private, for the purpose of obtaining information, making inspections, obtaining samples, inspecting or copying records or plans required to be made and maintained, or conducting surveys or investigation or detecting any offenses committed in contravention of these regulations.

52. Penalty for Lack of Permit

Any person required to have a permit under these regulations and engaged in an activity without such a permit shall be subject to a civil penalty of up to $500.00 per day for each day the activity is conducted without a permit.

Adopted by the Authority January 6, 1994.

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Jiba B. Kabua, Chairman
Environmental Protection Authority
Republic of the Marshall Islands

Approved by the Minister of Health and Environment February 18, 1994.

_____
Honorable Evelyn Konou
Minister of Health and Environment
Republic of the Marshall Islands

EFFECTIVE DATE: January 7, 1994