4-15 OU111 AR 571

Utah Drinking Water Rules - as in effect on January 1, 1997
R309. Environmental Quality, Drinking Water

MRAP OU111 AR 571 4-15 DRINKING WATER
UTAH DRINKING WATER RULES AS OF 1/1/97 - R309
ENVIRON QUALITY 1/1/97

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R309. Environmental Quality, Drinking Water.
R309-101. General Administration of Drinking Water Program.
R309-101-1. Coverage.

These rules shall apply to all public drinking water systems within the State of Utah.

A public drinking water system is a system, either publicly or privately owned, providing water for human consumption and other domestic uses, which:

a. Has at least 15 service connections, or

b. Serves an average of at least 25 individuals daily at least 60 days out of the year.

Such term includes collection, treatment, storage and distribution facilities under control of the operator and used primarily in connection with the system. Additionally, the term includes collection, pretreatment or storage facilities used primarily in connection with the system but not under such control.

1.1 Categories of Public Drinking Water Systems

Public drinking water systems are divided into three categories, as follows:

a. "Community water system" means a public drinking water system which serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents.

b. "Non-transient, non-community system" means a public water system that is not a community water system and that regularly serves at least 25 of the same persons over six months per year.

c. "Non-community water system" means a public drinking water system that is not a community water system or a non-transient, non-community water system.

The distinctions between "Community", "Non-transient, non-community", and Non-community water systems are important with respect to monitoring and water quality requirements.

1.2 Responsibility

All public drinking water systems must have a person or organization designated as the owner of the system. The name, address and phone number of this person or organization shall be supplied, in writing, to the Board.

The name of the person to be contacted on issues concerning the operation and maintenance of the system shall also be provided, in writing, to the Board.

R309-101-2. Approval of Plans and Specifications for Public Water Supply Projects.

The Executive Secretary must approve, in writing, all engineering plans and specifications for public drinking water projects prior to construction.

Refer to R309-102-2 for further requirements.

R309-101-3. Feasibility Reviews.

Upon the request of the local health department, the Department of Environmental Quality will conduct a review to determine the "feasibility" of adequate water supply for any proposed public water system (e.g. subdivisions, industrial plants or commercial facilities). Information submitted to the Department for consideration must be simultaneously submitted to the local health department. This feasibility review is a preliminary investigation of the proposed method of water supply and is done in conjunction with a review of proposed methods of wastewater disposal.

Refer to the Department of Environmental Quality publication "Review Criteria for Establishing the Feasibility of Proposed Housing Subdivisions" available at the Division of Drinking Water.

R309-101-4. Sanitary Survey and Evaluation of Existing Facilities.

The Executive Secretary, after considering information gathered during sanitary surveys and facility evaluations, may make determinations of regulatory significance including: monitoring reductions or increases, treatment, variances and exemptions.

4.1 CONDUCTING SANITARY SURVEYS

The Executive Secretary shall ensure a sanitary survey is conducted at least every five years on all public water systems except non-community water systems that use only protected and disinfected ground water. The Executive Secretary shall ensure a sanitary survey is conducted at least every ten years on all non-community water systems that use only disinfected ground water from protected ground water zones as designated under R309-106. The Executive Secretary shall conduct an initial sanitary survey by June 29, 1994, on community water systems that do not collect five or more routine bacteriologic samples per month and by June 29, 1999, on non-transient non-community and non-community water systems.

Sanitary surveys conducted by the following individuals under the circumstances as listed, may be used by the Executive Secretary for the above determinations:

a. Division of Drinking Water personnel;

b. Utah Department of Environmental Quality District Engineers;
c. local health officials;
d. Forest Service engineers;
e. Utah Rural Water Association staff;
f. consulting engineers; and
g. other qualified individuals authorized in writing by the Executive Secretary.

4.2 CONDITIONS ON CONDUCT OF SANITARY SURVEYS

In order for the groups of individuals listed in R309-101-4.1 to conduct sanitary surveys acceptable for consideration by the Executive Secretary, the following criteria must be met:

a) Surveys of all systems involving complete treatment plants must be performed by Division of Drinking Water staff or others authorized in writing by the Executive Secretary;

b) Local Health officials may conduct surveys of systems within their respective jurisdictions;

c) U.S. Forest Service (USFS) engineers may conduct surveys of water systems if the system is owned and operated by the USFS or USFS concessionaires;

d) Utah Rural Water Association staff may conduct surveys of water systems if the system's population is less than 10,000;

e) Consulting Engineers under the direction of a Registered Professional Engineer;

f) Other qualified individuals who are authorized in writing by the Executive Secretary may conduct surveys.

4.3 SANITARY SURVEY REPORT CONTENT

The Executive Secretary will prescribe the form and content of sanitary survey reports and be empowered to reject all or part of unacceptable reports.

4.4 ACCESS TO WATER FACILITIES

Department of Environmental Quality employees after reasonable notice and presentation of credentials, may enter any part of a public water system at reasonable times to inspect the facilities and water quality records, conduct sanitary surveys, take samples and otherwise evaluate compliance with Utah's drinking water rules. All others who have been authorized by the Executive Secretary to conduct sanitary surveys must have the permission of the water system owner or designated representative before a sanitary survey may be conducted.

Refer to R309-101-5 and R309-102-3 for further requirements.

R309-101-5. Rating System.

The Executive Secretary shall assign a rating to each public water supply in order to provide a concise indication of its condition and performance. The criteria to be used for determining a water system's rating shall be as set forth in R309-150.

R309-101-6. Orders and Emergency Actions.

In situations in which a public water system fails to meet the requirements of these regulations, the Board or the Executive Secretary shall issue an "Order" to a water supplier to take appropriate protective or corrective measures. Failure to take the required measures may result in the imposition of penalties as provided in the Utah Safe Drinking Water Act. Appeal procedures from administrative orders are outlined in the Utah Safe Drinking Water Act.

The Executive Secretary may also respond to emergency situations involving public drinking water in a manner deemed appropriate to protect the public health. Such emergency situations shall include those described in R309-102-10. The Executive Secretary's response may include the following:

1. Issuing press releases to inform the public of any confirmed or possible hazards in their drinking water.
2. Ordering water suppliers to take appropriate measures to protect public health.

R309-101-7. Variances.

Variances to the requirements of R309-103 of these rules may be granted by the Board to water systems which, because of characteristics of their raw water sources, cannot meet the required maximum contaminant levels despite the application of best technology and treatment techniques available (taking costs into consideration).

The variance will be granted only if doing so will not result in an unreasonable risk to health.

No variance from the maximum contaminant level for total coliforms are permitted.

No variance from the minimum filtration and disinfection requirements of R309-107 and R309-108 will be permitted for sources classified by the Executive Secretary as directly influenced by surface water.

Within one year of the date any variance is granted, the Board shall prescribe a schedule by which the water system will come into compliance with the maximum contaminant level in question. The requirements of Section 1415 of the Federal Safe Drinking Water

Act, PL 99-339, are hereby incorporated by reference. The Board shall provide notice and opportunity for public hearing prior to granting any variance or determining the compliance schedule. Procedures for giving notice and opportunity for hearing will be as outlined in 40 CFR Section 142.44.

R309-101-8. Exemptions.

The Board may grant an exemption from the requirements of R309-103 or from any required treatment technique if:

1. Due to compelling factors (which may include economic factors), the public water system is unable to comply with contaminant level or treatment technique requirements, and

2. The public water system was in operation on the effective date of such contaminant level or treatment technique requirement, and

3. The granting of the exemption will not result in an unreasonable risk to health.

4. No exemptions from the maximum contaminant level for total coliforms are permitted.

5. No exemptions from the minimum disinfection requirements of R309-103-2.6 will be permitted for sources classified by the Executive Secretary as directly influenced by surface water.

Within one year of the granting of an exemption, the Board shall prescribe a schedule by which the water system will come into compliance with contaminant level or treatment technique requirement. The requirements of Section 1416 of the Federal Safe Drinking Water Act, PL 99-339, are hereby incorporated by reference.

The Board shall provide notice and opportunity for an exemption hearing as provided in 40 CFR Section 142.54.

R309-101-9. Definitions.

The following definitions apply to this section:

Approval - Unless indicated otherwise, shall be taken to mean a written statement of acceptance.

Board - means the Drinking Water Board.

Executive Secretary - means the Executive Secretary of the Drinking Water Board.

Must - means that a particular action is obliged and has to be accomplished.

Service Connection - The means by which a dwelling, commercial or industrial establishment, or other water user obtains water from the supplier's distribution system. Multiple dwelling units such as condominiums or apartments, shall be considered to have a single service connection if fed by a single line.

Shall - means that a particular action is obliged and has to be accomplished.

Should - means that a particular action is recommended but does not have to be accomplished.

Water Supplier - means a person who owns or operates a public water system.

9.1 The following proceedings and actions are designated to be conducted either formally or informally as required by Utah Code Annotated Section 63-46b-4:

(a) Approval of plans shall be by informal procedures outlined in R309-102 of the Utah Public Drinking Water Rules. Appeals of plan approvals, denials or conditions in an approval shall be conducted formally.

(b) Notices of Violations and Orders are exempt under Utah Code Annotated Section 64-46b-1(m). Appeals to the Board of notices of violations and orders shall be conducted formally.

(c) Variances and exemptions shall be by informal procedures as outlined in R309-101-7 and R309-101-8 of the Utah Public Drinking Water Rules. Any person denied a variance or exemption may request a formal hearing before the Board.

(d) Operator certification shall be handled informally as outlined in the certification regulations of the Board. Appeals to the Board of a denial of certification shall be processed formally.

(e) Funding applications, insofar as they are covered by Utah Code Annotated Section 63-46b-1, shall be processed informally in accordance with the procedures in the Board's rules, policies, and guidelines.

(f) Any other approvals, or authorizations shall be processed informally in accordance with the procedures in the Board's rules.

9.2 At any time before a final order is issued, the Board or appointed hearing officer may convert proceedings which are designated to be informal to formal, and proceedings which are designated as formal to informal if conversion is in the public interest and rights of all parties are not unfairly prejudiced.

9.3 Rules for conducting formal proceedings shall be as provided in Utah Code Annotated Sections 63-46b-3, and 6 through 13. In addition to the procedures referenced in paragraph 9.1 above, the procedures in Utah Code Annotated Section 63-46b-3 and 5 apply to informal proceedings.

9.4 Declaratory Orders. In accordance with the provisions of Utah Code Annotated

Section 63-46b-21, any person may file a request for a declaratory order. The request shall be titled a petition for declaratory order and shall specifically identify the issues requested to be the subject of the order. Requests for declaratory order, if set for adjudicative hearing, will be processed informally using the procedures identified in Utah Code Annotated Section 63-46b-3 and 63-46b-5 unless converted to a formal proceeding under paragraph 9.2 above. No declaratory orders will be issued in the circumstances described in Utah Code Annotated Section 63-46b-21. Intervention rights and other procedures governing declaratory orders are outlined in Utah Code Annotated Section 63-46b-21.

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R309. Environmental Quality, Drinking Water.
R309-102. Responsibilities of Public Water System Owners and Operators.
R309-102-1. General.

Water suppliers are responsible for the quality of water delivered to their customers. In order to give the public reasonable assurance that the water which they are consuming is satisfactory, the Board has established rules for the design, construction, operation and maintenance of public water supplies.

R309-102-2. Construction of Public Drinking Water Facilities.

The following requirements pertain to the construction of public water systems.

2.1 Approval of Engineering Plans and Specifications

Complete plans and specifications for all public drinking water projects, as described in R309-102-2.3, must be approved in writing by the Executive Secretary prior to the commencement of construction. A 30-day review time should be assumed.

Appropriate engineering reports, supporting information and master plans may also be required by the Executive Secretary as needed to evaluate the proposed project. A certificate of convenience and necessity or an exemption therefrom, issued by the Public Service Commission, must be filed with the Executive Secretary prior to approval of any plans or specifications for projects described in R309-102-2.3.a.

2.2 Acceptable Design and Construction Methods

The design and construction methods of all public drinking water facilities must conform to the applicable standards contained in R309-105 through R309-112 of these rules. The Executive Secretary may require modifications to plans and specifications before approval is granted.

There may be times in which the requirements of the Design and Construction Standards are not appropriate. Thus, the Executive Secretary may grant an "exception" to the Design and Construction Standards (R309-105 through R309-112) if it can be shown that the granting of such an exception will not jeopardize the public health.

Alternative or new treatment techniques may be developed which are not specifically addressed by the Design and Construction Standards. These treatment techniques may be accepted by the Executive Secretary if it can be shown that:

1. They will result in a finished water meeting the requirements of R309-103 of these regulations.
2. The technique will produce finished water which will protect public health to the same extent provided by comparable treatment processes outlined in the Design and Construction Standards.
3. The technique is as reliable as any comparable treatment process governed by the Design and Construction Standards.

2.3 Description of "Public Drinking Water Project"

The following describes what projects must be submitted for review and defines the term "Public Drinking Water Project":

a. All facilities of any new public drinking water supply.

b. Any addition to or modification of an existing public water supply which will or may affect the quality and/or quantity of the supply. Thus, additions to or modifications of the following facility or facilities must be submitted for review:

1. Sources
2. Transmission lines
3. Treatment
4. Storage
5. Pumping
6. Pressure modification
7. Distribution system modifications or extensions of more than 500 feet; or affecting or potentially adding more than 10% of the number of connections in the system. These modifications and extensions are not considered routine. However, suppliers with full-time water department staff, which includes a registered professional engineer, need only submit plans for distribution system extensions or modifications exceeding the 10% limitations given above (i.e. length limitation would not apply in this case).

Routine maintenance or repairs of existing public water systems, carried out in conformance with all applicable regulations (see R309-102-4.2) and not altering the system's ability to provide an adequate supply of water, need not be submitted for review.

2.4 Preparation of Plans and Specifications

2.4.1 Professional Registration

Plans and specifications for all public drinking water projects must be stamped and signed by a licensed professional engineer in accordance with Utah Code Annotated Sections 58-22-1 et seq. Any document not so stamped will be returned without review.

Specifications for the drilling of a public water supply well may be prepared and submitted by a licensed well driller holding a current Utah Well Driller's Permit if

authorized by the Executive Secretary.

2.4.2 Drawing Quality and Size

Drawings which are submitted shall be compatible with Division of Drinking Water Document storage. Drawings which are illegible or of unusual size will not be accepted for review. Drawing size shall not exceed 30" x 42" nor be less than 8-1/2" x 11".

2.5 Requirements After Approval of Plans for Construction

After the approval of plans for construction, the following are required:

a. If construction or the ordering of substantial equipment has not commenced within one year, a renewal of the approval must be obtained prior to proceeding with construction.

b. As a project proceeds, copies of all "change orders" affecting facilities as described in R309-102-2.3 must be forwarded to the Division of Drinking Water.

c. Changes to the project which will or may have an impact on the quantity or quality of the delivered water shall be reviewed and approved by the Executive Secretary. Where such changes involve revisions to previously submitted plans or specifications, such changes shall be clearly noted on the appropriate sheet or page.

d. The Division of Drinking Water shall be informed of the progress of a project (as specified in the plan approval letter) and may conduct a final inspection prior to commencement of the regular use of the facility. Interim inspections may also be conducted.

e. The Executive Secretary may require that "as built" drawings be submitted by the water supplier to the Division of Drinking Water. The as-built drawings must confirm that the project has been constructed in accordance with the approved plans.

R309-102-3. Existing Water System Facilities.

All public water systems must deliver water meeting the applicable requirements of R309-103 of these regulations.

Existing facilities must be brought into compliance with R309-105 through R309-112 or must be reliably capable of delivering water meeting the requirements of R309-103.

In situations where a water system is providing water of unsatisfactory quality, or when the quality of the water or the public health is threatened by poor physical facilities, the water system management must solve the problem(s).

R309-102-4. Operation and Maintenance Procedures.

All routine operation and maintenance of public water supplies must be carried out with due regard for public health and safety. The following sections describe procedures which must be used in carrying out some common operation and maintenance procedures.

4.1 Chemical Addition

Water system operators must determine that all chemicals added to water intended for human consumption are suitable for potable water use and comply with National Sanitation Foundation (NSF) Standard 60.

No chemicals or other substances may be added to public water supplies unless the chemical addition facilities and chemical type have been reviewed and approved by the Division of Drinking Water.

Chlorine, when used in the distribution system, must be added in sufficient quantity to achieve either "breakpoint" and yield a detectable free chlorine residual or a detectable combined chlorine residual in the distribution system at points to be determined by the Executive Secretary. Residual checks must be taken daily by the operator of any system using disinfectants. The Executive Secretary may, however, reduce the frequency of residual checks if he determines that this would be an unwarranted hardship on the water system operator and, furthermore, the disinfection equipment has a verified record of reliable operation. Suppliers, when checking for residuals, must use test kits and methods which meet the requirements of the U.S. EPA. The "DPD" test method is recommended for free chlorine residuals. Information on the suppliers of this equipment is available from the Division of Drinking Water.

4.2 New and Repaired Mains

All new water mains must meet the requirements of R309-112-1.1 with regard to materials of construction. All products in contact with culinary water shall comply with National Sanitation Foundation (NSF) Standard 61.

All new and repaired water mains or appurtenances shall be disinfected in accordance with AWWA Standard C651. The chlorine solution must be flushed from the water main with potable water prior to the main being placed in use.

All products used to recoat the interiors of storage structures and which may come in contact with culinary water shall comply with National Sanitation Foundation (NSF) Standard 61.

4.3 Reservoir Maintenance and Disinfection

After a reservoir has been entered for maintenance or re-coating, it must be disinfected prior to being placed into service. Procedures given in AWWA Standard C652 must be followed in this regard.

4.4 Spring Collection Area Maintenance

Spring collection areas shall be periodically cleared of deep rooted vegetation to prevent root growth from clogging collection lines. Frequent hand or mechanical clearing of spring collection areas is strongly recommended. It is advantageous to encourage the growth of grasses and other shallow rooted vegetation for erosion control and to inhibit the growth of more detrimental flora.

No pesticide (e.g., herbicide) may be applied on a spring collection area without the prior written approval of the Executive Secretary. Such approval shall be given 1) only when acceptable pesticides are proposed; 2) when the pesticide product manufacturer certifies that no harmful substance will be imparted to the water; and 3) only when spring development meets the requirements of these regulations (see R309-106-3.5).

4.5 Security

All water system facilities such as spring junction boxes, well houses, reservoirs, and treatment facilities must be secure.

4.6 Seasonal Operation

Water systems operated seasonally must be disinfected and flushed according to the techniques given in AWWA Standard C601 and D105 prior to each season's use. A satisfactory bacteriologic sample must be achieved prior to use. During the non-use period, care must be taken to close all openings into the system.

4.7 Pump Lubricants

All oil lubricated pumps for culinary wells must utilize mineral oils suitable for human consumption as determined by the Executive Secretary. To assure proper performance, and to prevent the voiding of any warranties which may be in force, the water supplier should confirm with individual pump manufacturers that the oil which is selected will have the necessary properties to perform satisfactorily.

R309-102-5. Cross Connection Control.

The water supplier shall not allow a connection to his system which may jeopardize its quality and integrity. Cross connections are not allowed unless controlled by an approved and properly operating backflow prevention assembly. The requirements of Chapter 10 of the Uniform Plumbing Code must be met with respect to cross connection control and backflow prevention.

Suppliers shall maintain an inventory of each pressure atmospheric vacuum breaker, double check valve, reduced pressure zone principle assembly, and high hazard air gap used by their customers, and a service record for each such assembly.

Backflow prevention assemblies must be inspected and tested at least once a year, by an individual certified for such work. This responsibility may be borne by the water system or the water system management may require that the customer having the backflow prevention assembly be responsible for having the device tested.

Suppliers serving areas also served by a pressurized irrigation system must prevent cross connections between the two. Requirements for pressurized irrigation systems are outlined in Section 26-1-31 of the Utah Code Annotated 1953 as amended.

R309-102-6. Monitoring, Reporting and Keeping Records of Finished Water Quality.

All public water systems are required to monitor their water according to the requirements of R309-104 to determine if the water quality standards of R309-103 have been met. Water systems are also required to keep records and, under certain circumstances, give public notice as required in R309-104.

R309-102-7. Operational Reports.

7.1 Treatment techniques for acrylamide and epichlorohydrin.

Each public water system shall certify annually in writing to the Executive Secretary (using third party or manufacturer's certification) that when acrylamide and epichlorohydrin are used in drinking water systems, the combination (or product) of dose and monomer level does not exceed the levels specified in R309-104-4.7.2.c.

Certifications may rely on manufacturers data.

7.2 All water systems using chemical addition or specialized equipment for the treatment of drinking water must regularly complete operational reports. This information shall be evaluated to confirm that the treatment process is being done properly, resulting in successful treatment.

The information to be provided, and the frequency at which it is to be gathered and reported, will be determined by the Executive Secretary.

R309-102-8. Annual Reports.

All community water systems shall be required to complete annual report forms furnished by the Division of Drinking Water. The information to be provided should include:

a. the status of all water system projects started during the previous year,
b. water demands met by the system,

c. problems experienced,
d. anticipated projects.

R309-102-9. Operator Certification.

All public water systems serving more than 800 individuals or that employ treatment techniques for surface water or ground water under the direct influence of surface water must have an appropriately certified operator in accordance with the requirements of the Drinking Water Board's Rules. Refer to R309-301, Required Certification Rules for Water Supply Operators in the State of Utah, for specific requirements.

R309-102-10. Emergencies.

The Executive Secretary or the local health department must be informed by telephone by a water supplier of any "emergency situation". The term "emergency situation" includes the following:

1. The malfunction of any disinfection facility such that a detectable residual cannot be maintained at all points in the distribution system.
2. The malfunction of any "complete" treatment plant such that a clearwell effluent turbidity greater than 5 NTU is maintained longer than fifteen minutes.
3. Muddy or discolored water (which cannot be explained by air entrainment or re-suspension of sediments normally deposited within the distribution system) is experienced by a significant number of individuals on a system.
4. An accident has occurred which has, or could have, permitted the entry of untreated surface water and/or other contamination into the system (e.g. break in an unpressurized transmission line, flooded spring area, chemical spill, etc.)
5. A threat of sabotage has been received by the water supplier or there is evidence of vandalism or sabotage to any public drinking water supply facility which may affect the quality of the delivered water.
6. Any instance where a consumer reports becoming sick by drinking from a public water supply and the illness is substantiated by a doctor's diagnosis (unsubstantiated claims should also be reported to the Division of Drinking Water, but this is not required).

If an emergency situation exists, the water supplier must then contact the Division of Drinking Water in Salt Lake City within eight hours. Division personnel may be reached at all times through 801-536-4123.

All suppliers are advised to develop contingency plans to cope with possible emergency situations. In many areas of the state the possibility of earthquake damage must be realistically considered.

R309-102-11. Location of New Connections.

Unless otherwise specifically approved by the Executive Secretary, no water supplier shall allow any connection to the water system where water pressure at the point of connection will fall below 20 psi during the normal operation of the water system.

See R309-110-4.1. for conditions in which the use of individual home booster pumps may be allowed.

R309-102-12. Definitions.

The following definitions apply to this section:

Approval - unless indicated otherwise, shall be taken to mean a written statement of acceptance.

AWWA - means the American Water Works Association. This association's standards are used throughout the drinking water industry and are available at the Division of Drinking Water office.

Board - means the Drinking Water Board.

Breakpoint - The point at which enough chlorine has been added to water to permit the formation of free available chlorine. The chlorine added prior to achieving this condition is "tied up" by naturally occurring substances in the water, resulting in reduced disinfecting capability.

Community Water System - means a public drinking water system which serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents.

Executive Secretary - means the Executive Secretary of the Drinking Water Board.

Must - means that a particular action is obliged and has to be accomplished.

NSF - means the National Sanitation Foundation. This entity's standards are used within the drinking water industry and are available at the Division of Drinking Water office.

Non-Community Water System - means a public drinking water system that is not a community water system or a non-transient non-community water system.

Public Water System - means a system, either publicly or privately owned, providing water for human consumption and other domestic uses which has at least 15 service

connections, or regularly serves an average of at least 25 individuals daily for at least sixty days out of the year. Such term includes collection, treatment, storage and distribution facilities under control of the operator and used primarily in connection with the system. Additionally, the term includes collection, pretreatment or storage facilities used primarily in connection with the system but not under such control.

Shall - means that a particular action is obliged and has to be accomplished.

Should - means that a particular action is recommended but does not have to be accomplished.

Supplier - means a person who owns or operates a public water system.

Surface Water Source - means a source of culinary water which lies or travels on the surface prior to its capture for use in a culinary water system. Such term includes lakes, ponds, impoundments, streams and springs which do not meet the requirements necessary to be considered a groundwater source.

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In no case shall the Board allow the use of water having a sulfate level greater than 1000 mg/liter.

(3) If TDS is greater than 1000 mg/l, the supplier shall satisfactorily demonstrate to the Board that no better water is available. The Board shall not allow the use of an inferior source of water if a better source of water (i.e. lower in TDS) is available.

(4) In the case of a non-community water systems which exceed the MCL for nitrate, the Executive Secretary may allow, on a case-by-case basis, a nitrate level not to exceed 20 mg/l if the supplier can adequately demonstrate that:

(a) such water will not be available to children under 6 months of age as may be the case in hospitals, schools and day care centers; and

(b) there will be continuous posting of the fact that nitrate levels exceed 10 mg/l and the potential health effect of exposure; and

(c) the water is analyzed in conformance to R309-104-4.1.4; and
(d) that no adverse health effects will result.

2.2 Lead and copper.
a. The lead action level is exceeded if the concentration of lead in more than 10 percent of tap water samples collected during any monitoring period conducted in accordance with R309-104-4.2.3 is greater than 0.015 mg/L (i.e., if the "90th percentile" lead level is greater than 0.015 mg/L).
b. The copper action level is exceeded if the concentration of copper in more than 10 percent of tap water samples collected during any monitoring period conducted in accordance with R309-104-4.2.3 is greater than 1.3 mg/L (i.e., if the "90th percentile" copper level is greater than 1.3 mg/L).
c. The 90th percentile lead and copper levels shall be computed as follows:
1. The results of all lead or copper samples taken during a monitoring period shall be placed in ascending order from the sample with the lowest concentration to the sample with the highest concentration. Each sampling result shall be assigned a number, ascending by single integers beginning with the number 1 for the sample with the lowest contaminant level. The number assigned to the sample with the highest contaminant level shall be equal to the total number of samples taken.
2. The number of samples taken during the monitoring period shall be multiplied by 0.9.
3. The contaminant concentration in the numbered sample yielded by the calculation in paragraph c.2 above is the 90th percentile contaminant level.
4. For water systems serving fewer than 100 people that collect 5 samples per monitoring period, the 90th percentile is computed by taking the average of the highest and second highest concentrations.
2.3 Organic Contaminants.
The following are the maximum contaminant levels for organic chemicals. For the purposes of R309-101 through R309-113, organic chemicals are divided into three categories: Pesticides/PCBs/SOCs, volatile organic contaminants (VOCs) and total trihalomethanes.
a. Pesticides/PCBs/SOCs - The MCLs for organic contaminants list in Table 103-2 are applicable to community water systems and non-transient, non-community water systems.

TABLE 103-2
PESTICIDE/PCB/SOC CONTAMINANTS

Contaminant	Maximum Contaminant Level
1. Alachlor	0.002 mg/l
2. Aldicarb	(see Note 1 below)
3. Aldicarb sulfoxide	(see Note 1 below)
4. Aldicarb sulfone	(see Note 1 below)
5. Atrazine	0.003 mg/l
6. Carbofuran	0.04 mg/l
7. Chlordane	0.002 mg/l
8. Dibromochloropropane	0.0002 mg/l
9. 2,4-D	0.07 mg/l
10. Ethylene dibromide	0.00005 mg/l
11. Heptachlor	0.0004 mg/l
12. Heptachlor epoxide	0.0002 mg/l

R309. Environmental Quality, Drinking Water.
R309-103. Water Quality Maximum Contaminant Levels (MCLs).
R309-103-1. General.

Maximum contaminant levels (MCLs) and treatment techniques are herein established for those routinely measurable substances which may be found in water supplies. "Primary" standards and treatment techniques are established for the protection of human health. "Secondary" regulations are established to provide guidance in evaluating the aesthetic qualities of drinking water.

The applicable "Primary" standards and treatment techniques must be met by all public drinking water systems. The "Secondary" standards are recommended levels which should be met in order to avoid consumer complaint.

The methods used to determine compliance with these maximum contaminant levels and treatment techniques are given in R309-104. Analytical techniques which must be followed in making the required determinations shall be as given in 40 CFR 141 as published on July 1, 1993 by the Office of the Federal Register.

Unless otherwise required by the Board, the effective dates on which new analytical methods shall be initiated are identical to the dates published in 40 CFR 141 on July 1, 1993 by the Office of the Federal Register.

R309-103-2. Primary Drinking Water Standards.

2.1 Inorganic Contaminants.

a. The maximum contaminant levels (MCLs) for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium, sodium, thallium and total dissolved solids are applicable to community and non-transient non-community water systems.

b. The MCLs for nitrate, nitrite, and total nitrate, nitrite and sulfate are applicable to community, non-transient non-community, and non-community water systems.

c. The maximum contaminant levels for inorganic chemicals are listed in Table 103-1.

TABLE 103-1
PRIMARY INORGANIC CONTAMINANTS

Contaminant	Maximum Contaminant Level
1. Antimony	0.006 mg/l
2. Arsenic	0.05 mg/l
3. Asbestos	7 Million Fibers/liter (longer than 10 um)
4. Barium	2 mg/l
5. Beryllium	0.004 mg/l
6. Cadmium	0.005 mg/l
7. Chromium	0.1 mg/l
8. Cyanide (as free Cyanide)	0.2 mg/l
9. Fluoride	4.0 mg/l
10. Mercury	0.002 mg/l
11. Nickel	0.1 mg/l
12. Nitrate	10 mg/l (as Nitrogen) (see Note 4 below)
13. Nitrite	1 mg/l (as Nitrogen)
14. Total Nitrate and Nitrite	10 mg/l (as Nitrogen)
15. Selenium	0.05 mg/l
16. Sodium	--- (see Note 1 below)
17. Sulfate	1000 mg/l (see Note 2 below)
18. Thallium	0.002 mg/l
19. Total Dissolved Solids	2000 mg/l (see Note 3 below)

NOTE:

(1) No maximum contaminant level has been established for sodium. However, this contaminant must be monitored and reported in accordance with the requirements of R309-104-4.1.3.

(2) If the sulfate level of a public (community, NTNC and non-community) water system is greater than 500 mg/l, the supplier must satisfactorily demonstrate that:

(a) No better quality water is available, and

(b) The water shall not be available for human consumption from commercial establishments.

The following are the maximum contaminant levels for Radium-226, Radium-228, and gross alpha particle radioactivity:

1. Combined Radium-226 and Radium-228: 5 pCi/l.

2. Gross alpha particle activity (including Radium-226 but excluding Radon and Uranium): 15 pCi/l.

b. Beta particle and photon radioactivity from man-made radionuclides in community water systems:

1. The average annual concentration of beta particle and photon radioactivity from man-made radionuclides in drinking water shall not produce an annual dose equivalent to the total body or any internal organ greater than four millirem/year.

2. Except for the radionuclides listed in Table 103-4, the concentration of man-made radionuclides causing four mrem total body or organ dose equivalents shall be calculated on the basis of a two liter per day drinking water intake using the 168 hour data listed in "Maximum Permissible Body Burden and Maximum Permissible Concentration of Radionuclides in Air or Water or 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 four millirem/year.

TABLE 103-4
MAN-MADE RADIONUCLIDE CONTAMINANTS

Average annual concentrations assumed to produce a total body or organ dose of four mrem/year.

Radionuclide	Critical Organ	pCi per liter
Tritium	Total Body	20,000
Strontium-90	Bone Marrow	8

2.5 TURBIDITY

a. Surface water sources or ground water sources under the direct influence of surface water:

1. The following turbidity limit applies to finished water from water treatment facilities providing water to all public water systems whether community, non-transient non-community or non-community.

2. The limit for turbidity in drinking water from treatment facilities which utilize surface water sources or ground water sources under the direct influence of surface water is 0.5 NTU in at least 95 percent of the samples as required by R309-104-4.5.1.c for conventional complete treatment and direct filtration. If the Executive Secretary determines that the system is capable of achieving at least 99.9 percent removal and inactivation of Giardia lamblia cysts at some turbidity level higher than 0.5 NTU in at least 95 percent of the measurements, the Executive Secretary may substitute this higher turbidity limit for that system. However, in no case may the Executive Secretary approve a turbidity limit that allows more than 1.0 NTU in more than 5 percent of the samples taken each month, measured as specified in R309-104-4.5.1.c and d.

The turbidity limit for slow sand filtration and diatomaceous earth filtration must be less than or equal to 1.0 NTU in at least 95 percent of the measurements taken each month, measured as specified in R309-104-4.5.1.c and d. For slow sand filtration only, if the Executive Secretary determines that the system is capable of achieving 99.9 percent removal and inactivation of Giardia lamblia cysts at some turbidity level higher than 1.0 NTU in at least 95 percent of the measurements, the Executive Secretary may substitute this higher turbidity limit for that system.

The turbidity level of representative samples must at no time exceed 5.0 NTU for any treatment technique, measured as specified in R309-104-4.5.1.c and d.

The Executive Secretary may allow the higher turbidity limits for the above treatment techniques only if the supplier of water can demonstrate to the Executive Secretary's satisfaction that the higher turbidity does not do any of the following:

(a) Interfere with disinfection;

(b) Prevent maintenance of an effective disinfectant agent throughout the distribution system;

(c) Interfere with microbiological determinations; or

(d) Interfere with a treatment technique's ability to achieve the required log removal/inactivation of pathogens or virus as required by R309-108-5(2)(a) and (b).

b. Ground water sources not under the direct influence of surface water:

1. The following turbidity limit applies to community water systems only.

2. The limit for turbidity in drinking water from ground water sources not contaminated by surface sources is 5.0 NTU based on an average for two consecutive days pursuant to R309-104-4.5.3.

13.	Lindane	0.0002 mg/l
14.	Methoxychlor	0.04 mg/l
15.	Polychlorinated biphenyls	0.0005 mg/l
16.	Pentachlorophenol	0.001 mg/l
17.	Toxaphene	0.003 mg/l
18.	2,4,5-TP	0.05 mg/l
19.	Benzo(a)pyrene	0.0002 mg/l
20.	Dalapon	0.2 mg/l
21.	Di(2-ethylhexyl)adipate	0.4 mg/l
22.	Di(2-ethylhexyl)phthalate	0.006 mg/l
23.	Dinoseb	0.007 mg/l
24.	Diquat	0.02 mg/l
25.	Endothall	0.1 mg/l
26.	Endrin	0.002 mg/l
27.	Glyphosate	0.7 mg/l
28.	Hexachlorobenzene	0.001 mg/l
29.	Hexachlorocyclopentadiene	0.05 mg/l
30.	Oxamyl (Vydate)	0.2 mg/l
31.	Picloram	0.5 mg/l
32.	Simazine	0.004 mg/l
33.	2,3,7,8-TCDD (Dioxin)	0.00000003 mg/l

Note 1: The MCL for this contaminant is under further review, however, this contaminant shall be monitored in accordance with R309-104-4.3.1.

b. Volatile organic contaminants - The maximum contaminant levels for organic contaminants listed in Table 103-3 apply to community and non-transient non-community water systems.

TABLE 103-3
VOLATILE ORGANIC CONTAMINANTS

	Contaminant	Maximum Contaminant Level
1.	Vinyl chloride	0.002 mg/l
2.	Benzene	0.005 mg/l
3.	Carbon tetrachloride	0.005 mg/l
4.	1,2-Dichloroethane	0.005 mg/l
5.	Trichloroethylene	0.005 mg/l
6.	para-Dichlorobenzene	0.075 mg/l
7.	1,1-Dichloroethylene	0.007 mg/l
8.	1,1,1-Trichloroethane	0.2 mg/l
9.	cis-1,2-Dichloroethylene	0.07 mg/l
10.	1,2-Dichloropropane	0.005 mg/l
11.	Ethylbenzene	0.7 mg/l
12.	Monochlorobenzene	0.1 mg/l
13.	o-Dichlorobenzene	0.6 mg/l
14.	Styrene	0.1 mg/l
15.	Tetrachloroethylene	0.005 mg/l
16.	Toluene	1 mg/l
17.	trans-1,2-Dichloroethylene	0.1 mg/l
18.	Xylenes (total)	10 mg/l
19.	Dichloromethane	0.005 mg/l
20.	1,2,4-Trichlorobenzene	0.07 mg/l
21.	1,1,2-Trichloroethane	0.005 mg/l

c. Total Trihalomethanes - The following maximum contaminant level applies to community water systems serving a population of 10,000 or more.

The MCL for total trihalomethane (TTHM) compounds for community water systems serving a population of 10,000 or more shall be either of the following:

1. The running average of analyses of quenched TTHM samples for four consecutive calendar quarters shall not exceed 100 micrograms per liter.

2. The single sample Total Trihalomethane Formation Potential (THMFP) shall not exceed 100 micrograms per liter. Approval is needed from the Executive Secretary to substitute this test for TTHM samples and may only be used for groundwater sources. Compliance for each source is based on measurement of this sample.

2.4 Radiologic Chemicals - applies to community water systems.

a. Radium-226, Radium-228 and gross alpha particle radioactivity in community water systems:

2.6 MICROBIOLOGICAL QUALITY

a. The maximum contaminant level (MCL) for microbiological contaminants for all public water systems is:

1. For a system which collects less than 40 total coliform samples per month, no more than one sample per month may be total coliform-positive.

2. For a system which collects 40 or more total coliform samples per month, no more than 5.0 percent of the samples collected during a month may be total coliform-positive.

b. Any fecal coliform-positive or Escherichia coliform (E. coli)-positive repeat sample or any total coliform-positive repeat sample following a fecal coliform positive or E. coli-positive routine sample constitutes a violation of the MCL for total coliforms. For the purposes of public notification requirements in R309-104-7 this is a violation that may pose an acute risk to health.

c. For NTNC and non-community systems that are required to sample at a rate of less than one per month, compliance with paragraphs a. or b. of this subsection shall be determined for the month in which the sample was taken.

2.7 DISINFECTION

Continuous disinfection is recommended for all water sources. It shall be required of all ground water sources which do not consistently meet standards of bacteriologic quality. Surface water sources or ground water sources under direct influence of surface water must be disinfected and continuously monitored for disinfection residual during the course of required conventional complete treatment for systems serving greater than 3,300 people. Disinfection shall not be considered a substitute for inadequate collection or filtration facilities.

Successful disinfection assures 99.9 percent inactivation of Giardia lamblia cysts and 99.99 percent inactivation of enteric viruses. Both filtration and disinfection are considered treatment techniques to protect against the potential adverse health effects of exposure to Giardia lamblia, viruses, Legionella, and heterotrophic bacteria in water. Minimum disinfection levels are set by "CT" values as defined in R309-103-5.

a. Each public water system that provides filtration treatment must provide disinfection treatment as follows:

1. The disinfection treatment must be sufficient to ensure that the total treatment processes of the system achieve at least 99.9 percent (3-log) inactivation and/or removal of Giardia lamblia cysts and at least 99.99 percent (4-log) inactivation and/or removal of viruses, as determined by the Executive Secretary.

2. The residual disinfectant concentration in the water entering the distribution system cannot be less than 0.2 mg/l for more than 4 hours.

3. The residual disinfectant concentration in the distribution system, measured as combined chlorine or chlorine dioxide, cannot be undetectable in more than 5 percent of the samples each month, for any two consecutive months that the system serves water to the public. 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. Thus, the value "V" in the following formula cannot exceed 5 percent in one month, for any two consecutive months.

$V = ((c + d + e) / (a + b)) \times 100$ where:

a = number of instances where the residual disinfectant concentration is measured;

b = number of instances where the residual disinfectant concentration is not measured but heterotrophic bacteria plate count (HPC) is measured;

c = number of instances where the residual disinfectant concentration is measured but not detected and no HPC is measured;

d = number of instances where no residual disinfectant concentration is detected and where HPC is greater than 500/ml;

e = number of instances where the residual disinfectant concentration is not measured and HPC is greater than 500/ml.

b. If the Executive Secretary determines, based on site-specific considerations, that a system has no means for having a sample transported and analyzed for HPC by a certified laboratory under the requisite time and temperature conditions specified in Heterotrophic Plate Count (Pour Plate Method) as set forth in the latest edition of Standard Methods for the Examination of Water and Wastewater, 1985, American Public Health Association et al. (Method 907A in the 16th edition) and that the system is providing adequate disinfection in the distribution system, the requirements of R309-103-2.7a(3) do not apply.

c. If a system utilizes a combination of sources, some surface water influenced (requiring filtration and disinfection treatment) and others deemed ground water (not requiring any treatment, even disinfection), the Executive Secretary may, based on site-specific considerations, allow sampling for residual disinfectant or HPC at locations other than those specified by total coliform monitoring required by R309-104-4.6.

R309-103-3. Secondary Drinking Water Standards for Community, Non-Transient Non-Community and Non-Community Water.

The Secondary Maximum Contaminant Levels for public water systems deals with substances which affect the aesthetic quality of drinking water. They are presented here as recommended limits or ranges and are not grounds for rejection. The taste of water may be unpleasant and the usefulness of the water may be impaired if these standards are significantly exceeded.

TABLE 103-5
SECONDARY INORGANIC CONTAMINANTS

Contaminant	Level
Aluminum	0.05 to 0.2 mg/l
Chloride	250 mg/l
Color	15 Color Units
Copper	1 mg/l
Corrosivity	Non-corrosive
Fluoride	2.0 mg/l (see Note below)
Foaming Agents	0.5 mg/l
Iron	0.3 mg/l
Manganese	0.05 mg/l
Odor	3 Threshold Odor Number
pH	6.5-8.5
Silver	0.1 mg/l
Sulfate	250 mg/l (see Note below)
TDS	500 mg/l (see Note below)
Zinc	5 mg/l

Note: Maximum allowable Fluoride, TDS and Sulfate levels are given in the Primary Drinking Water Standards, R309-103-2.1. They are listed as secondary standards because levels in excess of these recommended levels will likely cause consumer complaint.

R309-103-4. Unregulated Contaminants.

No MCLs are established herein for unregulated contaminants; viruses, protozoans and other chemical and biological substances. Some unregulated contaminants must be monitored for in accordance with R309-104-5. The Board has determined that the minimum level of treatment as described in R309-107 and R309-108 herein or its equivalent is required for surface water sources and ground water contaminated by surface sources.

R309-103-5. Definitions.

The following definitions are applicable to Section 103:

Action Level - is the concentration of lead or copper in water specified in R309-103-2.2 which determines, in some cases, the corrosion control treatment, public education and lead line replacement requirements that a water system is required to complete.

Board - means the Drinking Water Board.

Community Water System - means a public water system which serves at least fifteen service connections used by year-round residents or regularly serves at least twenty-five year-round residents.

Contaminant - means any physical, chemical, biological, or radiological substance or matter in water.

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 disinfectant 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). "CT99.9" is the CT value required for 99.9 percent (3-log) inactivation of Giardia lamblia cysts. CT99.9 for a variety of disinfectants and conditions appear in Tables 1.1-1.6, 2.1, and 3.1 of Section 141.74(b)(3) of the Federal Register, Vol. 54, No. 124, Thursday, June 29, 1989, pages 27532 through 27534 (also available from the Division of Drinking Water). CTcalc/CT99.9 is the inactivation ratio. The sum of the inactivation ratios, or total inactivation ratio shown as "Summation sign (CTcalc)/(CT99.9)" 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.

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

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 where residual disinfectant concentration ("C") is measured. Where more than one "C" is measured, "T" is (a) for the first measurement of "C", the time in minutes that it takes for water to move from the first or only point of disinfectant application to a point before or at the point where the first "C" is measured and (b) for subsequent measurements of "C", the time in minutes that it takes for water to move from the previous "C" measurement point to the "C" measurement point for which the particular "T" is being calculated. 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.

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 by the International Commission on Radiological Units and Measurements (ICRU).

Executive Secretary - means the Executive Secretary of the Drinking Water Board.

Gross Alpha Particle Activity - means the total radioactivity due to alpha particle emission as inferred from measurements on a dry sample.

Gross Beta Particle Activity - means the total radioactivity due to beta particle emission as inferred from measurements on a dry sample.

Ground Water Sources - means a source of culinary water captured underground. This term includes wells and springs.

Legionella - means a genus of bacteria, some species of which have caused a type of pneumonia called Legionnaires Disease.

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.

Maximum Contaminant Level - The maximum permissible level of a contaminant in water which is delivered to any user of a public water system.

Non-Community Water System - means a public water system that is not a community water system or a non-transient non-community water system.

Non-Transient, Non-Community Water System - means a public water system that is not a community water system and that regularly serves at least 25 of the same persons for more than six months per year. Examples are separate systems serving workers and schools.

PCBs - means a group of chemicals that contain polychlorinated biphenyl.

Picocurie (pCi) - means that quantity of radioactive material producing 2.22 nuclear transformations per minute.

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.

Public Water System - means a system, either publicly or privately owned, providing water for human consumption and other domestic uses which has at least fifteen service connections, or regularly serves an average of at least twenty-five individuals for at least sixty days out of the year. Such term includes collection, treatment, storage and distribution facilities under control of the operator and used primarily in connection with the system. Additionally, the term includes collection, pretreatment or storage facilities used primarily in connection with system but not under such control.

Rem - means the unit of 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.

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

Shall - means that a particular action is obliged and has to be accomplished.

Should - means that a particular action is recommended but does not have to be accomplished.

Secondary Maximum Contaminant Level - means the advisable maximum level of contaminant in water which is delivered to any user of a public water system.

SOCs - means synthetic organic chemicals.

Surface Water Sources - means a source of culinary water which lies or travels on the surface prior to its capture for use in a culinary water system.

Total Trihalomethanes (TTHM) - means the MCL for trihalomethanes. This is the sum of four of the ten possible isomers of chlorine/bromine/methane compounds, all known as trihalomethanes (THM). TTHM is defined as the arithmetic sum of the concentrations in micro grams per liter of only four of these, i.e. of chloroform, bromodichloromethane dibromochloromethane, and bromoform, rounded to two significant figures. This measurement is made by samples which are "quenched", meaning that a chlorine neutralizing agent has

been added, preventing further THM formation in the samples.

Trihalomathanes (THM) - means any one or all members of this class of organic compounds.

Trihalomathane Formation Potential (THMFP) - these samples are collected just following disinfection and measure the highest possible TTHM value to be expected in the water distribution system. The formation potential is measured by not neutralizing the disinfecting agent at the time of collection, but storing the sample seven days at 25 degrees C prior to analysis. A chlorine residual must be present in these samples at the end of the seven day period prior to analysis for the samples to be considered valid for this test. Samples without a residual at the end of this period must be resampled if this test is desired.

Turbidity Unit - means that unit of measurement used in the nephelometric method of water analysis. This method is Nephelometric Method - Nephelometric Turbidity Unit as set forth in the latest edition of Standard Methods for Examination of Water and Wastewater, 1985, American Public Health Association et al., (Method 214A, pp. 134-136 in the 16th edition).

Unregulated Contaminant - A known or suspected disease causing contaminant for which no maximum contaminant level has been established.

Virus - means a virus of fecal origin which is infectious to humans by waterborne transmission.

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R309. Environmental Quality, Drinking Water.
R309-104. Monitoring, Reporting and Public Notification.
R309-104-1. General.

All public water systems are required to monitor their water to determine if they comply with the requirements for water quality stated in R309-103 of these regulations. In exceptional circumstances the Executive Secretary may modify the monitoring requirements given herein as is deemed appropriate.

The Executive Secretary may determine compliance or initiate compliance actions based upon analytical results and other information compiled by authorized representatives.

If the water fails to meet these minimum standards, then certain notification procedures must be carried out, as outlined in R309-104-7. Water suppliers must also keep analytical records in their possession, for a required length of time, as outlined in R309-104-7.

Unless otherwise required by the Board, the dates on which required monitoring shall be initiated are identical to those in 40 C.F.R. Sec 141, July 1, 1993.

In no event shall the Executive Secretary authorize modifications in the monitoring requirements which are less stringent than requirements established by the Federal Safe Drinking Water Act.

R309-104-2. Exemptions From Monitoring Requirements.

The applicable requirements for monitoring shall apply to each public water system, unless the public water system meets all of the following conditions:

a. Consists only of distribution and storage facilities (and does not have any collection and treatment facilities);

b. Obtains all of its water from, but is not owned or operated by, a public water system to which such regulations apply;

c. Does not sell water to any person; and

d. Is not a carrier which conveys passengers in interstate commerce.

Furthermore, when a public water system supplies water to one or more other public water systems, the Executive Secretary may modify the monitoring requirements imposed by R309-104 to the extent that the interconnection of the systems justifies treating them as a single system for monitoring purposes.

R309-104-3. Approved Laboratories.

For the purpose of determining compliance, samples may be considered only if they have been analyzed by the State of Utah primacy laboratory or a laboratory approved by the Utah State Health Laboratory. However, measurements for pH, temperature, turbidity and disinfectant residual may, under the direction of the direct responsible charge operator, be performed by any water supplier or their representative.

R309-104-4. Water Quality Monitoring Requirements.

4.1 Inorganic Contaminants.

Community, non-transient non-community, and non-community water systems shall conduct monitoring as specified to determine compliance with the maximum contaminant levels specified in R309-103-2 in accordance with this section.

4.1.1 Monitoring shall be conducted as follows:

a. Groundwater systems shall take a minimum of one sample at every entry point to the distribution system which is representative of each well after treatment (hereafter called a sampling point) beginning in the compliance period starting January 1, 1993. The system shall take each sample at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.

b. Surface water systems shall take a minimum of one sample at every entry point to the distribution system after any application of treatment or in the distribution system at a point which is representative of each source after treatment (hereafter called a sampling point) beginning in the compliance period beginning January 1, 1993. The system shall take each sample at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant. (Note: For purposes of this paragraph, surface water systems include systems with a combination of surface and ground sources.)

c. If a system draws water from more than one source and the sources are combined before distribution, the system must sample at an entry point to the distribution system during periods of normal operating conditions (i.e., when water is representative of all sources being used).

d. The frequency of monitoring for asbestos shall be in accordance with R309-104-4.1.2; the frequency of monitoring for antimony, arsenic, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium, sodium, sulfate, thallium, and total dissolved solids shall be in accordance with R309-104-4.1.3; the frequency of monitoring for nitrate shall be in accordance with R309-104-4.1.4; the

frequency of monitoring for nitrite shall be in accordance with R309-104-4.1.5.

4.1.2 The frequency of monitoring conducted to determine compliance with the maximum contaminant level for asbestos specified in R309-103-2.1 shall be conducted as follows:

a. Each community and non-transient non-community water system is required to monitor for asbestos during the first three-year compliance period of each nine-year compliance cycle beginning in the compliance period starting January 1, 1993.

b. If the system believes it is not vulnerable to either asbestos contamination in its source water or due to corrosion of asbestos-cement pipe, or both, it may apply to the Executive Secretary for a waiver of the monitoring requirement in paragraph 4.1.2.a. of this section. If the Executive Secretary grants the waiver, the system is not required to monitor for asbestos.

c. The Executive Secretary may grant a waiver based on a consideration of the following factors:

1. Potential asbestos contamination of the water source, and

2. The use of asbestos-cement pipe for finished water distribution and the corrosive nature of the water.

d. A waiver remains in effect until the completion of the three-year compliance period. Systems not receiving a waiver must monitor in accordance with the provisions of paragraph 4.1.2.a. of this section.

e. A system vulnerable to asbestos contamination due solely to corrosion of asbestos-cement pipe shall take one sample at a tap served by asbestos-cement pipe and under conditions where asbestos contamination is most likely to occur.

f. A system vulnerable to asbestos contamination due solely to source water shall monitor in accordance with the provision of paragraph 4.1.1. of this section.

g. A system vulnerable to asbestos contamination due both to its source water supply and corrosion of asbestos-cement pipe shall take one sample at a tap served by asbestos-cement pipe and under conditions where asbestos contamination is most likely to occur.

h. A system which exceeds the maximum contaminant levels as determined in R309-104-4.1.8. shall monitor quarterly beginning in the next quarter after the violation occurred.

i. The Executive Secretary may decrease the quarterly monitoring requirement to the frequency specified in paragraph 4.1.2.a. of this section provided the Executive Secretary has determined that the system is reliably and consistently below the maximum contaminant level. In no case can the Executive Secretary make this determination unless a groundwater system takes a minimum of two quarterly samples and a surface (or combined surface/ground) water system takes a minimum of four quarterly samples.

j. If monitoring data collected after January 1, 1990 are generally consistent with the requirements of R309-104-4.1.2., then the Executive Secretary may allow systems to use that data to satisfy the monitoring requirement for the initial compliance period beginning January 1, 1993.

4.1.3. The frequency of monitoring conducted to determine compliance with the maximum contaminant levels in R309-103-2.1. for antimony, arsenic, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium, sodium, sulfate, thallium and total dissolved solids shall be as follows:

a. Each community and non-transient non-community groundwater system shall take one sample at each sampling point once every three years. Each community and non-transient non-community surface water system (or combined surface/ground) shall take one sample annually at each sampling point. Each non-community system shall take one sample for sulfate only at each sampling point once every three years for both groundwater and surface water systems.

b. The system may apply to the Executive Secretary for a waiver from the monitoring frequencies specified in paragraph 4.1.3.a. of this section. A waiver from the monitoring requirements for arsenic shall not be available.

c. A condition of the waiver shall require that a system shall take a minimum of one sample while the waiver is effective. The term during which the waiver is effective shall not exceed one compliance cycle (i.e., nine years).

d. The Executive Secretary may grant a waiver provided surface water systems have monitored annually for at least three years and groundwater systems have conducted a minimum of three rounds of monitoring. (At least one sample shall have been taken since January 1, 1990.) Both surface and groundwater systems shall demonstrate that all previous analytical results were less than the maximum contaminant level. Systems that use a new water source are not eligible for a waiver until three rounds of monitoring from the new source have been completed.

e. In determining the appropriate reduced monitoring frequency, the Executive Secretary shall consider:

1. Reported concentrations from all previous monitoring;

2. The degree of variation in reported concentrations; and

3. Other factors which may affect contaminant concentrations such as changes in

groundwater pumping rates, changes in the system's configuration, changes in the system's operating procedures, or changes in stream flows or characteristics.

f. A decision by the Executive Secretary to grant a waiver shall be made in writing and shall set forth the basis for the determination. The determination may be initiated by the Executive Secretary or upon an application by the public water system. The public water system shall specify the basis for its request. The Executive Secretary shall review and, where appropriate, revise its determination of the appropriate monitoring frequency when the system submits new monitoring data or when other data relevant to the system's appropriate monitoring frequency become available.

g. Systems which exceed the maximum contaminant levels as calculated in R309-104-4.1.8. of this section shall monitor quarterly beginning in the next quarter after the violation occurred.

h. The Executive Secretary may decrease the quarterly monitoring requirement to the frequencies specified in paragraphs 4.1.3.a. and 4.1.3.b. of this section provided it has determined that the system is reliably and consistently below the maximum contaminant level. In no case can the Executive Secretary make this determination unless a groundwater system takes a minimum of two quarterly samples and a surface water system takes a minimum of four quarterly samples.

4.1.4. All public water systems (community; non-transient non-community; and non-community systems) shall monitor to determine compliance with the maximum contaminant level for nitrate in R309-103-2.1.

a. Community and non-transient non-community water systems served by groundwater systems shall monitor annually beginning January 1, 1993; systems served by surface water shall monitor quarterly beginning January 1, 1993.

b. For community and non-transient non-community water systems, the repeat monitoring frequency for ground water systems shall be quarterly for at least one year following any one sample in which the concentration is greater than or equal to 50 percent of the MCL. The Executive Secretary may allow a groundwater system to reduce the sampling frequency to annually after four consecutive quarterly samples are reliably and consistently less than the MCL.

c. For community and non-transient non-community water systems, the Executive Secretary may allow a surface water system to reduce the sampling frequency to annually if all analytical results from four consecutive quarters are less than 50 percent of the MCL. A surface water system shall return to quarterly monitoring if any one sample is greater than or equal to 50 percent of the MCL.

d. Each non-community water system shall monitor annually beginning January 1, 1993.

e. After the initial round of quarterly sampling is completed, each community and non-transient non-community system which is monitoring annually shall take subsequent samples during the quarter(s) which previously resulted in the highest analytical result.

4.1.5. All public water systems (community; non-transient non-community; and non-community systems) shall monitor to determine compliance with the maximum contaminant level for nitrite in R309-103-2.1.

a. All public water systems shall take one sample at each sampling point in the compliance period beginning January 1, 1993 and ending December 31, 1995.

b. After the initial sample, systems where an analytical result for nitrite is less than 50 percent of the MCL shall monitor at the frequency specified by the Executive Secretary.

c. For community, non-transient non-community, and non-community water systems, the repeat monitoring frequency for any water system shall be quarterly for at least one year following any one sample in which the concentration is greater than or equal to 50 percent of the MCL. The Executive Secretary may allow a system to reduce the sampling frequency to annually after determining the system is reliably and consistently less than the MCL.

d. Systems which are monitoring annually shall take each subsequent sample during the quarter(s) which previously resulted in the highest analytical result.

4.1.6 Confirmation samples:

a. Where the results of sampling for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium, sulfate, thallium or total dissolved solids indicate an exceedance of the maximum contaminant level, the Executive Secretary may require that one additional sample be collected as soon as possible after the initial sample was taken (but not to exceed two weeks) at the same sampling point.

b. Where nitrate or nitrite sampling results indicate an exceedance of the maximum contaminant level, the system shall take a confirmation sample within 24 hours of the system's receipt of notification of the analytical results of the first sample. Systems unable to comply with the 24-hour sampling requirement must immediately notify the consumers in the area served by the public water system source in accordance with R309-104-7.1.a. Systems exercising this option must take and analyze a confirmation sample within two weeks of notification of the analytical results of the first sample.

c. Procedures if the Secondary Standard for Fluoride is Exceeded Notification of

State and/or Public.

If the result of an analysis indicates that the level of fluoride exceeds the Secondary Drinking Water Standard, the supplier of water shall give notice as required in R309-104-7.

d. The results of the initial and confirmation sample(s) taken for any contaminant, shall be averaged. The resulting average shall be used to determine the system's compliance in accordance with paragraph 4.1.8. of this section. The Executive Secretary has the discretion to delete results of obvious sampling errors.

4.1.7. The Executive Secretary may require more frequent monitoring than specified in paragraphs 4.1.2., 4.1.3., 4.1.4. and 4.1.5. of this section or may require confirmation samples for positive and negative results. The Executive Secretary may also require an appropriate treatment process.

4.1.8. Compliance with R309-103-2.1. shall be determined based on the analytical result(s) obtained at each sampling point.

a. For systems which are conducting monitoring at a frequency greater than annual, compliance with the maximum contaminant levels for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium, sulfate, thallium and total dissolved solids is determined by a running annual average at each sampling point. If the average at any sampling point is greater than the MCL, then the system is out of compliance. If any one sample would cause the annual average to be exceeded, then the system is out of compliance immediately. Any sample below the detection limit shall be calculated at zero for the purpose of determining the annual average.

b. For systems which are monitoring annually, or less frequently, the system is out of compliance with the maximum contaminant levels for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium, sulfate, thallium and total dissolved solids if the level of a contaminant at any sampling point is greater than the MCL. If a confirmation sample is required by the Executive Secretary, the determination of compliance will be based on the average of the two samples.

c. Compliance with the maximum contaminant levels for nitrate and nitrite is determined based on one sample. If the levels of nitrate and/or nitrite exceed the MCLs in the initial sample, a confirmation sample is required in accordance with paragraph 4.1.6.b. of this section, and compliance shall be determined based on the average of the initial and confirmation samples.

d. If a public water system has a distribution system separable from other parts of the distribution system with no interconnections, the Executive Secretary may allow the system to give public notice to only the area served by that portion of the system which is out of compliance.

4.1.9. Each public water system shall monitor at the time designated by the Executive Secretary during each compliance period.

4.2 Lead and Copper

4.2.1 General requirements.

a. Applicability and effective dates

1. The requirements of R309-104-4.2. unless otherwise indicated, apply to community water systems and non-transient non-community water systems (hereinafter referred to as water systems or systems).

2. The requirements in R309-104-4.2.2., R309-104-4.2.4, and R309-104-4.2.7. shall take effect December 7, 1992.

b. R309-104-4.2. establishes a treatment technique that includes requirements for corrosion control treatment, source water treatment, lead service line replacement, and public education. These requirements are triggered, in some cases, by lead and copper action levels measured in samples collected at consumers' taps.

c. Corrosion control treatment requirements

1. All water systems shall install and operate optimal corrosion control treatment. However, any water system that complies with the applicable corrosion control treatment requirements specified by the Executive Secretary under R309-104-4.2.2 and R309-104-4.2.4.a. shall be deemed in compliance with this treatment requirement.

d. Source water treatment requirements

Any system exceeding the lead or copper action level shall implement all applicable source water treatment requirements specified by the Executive Secretary under R309-104-4.2.4.b.

e. Lead service line replacement requirements

Any system exceeding the lead action level after implementation of applicable corrosion control and source water treatment requirements shall complete the lead service line replacement requirements contained in R309-104-4.2.4.c.

f. Public education requirements

Any system exceeding the lead action level shall implement the public education requirements contained in R309-104-4.2.7.

g. Monitoring and analytical requirements

Tap water monitoring for lead and copper, monitoring for water quality parameters, source water monitoring for lead and copper, and analyses of the monitoring results shall be completed in compliance with R309-104-4.2.3., R309-104-4.2.6. and R309-104-3.

h. Reporting requirements

Systems shall report to the Executive Secretary any information required by the treatment provisions of this subpart and R309-104-4.2.8.

i. Recordkeeping requirements

Systems shall maintain records in accordance with R309-104-8.b.

j. Violation of primary drinking water rules

Failure to comply with the applicable requirements of R309-104-4.2., including requirements established by the Executive Secretary pursuant to these provisions, shall constitute a violation of the primary drinking water regulations for lead and/or copper.

4.2.2. Applicability of corrosion control treatment steps to small, medium-size and large water systems.

a. Systems shall complete the applicable corrosion control treatment requirements described in R309-104-4.2.4.a. by the deadlines established in this section.

1. A large system (serving greater than 50,000 persons) shall complete the corrosion control treatment steps specified in R309-104-4.2.2.d., unless it is deemed to have optimized corrosion control under R309-104-4.2.2.b.2. or b.3.

2. A small system (serving less than 3300 persons) and a medium-size system (serving greater than 3,300 and less than 50,000 persons) shall complete the corrosion control treatment steps specified in R309-104-4.2.2.e., unless it is deemed to have optimized corrosion control under R309-104-4.2.2.b.1., b.2., or b.3.

b. A system is deemed to have optimized corrosion control and is not required to complete the applicable corrosion control treatment steps identified in this section if the system satisfies one of the following criteria:

1. A small or medium-size water system is deemed to have optimized corrosion control if the system meets the lead and copper action levels during each of two consecutive six-month monitoring periods conducted in accordance with R309-104-4.2.3.

2. Any water system may be deemed by the Executive Secretary to have optimized corrosion control treatment if the system demonstrates to the satisfaction of the Executive Secretary that it has conducted activities equivalent to the corrosion control steps applicable to such system under this section. If the Executive Secretary makes this determination, it shall provide the system with written notice explaining the basis for its decision and shall specify the water quality control parameters representing optimal corrosion control in accordance with R309-104-4.2.4.a.6. A system shall provide the Executive Secretary with the following information in order to support a determination under this paragraph:

(a) the results of all test samples collected for each of the water quality parameters in R309-104-4.2.4.a.3(c).

(b) a report explaining the test methods used by the water system to evaluate the corrosion control treatments listed in R309-104-4.2.4.a.3(a), the results of all tests conducted, and the basis for the system's selection of optimal corrosion control treatment;

(c) a report explaining how corrosion control has been installed and how it is being maintained to insure minimal lead and copper concentrations at consumers' taps; and

(d) the results of tap water samples collected in accordance with R309-104-4.2.3 at least once every six months for one year after corrosion control has been installed.

3. Any water system is deemed to have optimized corrosion control if it submits results of tap water monitoring conducted in accordance with R309-104-4.2.3 and source water monitoring conducted in accordance with R309-104-4.2.6 that demonstrates for two consecutive six-month monitoring periods that the difference between the 90th percentile tap water lead level computed under R309-103-2.4.c., and the highest source water lead concentration, is less than the Practical Quantitation Level (PQL) for lead as specified in R309-104-3.

c. Any small or medium-size water system that is required to complete the corrosion control steps due to its exceedance of the lead or copper action level may cease completing the treatment steps whenever the system meets both action levels during each of two consecutive monitoring periods conducted pursuant to R309-104-4.2.3 and submits the results to the Executive Secretary. If any such water system thereafter exceeds the lead or copper action level during any monitoring period, the system (or the Executive Secretary, as the case may be) shall recommence completion of the applicable treatment steps, beginning with the first treatment step which was not previously completed in its entirety. The Executive Secretary may require a system to repeat treatment steps previously completed by the system where the Executive Secretary determines that this is necessary to implement properly the treatment requirements of this section. The Executive Secretary shall notify the system in writing of such a determination and explain the basis for its decision.

d. Treatment steps and deadlines for large systems

Except as provided in R309-104-4.2.2.b.2. and b.3., large systems shall complete the following corrosion control treatment steps by the indicated dates.

1. Step 1: The system shall conduct initial monitoring (R309-104-4.2.3.d.1 and R309-104-4.2.5.b) during two consecutive six-month monitoring periods by January 1, 1993.

2. Step 2: The system shall complete corrosion control studies (R309-104-4.2.4.a.3.) by July 1, 1994.

3. Step 3: The Executive Secretary shall designate optimal corrosion control treatment (R309-104-4.2.4.a.4.) by January 1, 1995.

4. Step 4: The system shall install optimal corrosion control treatment (R309-104-4.2.4.a.5.) by January 1, 1997.

5. Step 5: The system shall complete follow-up sampling (R309-104-4.2.3.d.2 and R309-104-4.2.5.c.) by January 1, 1998.

6. Step 6: The Executive Secretary shall review installation of treatment and designate optimal water quality control parameters (R309-104-4.2.4.a.6.) by July 1, 1998.

7. Step 7: The system shall operate in compliance with the State-specified optimal water quality control parameters (R309-104-4.2.4.a.7.) and continue to conduct tap sampling (R309-104-4.2.3.d.3 and R309-104-4.2.5.d).

e. Treatment steps and deadlines for small and medium-size systems

Except as provided in R309-104-4.2.2.b., small and medium-size systems shall complete the following corrosion control treatment steps by the indicated time periods.

1. Step 1: The system shall conduct initial tap sampling (R309-104-4.2.3.d.1 and R309-104-4.2.5.b) until the system either exceeds the lead or copper action level or becomes eligible for reduced monitoring under R309-104-4.2.3.d.4. A system exceeding the lead or copper action level shall recommend optimal corrosion control treatment (R309-104-4.2.4.a.1.) within six months after it exceeds one of the action levels.

2. Step 2: Within 12 months after a system exceeds the lead or copper action level, the Executive Secretary may require the system to perform corrosion control studies (R309-104-4.2.4.a.2.). If the Executive Secretary does not require the system to perform such studies, the Executive Secretary shall specify optimal corrosion control treatment (R309-104-4.2.4.a.4.) within the following time-frames:

(a) for medium-size systems, within 18 months after such system exceeds the lead or copper action level,

(b) for small systems, within 24 months after such system exceeds the lead or copper action level.

3. Step 3: If the Executive Secretary requires a system to perform corrosion control studies under step 2, the system shall complete the studies (R309-104-4.2.4.a.3.) within 18 months after the Executive Secretary requires that such studies be conducted.

4. Step 4: If the system has performed corrosion control studies under step 2, the Executive Secretary shall designate optimal corrosion control treatment (R309-104-4.2.4.a.4.) within 6 months after completion of step 3.

5. Step 5: The system shall install optimal corrosion control treatment (R309-104-4.2.4.a.5.) within 24 months after the Executive Secretary designates such treatment.

6. Step 6: The system shall complete follow-up sampling (R309-104-4.2.3.d.2 and R309-104-4.2.5.c) within 36 months after the Executive Secretary designates optimal corrosion control treatment.

7. Step 7: The Executive Secretary shall review the system's installation of treatment and designate optimal water quality control parameters (R309-104-4.2.4.a.6.) within 6 months after completion of step 6.

8. Step 8: The system shall operate in compliance with the Executive Secretary-designated optimal water quality control parameters (R309-104-4.2.4.a.7.) and continue to conduct tap sampling (R309-104-4.2.3.d.3 and R309-104-4.2.5.d).

4.2.3. Monitoring requirements for lead and copper in tap water.

a. Sample site location

1. By the applicable date for commencement of monitoring under R309-104-4.2.3.d.1., each water system shall complete a materials evaluation of its distribution system in order to identify a pool of targeted sampling sites that meets the requirements of this section, and which is sufficiently large to ensure that the water system can collect the number of lead and copper tap samples required in R309-104-4.2.3.c. All sites from which first draw samples are collected shall be selected from this pool of targeted sampling sites. Sampling sites may not include faucets that have point-of-use or point-of-entry treatment devices designed to remove inorganic contaminants.

2. A water system shall use the information on lead, copper, and galvanized steel when conducting a materials evaluation. When an evaluation of this information is insufficient to locate the requisite number of lead and copper sampling sites that meet the targeting criteria in R309-104-4.2.3.a., the water system shall review the sources of information listed below in order to identify a sufficient number of sampling sites. In addition, the system shall seek to collect such information where possible in the course of its normal operations (e.g., checking service line materials when reading water meters

or performing maintenance activities):

(a) all plumbing codes, permits, and records in the files of the building department(s) which indicate the plumbing materials that are installed within publicly and privately owned structures connected to the distribution system;

(b) all inspections and records of the distribution system that indicate the material composition of the service connections that connect a structure to the distribution system; and

(c) all existing water quality information, which includes the results of all prior analyses of the system or individual structures connected to the system, indicating locations that may be particularly susceptible to high lead or copper concentrations.

3. The sampling sites selected for a community water system's sampling pool ("tier 1 sampling sites") shall consist of single family structures that:

(a) contain copper pipes with lead solder installed after 1982 or contain lead pipes; and/or

(b) are served by a lead service line.

When multiple-family residences comprise at least 20 percent of the structures served by a water system, the system may include these types of structures in its sampling pool.

4. Any community water system with insufficient tier 1 sampling sites shall complete its sampling pool with "tier 2 sampling sites", consisting of buildings, including multiple-family residences that:

(a) contain copper pipes with lead solder installed after 1982 or contain lead pipes; and/or

(b) are served by a lead service line.

5. Any community water system with insufficient tier 1 and tier 2 sampling sites shall complete its sampling pool with "tier 3 sampling sites", consisting of single family structures that contain copper pipes with lead solder installed before 1983.

6. The sampling sites selected for a non-transient non-community water system ("tier 1 sampling sites") shall consist of buildings that:

(a) contain copper pipes with lead solder installed after 1982 or contain lead pipes; and/or

(b) are served by a lead service line.

7. A non-transient non-community water system with insufficient tier 1 sites that meet the targeting criteria in R309-104-4.2.3.a.6. shall complete its sampling pool with sampling sites that contain copper pipes with lead solder installed before 1983.

8. Any water system whose sampling pool does not consist exclusively of tier 1 sites shall demonstrate in a letter submitted to the Executive Secretary under R309-104-4.2.8.a.2. why a review of the information listed in R309-104-4.2.3.a.2. was inadequate to locate a sufficient number of tier 1 sites. Any community water system which includes tier 3 sampling sites in its sampling pool shall demonstrate in such a letter why it was unable to locate a sufficient number of tier 1 and tier 2 sampling sites.

9. Any water system whose distribution system contains lead service lines shall draw 50 percent of the samples it collects during each monitoring period from sites that contain lead pipes, or copper pipes with lead solder, and 50 percent of the samples from sites served by a lead service line. A water system that cannot identify a sufficient number of sampling sites served by a lead service line shall demonstrate in a letter submitted to the Executive Secretary under R309-104-4.2.8.a.4. why the system was unable to locate a sufficient number of such sites. Such a water system shall collect first draw samples from all of the sites identified as being served by such lines.

b. Sample collection methods

1. All tap samples for lead and copper collected in accordance with this section, with the exception of lead service line samples collected under R309-104-4.2.4.c.3., shall be first draw samples.

2. Each first-draw tap sample for lead and copper shall be one liter in volume and have stood motionless in the plumbing system of each sampling site for at least six hours. First draw samples from residential housing shall be collected from the cold-water kitchen tap or bathroom sink tap. First-draw samples from a non-residential building shall be collected at an interior tap from which water is typically drawn for consumption. First draw samples may be collected by the system or the system may allow residents to collect first draw samples after instructing the residents of the sampling procedures specified in this paragraph. To avoid problems with residents handling nitric acid, acidification of first draw samples may be done up to fourteen days after the sample is collected. If the sample is not acidified immediately after collection, then the sample must stand in the original container for at least 28 hours after acidification. If a system allows residents to perform sampling, the system may not challenge, based on alleged errors in sample collection, the accuracy of sampling results.

3. Each service line sample shall be one liter in volume and have stood motionless in the lead service line for at least six hours. Lead service line samples shall be collected in one of the following three ways:

(a) at the tap after flushing the volume of water between the tap and the lead service line. The volume of water shall be calculated based on the interior diameter and length of the pipe between the tap and the lead service line;

(b) tapping directly into the lead service line; or

(c) if the sampling site is a building constructed as a single-family residence, allowing the water to run until there is a significant change in temperature which would be indicative of water that has been standing in the lead service line.

4. A water system shall collect each first draw tap sample from the same sampling site from which it collected a previous sample. If, for any reason, the water system cannot gain entry to a sampling site in order to collect a follow-up tap sample, the system may collect the follow-up tap sample from another sampling site in its sampling pool as long as the new site meets the same targeting criteria, and is within reasonable proximity of the original site.

c. Number of samples

Water systems shall collect at least one sample during each monitoring period specified in R309-104-4.2.3.d. from the number of sites listed in the first column in Table 104-1 ("standard monitoring"). A system conducting reduced monitoring under R309-104-4.2.3.d.4. may collect one sample from the number of sites specified in the second column in Table 104-1 during each monitoring period specified in R309-104-4.2.3.d.4.

TABLE 104-1
NUMBER OF LEAD AND COPPER SAMPLING SITES

System Size (# People Served)	# of sites (Standard Monitoring)	# of sites (Reduced Monitoring)
Greater than 100,000	100	50
10,001-100,000	60	30
3,301 to 10,000	40	20
501 to 3,300	20	10
101 to 500	10	5
100 or less	5	5

d. Timing of monitoring

1. Initial tap sampling

The first six-month monitoring period for small, medium-size and large systems shall begin on the following dates in Table 104-2:

TABLE 104-2
INITIAL LEAD AND COPPER MONITORING PERIODS

System Size (# People Served)	First six-month Monitoring Period Begins On
Greater than 50,000	January 1, 1992
3,301 to 50,000	July 1, 1992
3,300 or less	July 1, 1993

(a) All large systems shall monitor during two consecutive six-month periods.

(b) All small and medium-size systems shall monitor during each six-month monitoring period until:

(1) the system exceeds the lead or copper action level and is therefore required to implement the corrosion control treatment requirements under R309-104-4.2.2, in which case the system shall continue monitoring in accordance with R309-104-4.2.3.d.2., or

(2) the system meets the lead and copper action levels during two consecutive six-month monitoring periods, in which case the system may reduce monitoring in accordance with R309-104-4.2.3.d.4.

2. Monitoring after installation of corrosion control and source water treatment

(a) Any large system which installs optimal corrosion control treatment pursuant to R309-104-4.2.2.d.4. shall monitor during two consecutive six-month monitoring periods by the date specified in R309-104-4.2.2.d.5.

(b) Any small or medium-size system which installs optimal corrosion control treatment pursuant to R309-104-4.2.2.e.5. shall monitor during two consecutive six-month monitoring periods by the date specified in R309-104-4.2.2.e.6.

(c) Any system which installs source water treatment pursuant to R309-104-4.2.4.b.1(c) shall monitor during two consecutive six-month monitoring periods by the date specified in R309-104-4.2.4.b.1(d).

3. Monitoring after State specifies water quality parameter values for optimal

corrosion control

After the Executive Secretary specifies the values for water quality control parameters under R309-104-4.2.4.a.6., the system shall monitor during each subsequent six-month monitoring period, with the first monitoring period to begin on the date the Executive Secretary specifies the optimal values under R309-104-4.2.4.a.6.

4. Reduced monitoring

(a) A small or medium-size water system that meets the lead and copper action levels during each of two consecutive six-month monitoring periods may reduce the number of samples in accordance with R309-104-4.2.3.c., Table 104-1, and reduce the frequency of sampling to once per year.

(b) Any water system that maintains the range of values for the water quality control parameters reflecting optimal corrosion control treatment specified by the Executive Secretary under R309-104-4.2.4.a.6. during each of two consecutive six-month monitoring periods may request that the Executive Secretary allow the system to reduce the frequency of monitoring to once per year and to reduce the number of lead and copper samples in accordance with R309-104-4.2.3.c., Table 104-1. The Executive Secretary shall review the information submitted by the water system and shall make its decision in writing, setting forth the basis for its determination. The Executive Secretary shall review, and where appropriate, revise its determination when the system submits new monitoring or treatment data, or when other data relevant to the number and frequency of tap sampling becomes available.

(c) A small or medium-size water system that meets the lead and copper action levels during three consecutive years of monitoring may reduce the frequency of monitoring for lead and copper from annually to once every three years. Any water system that maintains the range of values for the water quality control parameters reflecting optimal corrosion control treatment specified by the Executive Secretary under R309-104-4.2.4.a.6. during three consecutive years of monitoring may request that the Executive Secretary allow the system to reduce the frequency of monitoring from annually to once every three years. The Executive Secretary shall review the information submitted by the water system and shall make its decision in writing, setting forth the basis for its determination. The Executive Secretary shall review, and where appropriate, revise its determination when the system submits new monitoring or treatment data, or when other data relevant to the number and frequency of tap sampling becomes available.

(d) A water system that reduces the number and frequency of sampling shall collect these samples from sites included in the pool of targeted sampling sites identified in R309-104-4.2.3.a. Systems sampling annually or less frequently shall conduct the lead and copper tap sampling during the months of June, July, August or September.

(e) A small or medium-size water system subject to reduced monitoring that exceeds the lead or copper action level shall resume sampling in accordance R309-104-4.2.3.d.3. and collect the number of samples specified for standard monitoring under R309-104-4.2.3.c., Table 104-1. Such system shall also conduct water quality parameter monitoring in accordance with R309-104-4.2.5.b., c. or d. (as appropriate) during the monitoring period in which it exceeded the action level. Any water system subject to the reduced monitoring frequency that fails to operate within the range of values for the water quality parameters specified by the Executive Secretary under R309-104-4.2.4.a.6. shall resume tap water sampling in accordance with R309-104-4.2.3.d.3. and collect the number of samples specified for standard monitoring under R309-104-4.2.3.c., Table 104-1.

e. Additional monitoring by systems

The results of any monitoring conducted in addition to the minimum requirements of this section shall be considered by the system and the Executive Secretary in making any determinations (i.e., calculating the 90th percentile lead or copper level).

f. The Executive Secretary has the authority to allow the use of previously collected monitoring data for purposes of monitoring, if the data were collected in accordance with this section and analyzed in accordance with R309-104-3.

4.2.4. Corrosion Control for Control of Lead and Copper

a. Description of corrosion control treatment requirements.

Each system shall complete the corrosion control treatment requirements described below which are applicable to such system under R309-104-4.2.2.

1. System recommendation regarding corrosion control treatment

Based upon the results of lead and copper tap monitoring and water quality parameter monitoring, small and medium-size water systems exceeding the lead or copper action level shall recommend installation of one or more of the corrosion control treatments listed in R309-104-4.2.4.a.3(a) which the system believes constitutes optimal corrosion control for that system. The Executive Secretary may require the system to conduct additional water quality parameter monitoring in accordance with R309-104-4.2.5.b. to assist the Executive Secretary in reviewing the system's recommendation.

2. Studies of corrosion control treatment required for small and medium-size systems.

The Executive Secretary may require any small or medium-size system that exceeds the

lead or copper action level to perform corrosion control studies under R309-104-4.2.4.a.3. to identify optimal corrosion control treatment for the system.

3. Performance of corrosion control studies

(a) Any public water system performing corrosion control studies shall evaluate the effectiveness of each of the following treatments, and, if appropriate, combinations of the following treatments to identify the optimal corrosion control treatment for that system:

(1) alkalinity and pH adjustment;

(2) calcium hardness adjustment; and

(3) the addition of a phosphate or silicate based corrosion inhibitor at a concentration sufficient to maintain an effective residual concentration in all test tap samples.

(b) The water system shall evaluate each of the corrosion control treatments using either pipe rig/loop tests, metal coupon tests, partial-system tests, or analyses based on documented analogous treatments with other systems of similar size, water chemistry and distribution system configuration.

(c) The water system shall measure the following water quality parameters in any tests conducted under this paragraph before and after evaluating the corrosion control treatments listed above:

(1) lead;

(2) copper;

(3) pH;

(4) alkalinity;

(5) calcium;

(6) conductivity;

(7) orthophosphate (when an inhibitor containing a phosphate compound is used);

(8) silicate (when an inhibitor containing a silicate compound is used);

(9) water temperature.

(d) The water system shall identify all chemical or physical constraints that limit or prohibit the use of a particular corrosion control treatment and document such constraints with at least one of the following:

(1) data and documentation showing that a particular corrosion control treatment has adversely affected other water treatment processes when used by another water system with comparable water quality characteristics; and/or

(2) data and documentation demonstrating that the water system has previously attempted to evaluate a particular corrosion control treatment and has found that the treatment is ineffective or adversely affects other water quality treatment processes.

(e) The water system shall evaluate the effect of the chemicals used for corrosion control treatment on other water quality treatment processes.

(f) On the basis of an analysis of the data generated during each evaluation, the water system shall recommend to the Executive Secretary in writing the treatment option that the corrosion control studies indicate constitutes optimal corrosion control treatment for that system. The water system shall provide a rationale for its recommendation along with all supporting documentation specified in R309-104-4.2.4.a.3.(a) through R309-104-4.2.4.a.3.(e).

4. Designation of optimal corrosion control treatment

(a) Based upon consideration of available information including, where applicable, studies performed under R309-104-4.2.4.a.3. and a system's recommended treatment alternative, the Executive Secretary shall either approve the corrosion control treatment option recommended by the system, or designate alternative corrosion control treatment(s) from among those listed in R309-104-4.2.4.a.3.(a). When designating optimal treatment the Executive Secretary shall consider the effects that additional corrosion control treatment will have on water quality parameters and on other water quality treatment processes.

(b) The Executive Secretary shall notify the system of its decision on optimal corrosion control treatment in writing and explain the basis for this determination. If the Executive Secretary requests additional information to aid its review, the water system shall provide the information.

5. Installation of optimal corrosion control

Each system shall properly install and operate throughout its distribution system the optimal corrosion control treatment designated by the Executive Secretary under R309-104-4.2.4.a.4.

6. Review of treatment and specification of optimal water quality control parameters

The Executive Secretary shall evaluate the results of all lead and copper tap samples and water quality parameter samples submitted by the water system and determine whether the system has properly installed and operated the optimal corrosion control treatment designated by the Executive Secretary in R309-104-4.2.4.a.4. Upon reviewing the results of tap water and water quality parameter monitoring by the system, both before and after the system installs optimal corrosion control treatment, the Executive Secretary shall designate:

(a) A minimum value or a range of values for pH measured at each entry point to the distribution system;

(b) A minimum pH value, measured in all tap samples. Such value shall be equal to or greater than 7.0, unless the Executive Secretary determines that meeting a pH level of 7.0 is not technologically feasible or is not necessary for the system to optimize corrosion control;

(c) If a corrosion inhibitor is used, a minimum concentration or a range of concentrations for the inhibitor, measured at each entry point to the distribution system and in all tap samples, that the Executive Secretary determines is necessary to form a passivating film on the interior walls of the pipes of the distribution system;

(d) If alkalinity is adjusted as part of optimal corrosion control treatment, a minimum concentration or a range of concentrations for alkalinity, measured at each entry point to the distribution system and in all tap samples;

(e) If calcium carbonate stabilization is used as part of corrosion control, a minimum concentration or a range of concentrations for calcium, measured in all tap samples.

The values for the applicable water quality control parameters listed above shall be those that the Executive Secretary determines to reflect optimal corrosion control treatment for the system. The Executive Secretary may designate values for additional water quality control parameters determined by the Executive Secretary to reflect optimal corrosion control for the system. The Executive Secretary shall notify the system in writing of these determinations and explain the basis for the decisions.

7. Continued Operation and Monitoring

All systems shall maintain water quality parameter values at or above minimum values or within ranges designated by the Executive Secretary under R309-104-4.2.4.a.6. in each sample collected under R309-104-4.2.5.d. If the water quality parameter value of any sample is below the minimum value or outside the range designated by the Executive Secretary, then the system is out of compliance with this paragraph. As specified in R309-104-4.2.5.d., the system may take a confirmation sample for any water quality parameter value no later than 3 days after the first sample. If a confirmation sample is taken, the result must be averaged with the first sampling result and the average must be used for any compliance determinations under this paragraph. The Executive Secretary has the discretion to delete results of obvious sampling errors from this calculation.

8. Modification of treatment decisions

Upon its own initiative or in response to a request by a water system or other interested party, the Executive Secretary may modify its determination of the optimal corrosion control treatment under R309-104-4.2.4.a.4. or optimal water quality control parameters under R309-104-4.2.4.a.6. A request for modification by a system or other interested party shall: be in writing, explain why the modification is appropriate, and provide supporting documentation. The Executive Secretary may modify its determination where it concludes that such change is necessary to ensure that the system continues to optimize corrosion control treatment. A revised determination shall: be made in writing, set forth the new treatment requirements, explain the basis for the Executive Secretary's decision, and provide an implementation schedule for completing the treatment modifications.

b. Source water treatment requirements.

Systems shall complete the applicable source water monitoring and treatment requirements (described in the referenced portions of R309-104-4.2.4.b.2., and in R309-104-4.2.3., and R309-104-4.2.6.) by the following deadlines.

1. Deadlines for Completing Source Water Treatment Steps

(a) Step 1: A system exceeding the lead or copper action level shall complete lead and copper source water monitoring (R309-104-4.2.6.b.) and make a treatment recommendation to the Executive Secretary (R309-104-4.2.4.b.2.(a)) within 6 months after exceeding the lead or copper action level.

(b) Step 2: The Executive Secretary shall make a determination regarding source water treatment (R309-104-4.2.4.b.2(b)) within 6 months after submission of monitoring results under step 1.

(c) Step 3: If the Executive Secretary requires installation of source water treatment, the system shall install the treatment (R309-104-4.2.4.b.2(c)) within 24 months after completion of step 2.

(d) Step 4: The system shall complete follow-up tap water monitoring (R309-104-4.2.3.d.2.) and source water monitoring (R309-104-4.2.6.c.) within 36 months after completion of step 2.

(e) Step 5: The Executive Secretary shall review the system's installation and operation of source water treatment and specify maximum permissible source water levels (R309-104-4.2.4.b.2(d)) within 6 months after completion of step 4.

(f) Step 6: The system shall operate in compliance with the State-specified maximum permissible lead and copper source water levels (R309-104-4.2.4.b.2(d)) and continue source water monitoring (R309-104-4.2.6.d.).

2. Description of Source Water Treatment Requirements

(a) System treatment recommendation

Any system which exceeds the lead or copper action level shall recommend in writing to the Executive Secretary the installation and operation of one of the source water treatments listed in R309-104-4.2.4.b.2(b). A system may recommend that no treatment be installed based upon a demonstration that source water treatment is not necessary to minimize lead and copper levels at users' taps.

(b) Determination regarding source water treatment

The Executive Secretary shall complete an evaluation of the results of all source water samples submitted by the water system to determine whether source water treatment is necessary to minimize lead or copper levels in water delivered to users' taps. If the Executive Secretary determines that treatment is needed, the Executive Secretary shall either require installation and operation of the source water treatment recommended by the system (if any) or require the installation and operation of another source water treatment from among the following: ion exchange, reverse osmosis, lime softening or coagulation/filtration. If the Executive Secretary requests additional information to aid in its review, the water system shall provide the information by the date specified by the Executive Secretary in its request. The Executive Secretary shall notify the system in writing of its determination and set forth the basis for its decision.

(c) Installation of source water treatment

Each system shall properly install and operate the source water treatment designated by the Executive Secretary under R309-104-4.2.4.b.2(b).

(d) Review of source water treatment and specification of maximum permissible source water levels

The Executive Secretary shall review the source water samples taken by the water system both before and after the system installs source water treatment, and determine whether the system has properly installed and operated the source water treatment designated by the Executive Secretary. Based upon its review, the Executive Secretary shall designate the maximum permissible lead and copper concentrations for finished water entering the distribution system. Such levels shall reflect the contaminant removal capability of the treatment properly operated and maintained. The Executive Secretary shall notify the system in writing and explain the basis for its decision.

(e) Continued operation and maintenance

Each water system shall maintain lead and copper levels below the maximum permissible concentrations designated by the Executive Secretary at each sampling point monitored in accordance with R309-104-4.2.6. The system is out of compliance with this paragraph if the level of lead or copper at any sampling point is greater than the maximum permissible concentration designated by the Executive Secretary.

(f) Modification of treatment decisions

Upon its own initiative or in response to a request by a water system or other interested party, the Executive Secretary may modify its determination of the source water treatment under R309-104-4.2.4.b.2(b), or maximum permissible lead and copper concentrations for finished water entering the distribution system under R309-104-4.2.4.b.2(d). A request for modification by a system or other interested party shall: be in writing, explain why the modification is appropriate, and provide supporting documentation. The Executive Secretary may modify the determination where it concludes that such change is necessary to ensure that the system continues to minimize lead and copper concentrations in source water. A revised determination shall: be made in writing, set forth the new treatment requirements, explain the basis for the Executive Secretary's decision, and provide an implementation schedule for completing the treatment modifications.

c. Lead service line replacement requirements.

1. Systems that fail to meet the lead action level in tap samples taken pursuant to R309-104-4.2.3.d.2., after installing corrosion control and/or source water treatment (whichever sampling occurs later), shall replace lead service lines in accordance with the requirements of this section. If a system is in violation of R309-104-4.2.2. or R309-104-4.2.4.b. for failure to install source water or corrosion control treatment, the Executive Secretary may require the system to commence lead service line replacement under this section after the date by which the system was required to conduct monitoring under R309-104-4.2.3.d.2. has passed.

2. A system shall replace annually at least 7 percent of the initial number of lead service lines in its distribution system. The initial number of lead service lines is the number of lead lines in place at the time the replacement program begins. The system shall identify the initial number of lead service lines in its distribution system based upon a materials evaluation, including the evaluation required under R309-104-4.2.3.a. The first year of lead service line replacement shall begin on the date the action level was exceeded in tap sampling referenced in R309-104-4.2.4.c.1.

3. A system is not required to replace an individual lead service line if the lead concentration in all service line samples from that line, taken pursuant to

R309-104-4.2.3.b.3., is less than or equal to 0.015 mg/l.

4. A water system shall replace the entire service line (up to the building inlet) unless it demonstrates to the satisfaction of the Executive Secretary under R309-104-4.2.4.c.5. that it controls less than the entire service line. In such cases, the system shall replace the portion of the line which the Executive Secretary determines is under the system's control. The system shall notify the user served by the line that the system will replace the portion of the service line under its control and shall offer to replace the building owner's portion of the line, but is not required to bear the cost of replacing the building owner's portion of the line. For buildings where only a portion of the lead service line is replaced, the water system shall inform the resident(s) that the system will collect a first flush tap water sample after partial replacement of the service line is completed if the resident(s) so desire. In cases where the resident(s) accept the offer, the system shall collect the sample and report the results to the resident(s) within 14 days following partial lead service line replacement.

5. A water system is presumed to control the entire lead service line (up to the building inlet) unless the system demonstrates to the satisfaction of the Executive Secretary, in a letter submitted under R309-104-4.2.8.e.4., that it does not have any of the following forms of control over the entire line (as defined by state statutes, municipal ordinances, public service contracts or other applicable legal authority): authority to set standards for construction, repair, or maintenance of the line, authority to replace, repair, or maintain the service line, or ownership of the service line. The Executive Secretary shall review the information supplied by the system and determine whether the system controls less than the entire service line and, in such cases, shall determine the extent of the system's control. The Executive Secretary's determination shall be in writing and explain the basis for the decision.

6. The Executive Secretary shall require a system to replace lead service lines on a shorter schedule than that required by this section, taking into account the number of lead service lines in the system, where such a shorter replacement schedule is feasible. The Executive Secretary shall make this determination in writing and notify the system of its finding within 6 months after the system is triggered into lead service line replacement based on monitoring referenced in R309-104-4.2.4.c.1.

7. Any system may cease replacing lead service lines whenever first draw samples collected pursuant to R309-104-4.2.3.b.2. meet the lead action level during each of two consecutive monitoring periods and the system submits the results to the Executive Secretary. If first draw tap samples collected in any such water system thereafter exceeds the lead action level, the system shall recommence replacing lead service lines, pursuant to R309-104-4.2.4.c.2.

8. To demonstrate compliance with R309-104-4.2.4.c.1 through R309-104-4.2.4.c.4., a system shall report to the Executive Secretary the information specified in R309-104-4.2.8.e.

4.2.5. Monitoring requirements for water quality parameters.

All large water systems and all small and medium-size systems that exceed the lead or copper action level shall monitor water quality parameters in addition to lead and copper in accordance with this section.

a. General Requirements

1. Sample collection methods

(a) Tap samples shall be representative of water quality throughout the distribution system taking into account the number of persons served, the different sources of water, the different treatment methods employed by the system, and seasonal variability. Tap sampling under this section is not required to be conducted at taps targeted for lead and copper sampling under R309-104-4.2.3.a.

(b) Samples collected at the entry point(s) to the distribution system shall be from locations representative of each source after treatment. If a system draws water from more than one source and the sources are combined before distribution, the system must sample at an entry point to the distribution system during periods of normal operating conditions (i.e., when water is representative of all sources being used).

2. Number of samples

(a) Systems shall collect two tap samples for applicable water quality parameters during each monitoring period specified under R309-104-4.2.5.b. through R309-104-4.2.5.e. from the following number of sites in Table 104-3.

TABLE 104-3
NUMBER OF WATER QUALITY PARAMETER SAMPLE SITES

System Size (# People Served)	# of Sites For Water Quality Parameters
Greater than 100,000	25
10,001-100,000	10
3,301 to 10,000	3

501 to 3,300	2
101 to 500	1
100 or less	1

(b) Systems shall collect two samples for each applicable water quality parameter at each entry point to the distribution system during each monitoring period specified in R309-104-4.2.5.b. Systems shall collect one sample for each applicable water quality parameter at each entry point to the distribution system during each monitoring period specified in R309-104-4.2.5.c. through R309-104-4.2.5.e.

b. Initial Sampling

All large water systems shall measure the applicable water quality parameters as specified below at taps and at each entry point to the distribution system during each six-month monitoring period specified in R309-104-4.2.3.d.1. All small and medium-size systems shall measure the applicable water quality parameters at the locations specified below during each six-month monitoring period specified in R309-104-4.2.3.d.1. during which the system exceeds the lead or copper action level.

1. At taps:

(a) pH;

(b) alkalinity;

(c) orthophosphate, when an inhibitor containing a phosphate compound is used;

(d) silica, when an inhibitor containing a silicate compound is used;

(e) calcium;

(f) conductivity; and

(g) water temperature.

2. At each entry point to the distribution system: all of the applicable parameters listed in R309-104-4.2.5.b.1.

c. Monitoring after installation of corrosion control

Any large system which installs optimal corrosion control treatment pursuant to R309-104-4.2.2.d.4. shall measure the water quality parameters at the locations and frequencies specified below during each six-month monitoring period specified in R309-104-4.2.3.d.2(a). Any small or medium-size system which installs optimal corrosion control treatment shall conduct such monitoring during each six-month monitoring period specified in R309-104-4.2.3.d.2(b) in which the system exceeds the lead or copper action level.

1. At taps, two samples for:

(a) pH;

(b) alkalinity;

(c) orthophosphate, when an inhibitor containing a phosphate compound is used;

(d) silica, when an inhibitor containing a silicate compound is used;

(e) calcium, when calcium carbonate stabilization is used as part of corrosion control.

2. At each entry point to the distribution system, one sample every two weeks (bi-weekly) for:

(a) pH;

(b) when alkalinity is adjusted as part of optimal corrosion control, a reading of the dosage rate of the chemical used to adjust alkalinity, and the alkalinity concentration; and

(c) when a corrosion inhibitor is used as part of optimal corrosion control, a reading of the dosage rate of the inhibitor used, and the concentration of orthophosphate or silica (whichever is applicable).

d. Monitoring after Executive Secretary specifies water quality parameter values for optimal corrosion control.

After the Executive Secretary specifies the values for applicable water quality control parameters reflecting optimal corrosion control treatment under R309-104-4.2.4.a.6., all large systems shall measure the applicable water quality parameters in accordance with R309-104-4.2.5.c. during each monitoring period specified in R309-104-4.2.3.d.3. Any small or medium-size system shall conduct such monitoring during each monitoring period specified in R309-104-4.2.3.d.3. in which the system exceeds the lead or copper action level. The system may take a confirmation sample for any water quality parameter value no later than 3 days after the first sample. If a confirmation sample is taken, the result must be averaged with the first sampling result and the average must be used for any compliance determinations under R309-104-4.2.4.a.7. The Executive Secretary has the discretion to delete results of obvious sampling or laboratory errors from this calculation.

e. Reduced monitoring

1. Any water system that maintains the range of values for the water quality parameters reflecting optimal corrosion control treatment during each of two consecutive six-month monitoring periods under R309-104-4.2.5.d. shall continue monitoring at the entry point(s) to the distribution system as specified in R309-104-4.2.5.c.2. Such system

may collect two tap samples for applicable water quality parameters from the following reduced number of sites in Table 104-4 during each six-month monitoring period.

TABLE 104-4
REDUCED NUMBER OF WATER QUALITY PARAMETER SAMPLE SITES

System Size (# People Served)	Reduced # of Sites for Water Quality Parameters
Greater than 100,000	10
10,001 to 100,000	7
3,301 to 10,000	3
501 to 3,300	2
101 to 500	1
100 or less	1

2. Any water system that maintains the range of values for the water quality parameters reflecting optimal corrosion control treatment specified by the Executive Secretary under R309-104-4.2.4.a.6. during three consecutive years of monitoring may reduce the frequency with which it collects the number of tap samples for applicable water quality parameters specified in R309-104-4.2.5.e.1., Table 104-4, from every six months to annually. Any water system that maintains the range of values for the water quality parameters reflecting optimal corrosion control treatment specified by the Executive Secretary under R309-104-4.2.4.a.6. during three consecutive years of annual monitoring may reduce the frequency with which it collects the number of tap samples for applicable water quality parameters specified in R309-104-4.2.5.e.1., Table 104-4, from annually to every three years.

3. A water system that conducts sampling annually shall collect these samples evenly throughout the year so as to reflect seasonal variability.

4. Any water system subject to the reduced monitoring frequency that fails to operate within the range of values for the water quality parameters specified by the Executive Secretary in R309-104-4.2.4.a.6. shall resume tap water sampling in accordance with the number and frequency requirements in R309-104-4.2.5.d.

f. Additional monitoring by systems

The results of any monitoring conducted in addition to the minimum requirements of this section shall be considered by the system and the Executive Secretary in making any determinations (i.e., determining concentrations of water quality parameters) under this section or R309-104-4.2.4.a.

g. The Executive Secretary has the authority to allow the use of previously collected monitoring data for purposes of monitoring, if the data were collected in accordance with this section and analyzed in accordance with R309-104-3.

4.2.6 Monitoring requirements for lead and copper in source water.

a. Sample location, collection methods, and number of samples

1. A water system that fails to meet the lead or copper action level on the basis of tap samples collected in accordance with R309-104-4.2.3 shall collect lead and copper source water samples in accordance with the requirements regarding sample location, number of samples, and collection methods specified in R309-104-4.3.1.a. - d. at the time intervals specified in R309-104-4.2.6.b. and c.

2. Where the results of sampling indicate an exceedance of maximum permissible source water levels established under R309-104-4.2.4.b.2(d), the Executive Secretary may require that one additional sample be collected as soon as possible after the initial sample was taken (but not to exceed two weeks) at the same sampling point. If a confirmation sample is taken for lead or copper, then the results of the initial and confirmation sample shall be averaged in determining compliance with the specified maximum permissible levels. Any sample value below the detection limit shall be considered to be zero. Any value above the detection limit but below the PQL shall either be considered as the measured value or be considered one-half the PQL.

b. Monitoring frequency after system exceeds tap water action level.

Any system which exceeds the lead or copper action level at the tap shall collect one source water sample from each entry point to the distribution system within six months after the exceedance.

c. Monitoring frequency after installation of source water treatment.

Any system which installs source water treatment pursuant to R309-104-4.2.4.b.1(c) shall collect an additional source water sample from each entry point to the distribution system during two consecutive six-month monitoring periods by the deadline specified in R309-104-4.2.4.b.1(d).

d. Monitoring frequency after Executive Secretary specifies maximum permissible source water levels or determines that source water treatment is not needed

1. A system shall monitor at the frequency specified below in cases where the

Executive Secretary specifies maximum permissible source water levels under R309-104-4.2.4.b.2(d) or determines that the system is not required to install source water treatment under R309-104-4.2.4.b.2(b).

(a) A water system using only groundwater shall collect samples once during the three-year compliance period in effect when the applicable determination under R309-104-4.2.6.d.1. is made. Such systems shall collect samples once during each subsequent compliance period.

(b) A water system using surface water (or a combination of surface and groundwater) shall collect samples once during each year, the first annual monitoring period to begin on the date on which the applicable determination is made under R309-104-4.2.6.d.1.

2. A system is not required to conduct source water sampling for lead and/or copper if the system meets the action level for the specific contaminant in tap water samples during the entire source water sampling period applicable to the system under R309-104-4.2.6.d.1(a) or (b).

e. Reduced monitoring frequency

1. A water system using only groundwater which demonstrates that finished drinking water entering the distribution system has been maintained below the maximum permissible lead and/or copper concentrations specified by the Executive Secretary in R309-104-4.2.4.b.2(d) during at least three consecutive compliance periods under R309-104-4.2.6.d.1. may reduce the monitoring frequency for lead and/or copper to once during each nine-year compliance cycle.

2. A water system using surface water (or a combination of surface and ground waters) which demonstrates that finished drinking water entering the distribution system has been maintained below the maximum permissible lead and copper concentrations specified by the Executive Secretary in R309-104-4.2.4.b.2(d) for at least three consecutive years may reduce the monitoring frequency in R309-104-4.2.6.d.1. to once during each nine-year compliance cycle.

3. A water system that uses a new source of water is not eligible for reduced monitoring for lead and/or copper until concentrations in samples collected from the new source during three consecutive monitoring periods are below the maximum permissible lead and copper concentrations specified by the Executive Secretary in R309-104-4.2.4.b.1(e).

4. The Executive Secretary has the authority to allow the use of previously collected monitoring data for purposes of monitoring, if the data were collected in accordance with this section and analyzed in accordance with R309-104-3.

4.2.7 Public education and supplemental monitoring requirements.

A water system that exceeds the lead action level based on tap water samples collected in accordance with R309-104-4.2.3 shall deliver the public education materials contained in R309-104-4.2.7.a. and b. in accordance with the requirements in R309-104-4.2.7.c.

a. Content of written materials. A water system shall include the following text in all of the printed materials it distributes through its lead public education program. Any additional information presented by a system shall be consistent with the information below and be in plain English that can be understood by laypersons.

1. INTRODUCTION

The United States Environmental Protection Agency (EPA) and (insert name of water supplier) are concerned about lead in your drinking water. Although most homes have very low levels of lead in their drinking water, some homes in the community have lead levels above the EPA action level of 15 parts per billion (ppb), or 0.015 milligrams of lead per liter of water (mg/l). Under Federal law we are required to have a program in place to minimize lead in your drinking water by (insert date when corrosion control will be completed for your system). This program includes corrosion control treatment, source water treatment, and public education. We are also required to replace each lead service line that we control if the line contributes lead concentrations of more than 15 ppb after we have completed the comprehensive treatment program. If you have any questions about how we are carrying out the requirements of the lead regulation please give us a call at (insert water system's phone number). This brochure explains the simple steps you can take to protect you and your family by reducing your exposure to lead in drinking water.

2. HEALTH EFFECTS OF LEAD

Lead is a common metal found throughout the environment in lead-based paint, air, soil, household dust, food, certain types of pottery porcelain and pewter, and water. Lead can pose a significant risk to your health if too much of it enters your body. Lead builds up in the body over many years and can cause damage to the brain, red blood cells and kidneys. The greatest risk is to young children and pregnant women. Amounts of lead that won't hurt adults can slow down normal mental and physical development of growing bodies. In addition, a child at play often comes into contact with sources of lead contamination -- like dirt and dust -- that rarely affect an adult. It is important to wash children's hands and toys often, and to try to make sure they only put food in their mouths.

3. LEAD IN DRINKING WATER

(a) Lead in drinking water, although rarely the sole cause of lead poisoning, can

significantly increase a person's total lead exposure, particularly the exposure of infants who drink baby formulas and concentrated juices that are mixed with water. The EPA estimates that drinking water can make up 20 percent or more of a person's total exposure to lead.

(b) Lead is unusual among drinking water contaminants in that it seldom occurs naturally in water supplies like rivers and lakes. Lead enters drinking water primarily as a result of the corrosion, or wearing away, of materials containing lead in the water distribution system and household plumbing. These materials include lead-based solder used to join copper pipe, brass and chrome plated brass faucets, and in some cases, pipes made of lead that connect your house to the water main (service lines). In 1986, Congress banned the use of lead solder containing greater than 0.2% lead, and restricted the lead content of faucets, pipes and other plumbing materials to 8.0%.

(c) When water stands in lead pipes or plumbing systems containing lead for several hours or more, the lead may dissolve into your drinking water. This means the first water drawn from the tap in the morning, or later in the afternoon after returning from work or school, can contain fairly high levels of lead.

4. STEPS YOU CAN TAKE IN THE HOME TO REDUCE EXPOSURE TO LEAD IN DRINKING WATER

(a) Despite our best efforts mentioned earlier to control water corrosivity and remove lead from the water supply, lead levels in some homes or buildings can be high. To find out whether you need to take action in your own home, have your drinking water tested to determine if it contains excessive concentrations of lead. Testing the water is essential because you cannot see, taste, or smell lead in drinking water. Some local laboratories that can provide this service are listed at the end of this booklet. For more information on having your water tested, please call (insert phone number of water system).

(b) If a water test indicates that the drinking water drawn from a tap in your home contains lead above 15 ppb, then you should take the following precautions:

(1) Let the water run from the tap before using it for drinking or cooking any time the water in a faucet has gone unused for more than six hours. The longer water resides in your home's plumbing the more lead it may contain. Flushing the tap means running the cold water faucet until the water gets noticeably colder, usually about 15-30 seconds. If your house has a lead service line to the water main, you may have to flush the water for a longer time, perhaps one minute, before drinking. Although toilet flushing or showering flushes water through a portion of your home's plumbing system, you still need to flush the water in each faucet before using it for drinking or cooking. Flushing tap water is a simple and inexpensive measure you can take to protect your family's health. It usually uses less than one or two gallons of water and costs less than (insert a cost estimate based on flushing two times a day for 30 days) per month. To conserve water, fill a couple of bottles for drinking water after flushing the tap, and whenever possible use the first flush water to wash the dishes or water the plants. If you live in a high-rise building, letting the water flow before using it may not work to lessen your risk from lead. The plumbing systems have more, and sometimes larger pipes than smaller buildings. Ask your landlord for help in locating the source of the lead and for advice on reducing the lead level.

(2) Try not to cook with, or drink water from the hot water tap. Hot water can dissolve more lead more quickly than cold water. If you need hot water, draw water from the cold tap and heat it on the stove.

(3) Remove loose lead solder and debris from the plumbing materials installed in newly constructed homes, or homes in which the plumbing has recently been replaced, by removing the faucet strainers from all taps and running the water from 3 to 5 minutes. Thereafter, periodically remove the strainers and flush out any debris that has accumulated over time.

(4) If your copper pipes are joined with lead solder that has been installed illegally since it was banned in 1986, notify the plumber who did the work and request that he or she replace the lead solder with lead-free solder. Lead solder looks dull gray, and when scratched with a key looks shiny. In addition, notify your local plumbing inspector and the State Department of Commerce about the violation.

(5) Determine whether or not the service line that connects your home or apartment to the water main is made of lead. The best way to determine if your service line is made of lead is by either hiring a licensed plumber to inspect the line or by contacting the plumbing contractor who installed the line. You can identify the plumbing contractor by checking the city's record of building permits which should be maintained in the files of the (insert name of department that issues building permits). A licensed plumber can at the same time check to see if your homes's plumbing contains lead solder, lead pipes, or pipe fittings that contain lead. The public water system that delivers water to your home should also maintain records of the materials located in the distribution system. If the service line that connects your dwelling to the water main contributes more than 15 ppb to drinking water, after our comprehensive treatment program is in place, we are required to replace the line. If the line is only partially controlled by the (insert name of the

city, county, or water system that controls the line), we are required to provide you with information on how to replace your portion of the service line, and offer to replace that portion of the line at your expense and take a follow-up tap water sample within 14 days of the replacement. Acceptable replacement alternatives include copper, steel, iron, and plastic pipes.

(6) Have an electrician check your wiring. If grounding wires from the electrical system are attached to your pipes, corrosion may be greater. Check with a licensed electrician or your local electrical code to determine if your wiring can be grounded elsewhere. DO NOT attempt to change the wiring yourself because improper grounding can cause electrical shock and fire hazards.

(c) The steps described above will reduce the lead concentrations in your drinking water. However, if a water test indicates that the drinking water coming from your tap contains lead concentrations in excess of 15 ppb after flushing, or after we have completed our actions to minimize lead levels, then you may want to take the following additional measures:

(1) Purchase or lease a home treatment device. Home treatment devices are limited in that each unit treats only the water that flows from the faucet to which it is connected, and all of the devices require periodic maintenance and replacement. Devices such as reverse osmosis systems or distillers can effectively remove lead from your drinking water. Some activated carbon filters may reduce lead levels at the tap, however all lead reduction claims should be investigated. Be sure to check the actual performance of a specific home treatment device before and after installing the unit.

(2) Purchase bottled water for drinking and cooking.

(d) You can consult a variety of sources for additional information. Your family doctor or pediatrician can perform a blood test for lead and provide you with information about the health effects of lead. State and local government agencies that can be contacted include:

(1) (insert the name of city or county department of public utilities) at (insert phone number) can provide you with information about your community's water supply, and a list of local laboratories that have been certified by EPA for testing water quality;

(2) (insert the name of city or county department that issues building permits) at (insert phone number) can provide you with information about building permit records that should contain the names of plumbing contractors that plumbed your home; and

(3) The State Division of Drinking Water at 538-6159 or the (insert the name of the city or county health department) at (insert phone number) can provide you with information about the health effects of lead and how you can have your child's blood tested.

(e) The following is a list of some State approved laboratories in your area that you can call to have your water tested for lead. (Insert names and phone numbers of at least two laboratories).

b. Content of broadcast materials. A water system shall include the following information in all public service announcements submitted under its lead public education program to television and radio stations for broadcasting:

1. Why should everyone want to know the facts about lead and drinking water? Because unhealthy amounts of lead can enter drinking water through the plumbing in your home. That's why I urge you to do what I did. I had my water tested for (insert free or $ per sample). You can contact the (insert the name of the city or water system) for information on testing and on simple ways to reduce your exposure to lead in drinking water.

2. To have your water tested for lead, or to get more information about this public health concern, please call (insert the phone number of the city or water system).

c. Delivery of a public education program

1. In communities where a significant proportion of the population speaks a language other than English, public education materials shall be communicated in the appropriate language(s).

2. A community water system that fails to meet the lead action level on the basis of tap water samples collected in accordance with R309-104-4.2.3. shall, within 60 days:

(a) insert notices in each customer's water utility bill containing the information in R309-104-4.2.7.a., along with the following alert on the water bill itself in large print: "SOME HOMES IN THIS COMMUNITY HAVE ELEVATED LEAD LEVELS IN THEIR DRINKING WATER. LEAD CAN POSE A SIGNIFICANT RISK TO YOUR HEALTH. PLEASE READ THE ENCLOSED NOTICE FOR FURTHER INFORMATION."

(b) submit the information in R309-104-4.2.7.a. to the editorial departments of the major daily and weekly newspapers circulated throughout the community.

(c) deliver pamphlets and/or brochures that contain the public education materials in R309-104-4.2.7.a.2. and a.4. to facilities and organizations, including the following:

(1) public schools and/or local school boards;

(2) city or county health department;

(3) Women, Infants, and Children and/or Head Start Program(s) whenever available;

(4) public and private hospitals and/or clinics;
(5) pediatricians;
(6) family planning clinics; and
(7) local welfare agencies.

(d) submit the public service announcement in R309-104-4.2.7.b. to at least five of the radio and television stations with the largest audiences that broadcast to the community served by the water system.

3. A community water system shall repeat the tasks contained in Subsections R309-104-4.2.7.c.2.(a), (b) and (c) every 12 months, and the tasks contained in Subsection R309-104-4.2.7.c.2.(d) every 6 months for as long as the system exceeds the lead action level.

4. Within 60 days after it exceeds the lead action level, a non-transient non-community water system shall deliver the public education materials contained in R309-104-4.2.7.a.1., 2., and 4. as follows:

(a) post informational posters on lead in drinking water in a public place or common area in each of the buildings served by the system; and

(b) distribute informational pamphlets and/or brochures on lead in drinking water to each person served by the non-transient non-community water system.

5. A non-transient non-community water system shall repeat the tasks contained in R309-104-4.2.7.c.4. at least once during each calendar year in which the system exceeds the lead action level.

6. A water system may discontinue delivery of public education materials if the system has met the lead action level during the most recent six-month monitoring period conducted pursuant to R309-104-4.2.3. Such a system shall recommence public education in accordance with this section if it subsequently exceeds the lead action level during any monitoring period.

d. Supplemental monitoring and notification of results.

A water system that fails to meet the lead action level on the basis of tap samples collected in accordance with R309-104-4.2.3 shall offer to sample the tap water of any customer who requests it. The system is not required to pay for collecting or analyzing the sample, nor is the system required to collect and analyze the sample itself.

4.2.8. Reporting requirements.

All water systems shall report all of the following information to the Executive Secretary in accordance with this section.

a. Reporting requirements for tap water monitoring for lead and copper and for water quality parameter monitoring

1. A water system shall report the information specified below for all tap water samples within the first 10 days following the end of each applicable monitoring period specified in R309-104-4.2.3 and R309-104-4.2.5 and R309-104-4.2.6 (i.e., every six-months, annually, or every 3 years).

(a) the results of all tap samples for lead and copper including the location of each site and the criteria under R309-104-4.2.3a.3.,4.,5.,6., and 7. under which the site was selected for the system's sampling pool;

(b) a certification that each first draw sample collected by the water system is one-liter in volume and, to the best of their knowledge, has stood motionless in the service line, or in the interior plumbing of a sampling site, for at least six hours;

(c) where residents collected samples, a certification that each tap sample collected by the residents was taken after the water system informed them of proper sampling procedures specified in R309-104-4.2.3.b.2;

(d) the 90th percentile lead and copper concentrations measured from among all lead and copper tap water samples collected during each monitoring period;

(e) with the exception of initial tap sampling conducted pursuant to R309-104-4.2.3.d.1, the system shall designate any site which was not sampled during previous monitoring periods, and include an explanation of why sampling sites have changed;

(f) the results of all tap samples for pH, and where applicable, alkalinity, calcium, conductivity, temperature, and orthophosphate or silica collected under R309-104-4.2.5.b.-e.;

(g) the results of all samples collected at the entry point(s) to the distribution system for applicable water quality parameters under R309-104-4.2.5.b.- e.

2. By the applicable date in R309-104-4.2.3.d.1. for commencement of monitoring, each community water system which does not complete its targeted sampling pool with tier 1 sampling sites meeting the criteria in R309-104-4.2.3.a.3. shall send a letter to the Executive Secretary justifying its selection of tier 2 or tier 3 sampling sites under R309-104-4.2.3.a.4. and a.5.

3. By the applicable date in R309-104-4.2.3.d.1. for commencement of monitoring, each non-transient non-community water system which does not complete its sampling pool with tier 1 sampling sites meeting the criteria in R309-104-4.2.3.a.6. shall send a letter to the Executive Secretary justifying its selection of sampling sites under

R309-104-4.2.3.a.7.

4. By the applicable date in R309-104-4.2.3.d.1. for commencement of monitoring, each water system with lead service lines that is not able to locate the number of sites served by such lines required under R309-104-4.2.3.a.9. shall send a letter to the Executive Secretary demonstrating why it was unable to locate a sufficient number of such sites based upon the information listed in R309-104-4.2.3.a.2.

5. Each water system that requests that the Executive Secretary reduce the number and frequency of sampling shall provide the information required under R309-104-4.2.3.d.4.

b. Source water monitoring reporting requirements

1. A water system shall report the sampling results for all source water samples collected in accordance with R309-104-4.2.6. within the first 10 days following the end of each source water monitoring period (i.e., annually, per compliance period, per compliance cycle) specified in R309-104-4.2.6.

2. With the exception of the first round of source water sampling conducted pursuant to R309-104-4.2.6.b., the system shall specify any site which was not sampled during previous monitoring periods, and include an explanation of why the sampling point has changed.

c. Corrosion control treatment reporting requirements

By the applicable dates under R309-104-4.2.2., systems shall report the following information:

1. for systems demonstrating that they have already optimized corrosion control, information required in R309-104-4.2.2.b.2 or R309-104-4.2.2.b.3.

2. for systems required to optimize corrosion control, their recommendation regarding optimal corrosion control treatment under R309-104-4.2.4.a.1.

3. for systems required to evaluate the effectiveness of corrosion control treatments under R309-104-4.2.4.a.3., the information required by that paragraph.

4. for systems required to install optimal corrosion control designated by the Executive Secretary under R309-104-4.2.4.a.4., a letter certifying that the system has completed installing that treatment.

d. Source water treatment reporting requirements

By the applicable dates in R309-104-4.2.4.b., systems shall provide the following information to the Executive Secretary :

1. if required under R309-104-4.2.4.b.2(a), their recommendation regarding source water treatment;

2. for systems required to install source water treatment under R309-104-4.2.4.b.2(b), a letter certifying that the system has completed installing the treatment designated by the Executive Secretary within 24 months after the Executive Secretary designated the treatment.

e. Lead service line replacement reporting requirements

Systems shall report the following information to the Executive Secretary to demonstrate compliance with the requirements of R309-104-4.2.4.c:

1. Within 12 months after a system exceeds the lead action level in sampling referred to in R309-104-4.2.4.c.1., the system shall demonstrate in writing to the Executive Secretary that it has conducted a materials evaluation, including the evaluation in R309-104-4.2.3.a., to identify the initial number of lead service lines in its distribution system, and shall provide the Executive Secretary with the system's schedule for replacing annually at least 7 percent of the initial number of lead service lines in its distribution system.

2. Within 12 months after a system exceeds the lead action level in sampling referred to in R309-104-4.2.4.c.1., and every 12 months thereafter, the system shall demonstrate to the Executive Secretary in writing that the system has either:

(a) replaced in the previous 12 months at least 7 percent of the initial lead service lines (or a greater number of lines specified by the Executive Secretary under R309-104-4.2.4.c.6.) in its distribution system, or

(b) conducted sampling which demonstrates that the lead concentration in all service line samples from an individual line(s), taken pursuant to R309-104-4.2.3.b.3, is less than or equal to 0.015 mg/l. In such cases, the total number of lines replaced or which meet the criteria in R309-104-4.2.4.c.3. shall equal at least 7 percent of the initial number of lead lines identified under R309-104-4.2.8.a. (or the percentage specified by the Executive Secretary under R309-104-4.2.4.c.6.).

3. The annual letter submitted to the Executive Secretary under R309-104-4.2.8.e.2. shall contain the following information:

(a) the number of lead service lines scheduled to be replaced during the previous year of the system's replacement schedule;

(b) the number and location of each lead service line replaced during the previous year of the system's replacement schedule;

(c) if measured, the water lead concentration and location of each lead service line sampled, the sampling method, and the date of sampling.

4. As soon as practicable, but in no case later than three months after a system exceeds the lead action level in sampling referred to in R309-104-4.2.4.c.1., any system seeking to rebut the presumption that it has control over the entire lead service line pursuant to R309-104-4.2.4.c.4. shall submit a letter to the Executive Secretary describing the legal authority (e.g., state statutes, municipal ordinances, public service contracts or other applicable legal authority) which limits the system's control over the service lines and the extent of the system's control.

f. Public education program reporting requirements

By December 31st of each year, any water system that is subject to the public education requirements in R309-104-4.2.7. shall submit a letter to the Executive Secretary demonstrating that the system has delivered the public education materials that meet the requirements in R309-104-4.2.7.a. and b. and the delivery requirements in R309-104-4.2.7.c. This information shall include a list of all the newspapers, radio stations, television stations, facilities and organizations to which the system delivered public education materials during the previous year. The water system shall submit the letter required by this paragraph annually for as long as it exceeds the lead action level.

g. Reporting of additional monitoring data

Any system which collects sampling data in addition to that required by this subpart shall report the results to the Executive Secretary by the end of the applicable monitoring period under R309-104-4.2.3, R309-104-4.2.5 and R309-104-4.2.6. during which the samples are collected.

4.3 Organic Contaminants

For the purposes of R309-101. through R309-113., organic chemicals are divided into three categories: Pesticides/PCBs/SOCs, volatile organic contaminants (VOCs) and total trihalomethanes.

4.3.1 Pesticides/PCBs/SOCs monitoring requirements.

Analysis of the contaminants listed in R309-103-2.3.a for the purposes of determining compliance with the maximum contaminant level shall be conducted as follows:

a. Groundwater systems shall take a minimum of one sample at every entry point to the distribution system which is representative of each well after treatment (hereafter called a sampling point). Each sample must be taken at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.

b. Surface water systems shall take a minimum of one sample at points in the distribution system that are representative of each source or at each entry point to the distribution system after treatment (hereafter called a sampling point). Each sample must be taken at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant. (Note: For purposes of this paragraph, surface water systems include systems with a combination of surface and ground sources.)

c. If the system draws water from more than one source and the sources are combined before distribution, the system must sample at an entry point to the distribution system during periods of normal operating conditions (i.e., when water representative of all sources is being used).

d. Monitoring frequency:

1. Each community and non-transient non-community water system shall take four consecutive quarterly samples for each contaminant listed in R309-103-2.3.a during each compliance period beginning with the compliance period starting January 1, 1993. For systems serving less than 3,300, this requirement may be reduced to one sample if the sample is taken prior to October 1, 1993.

2. Systems serving more than 3,300 persons which do not detect a contaminant in the initial compliance period, may reduce the sampling frequency to a minimum of two quarterly samples in one year during each repeat compliance period.

3. Systems serving less than or equal to 3,300 persons which do not detect a contaminant in the initial compliance period may reduce the sampling frequency to a minimum of one sample during each repeat compliance period.

e. Each community and non-transient non-community water system may apply to the Executive Secretary for a waiver from the requirement of paragraph 4.3.1.d of this section. A system must reapply for a waiver for each compliance period.

f. The Executive Secretary may grant a waiver after evaluating the following factor(s): Knowledge of previous use (including transport, storage, or disposal) of the contaminant within the watershed or zone of influence of the system. If a determination by the Executive Secretary reveals no previous use of the contaminant within the watershed or zone of influence, a waiver may be granted. If previous use of the contaminant is unknown or it has been used previously, then the following factors shall be used to determine whether a waiver is granted.

1. Previous analytical results.

2. The proximity of the system to a potential point or non-point source of contamination. Point sources include spills and leaks of chemicals at or near a water treatment facility or at manufacturing, distribution, or storage facilities, or from

hazardous and municipal waste landfills and other waste handling or treatment facilities. Non-point sources include the use of pesticides to control insect and weed pests on agricultural areas, forest lands, home and gardens, and other land application uses.

3. The environmental persistence and transport of the pesticide or PCBs.

4. How well the water source is protected against contamination due to such factors as depth of the well and the type of soil and the integrity of the well casing and sanitary seal.

5. Elevated nitrate levels at the water supply source.

6. Use of PCBs in equipment used in the production, storage, or distribution of water (i.e., PCBs used in pumps, transformers, etc.).

g. If an organic contaminant listed in R309-103-2.3.a is detected in any sample, then:

1. Each system must monitor quarterly at each sampling point which resulted in a detection.

2. The Executive Secretary may decrease the quarterly monitoring requirement specified in paragraph 4.3.1.g.1 of this section provided it has determined that the system is reliably and consistently below the maximum contaminant level. In no case shall the Executive Secretary make this determination unless a groundwater system takes a minimum of two quarterly samples and a surface water system takes a minimum of four quarterly samples.

3. After the Executive Secretary determines the system is reliably and consistently below the maximum contaminant level the Executive Secretary may allow the system to monitor annually. Systems which monitor annually must monitor during the quarter that previously yielded the highest analytical result.

4. Systems which have 3 consecutive annual samples with no detection of a contaminant may apply to the Executive Secretary for a waiver as specified in paragraph 4.3.1.f of this section.

5. If monitoring results in detection of one or more of certain related contaminants (aldicarb, aldicarb sulfone, aldicarb sulfoxide and heptachlor, heptachlor epoxide), then subsequent monitoring shall analyze for all related contaminants.

h. Systems which violate the maximum contaminant levels of R309-103-2.3.a as determined by paragraph 4.3.1.j of this section must monitor quarterly. After a minimum of four quarterly samples show the system is in compliance and the Executive Secretary determines the system is reliably and consistently below the MCL, as specified in paragraph 4.3.1.j of this section, the system shall monitor at the frequency specified in paragraph 4.3.1.g.3 of this section.

i. The Executive Secretary may require a confirmation sample for positive or negative results. If a confirmation sample is required by the Executive Secretary, the result must be averaged with the first sampling result and the average used for the compliance determination as specified by paragraph 4.3.1.j of this section. The Executive Secretary has the discretion to delete results of obvious sampling errors from this calculation.

j. Compliance with the maximum contaminant levels in R309-103-2.3.a shall be determined based on the analytical results obtained at each sampling point.

1. For systems which are conducting monitoring at a frequency greater than annual, compliance is determined by a running annual average of all samples taken at each sampling point. If the annual average of any sampling point is greater than the MCL, then the system is out of compliance. If the initial sample or a subsequent sample would cause the annual average to be exceeded, then the system is out of compliance immediately. Any samples below the detection limit shall be calculated as zero for purposes of determining the annual average.

2. If monitoring is conducted annually, or less frequently, the system is out of compliance if the level of a contaminant at any sampling point is greater than the MCL. If a confirmation sample is required by the Executive Secretary, the determination of compliance will be based on the average of two samples.

3. If a public water system has a distribution system separable from other parts of the distribution system with no interconnections, the Executive Secretary may allow the system to give public notice to only that portion of the system which is out of compliance.

k. If monitoring data collected after January 1, 1990, are generally consistent with the other requirements of this section, then the Executive Secretary may allow systems to use that data to satisfy the monitoring requirement for the initial compliance period beginning January 1, 1993.

l. The Executive Secretary may increase the required monitoring frequency, where necessary, to detect variations within the system (e.g., fluctuations in concentration due to seasonal use, changes in water source).

m. The Executive Secretary has the authority to determine compliance or initiate enforcement action based upon analytical results and other information compiled by their sanctioned representatives and agencies.

n. Each public water system shall monitor at the time designated by the Executive

Secretary within each compliance period.

4.3.2 Volatile organic contaminants monitoring requirements.

Analysis of the contaminants listed in R309-103-2.3.b for the purpose of determining compliance with the maximum contaminant level shall be conducted as follows:

a. Groundwater systems shall take a minimum of one sample at every entry point to the distribution system which is representative of each well after treatment (hereafter called a sampling point). Each sample must be taken at the same sampling point unless conditions make another sampling point more representative of each source, treatment plant or within the distribution system.

b. Surface water systems (or combined surface/ground) shall take a minimum of one sample at points in the distribution system that are representative of each source or at each entry point to the distribution system after treatment (hereafter called a sampling point). Each sample must be taken at the same sampling point unless conditions make another sampling point more representative of each source, treatment plant, or within the distribution system.

c. If the system draws water from more than one source and the sources are combined before distribution, the system must sample at an entry point to the distribution system during periods of normal operating conditions (i.e., when water representative of all sources is being used).

d. Each community and non-transient non-community water system shall initially take four consecutive quarterly samples for each contaminant listed in R309-103-2.3.b.2 through b.21. during each compliance period beginning in the initial compliance period. For systems serving a population of less than 3,300, this requirement may be reduced to one sample if the sample is taken prior to October 1, 1993.

e. If the initial monitoring for contaminants listed in R309-103-2.3.b.2 through b.21. as allowed in paragraph 4.3.2.o has been completed by December 31, 1992, and the system did not detect any contaminant listed in R309-103-2.3.b, then each ground and surface water system shall take one sample annually beginning with the initial compliance period.

f. After a minimum of three years of annual sampling, the Executive Secretary may allow groundwater systems with no previous detection of any contaminant listed in R309-103-2.3.b to take one sample during each compliance period.

g. Each community and non-transient non-community water system which does not detect a contaminant listed in R309-103-2.3.b may apply to the Executive Secretary for a waiver from the requirements of paragraph 4.3.2.e and 4.3.2.f of this section after completing the initial monitoring. (For the purposes of this section, detection is defined as greater than or equal to 0.0005 mg/l.) A waiver shall be effective for no more than six years (two compliance periods). The Executive Secretary may also issue waivers for the initial round of monitoring for 1,2,4-trichlorobenzene.

h. The Executive Secretary may grant a waiver after evaluating the following factor(s):

1. Knowledge of previous use (including transport, storage, or disposal) of the contaminant within the watershed or zone of influence of the system. If a determination by the Executive Secretary reveals no previous use of the contaminant within the watershed or zone of influence, a waiver may be granted.

2. If previous use of the contaminant is unknown or it has been used previously, then the following factors shall be used to determine whether a waiver is granted.

(a) Previous analytical results.

(b) The proximity of the system to a potential point or non-point source of contamination. Point sources include spills and leaks of chemicals at or near a water treatment facility or at manufacturing, distribution, or storage facilities, or from hazardous and municipal waste landfills and other waste handling or treatment facilities.

(c) The environmental persistence and transport of the contaminants.

(d) How well the water source is protected against contamination such as whether it is a surface or groundwater system. Groundwater systems must consider factors such as depth of the well, the type of soil, and drinking water source protection. Surface water systems must consider watershed protection.

i. As a condition of the waiver a groundwater system must take one sample at each sampling point during the time the waiver is effective (i.e., one sample during two compliance periods or six years) and update its vulnerability assessment considering the factors listed in paragraph 4.3.2.h of this section. Based on this vulnerability assessment the Executive Secretary must confirm that the system is non-vulnerable. If the Executive Secretary does not make this reconfirmation within three years of the initial determination, then the waiver is invalidated and the system is required to sample annually as specified in paragraph 4.3.2.e of this section.

j. Each community and non-transient non-community surface water system which does not detect a contaminant listed in R309-103-2.3.b may apply to the Executive Secretary for a waiver from the requirements of 4.3.2.e of this section after completing the initial monitoring. Systems meeting this criteria must be determined by the Executive Secretary

to be non-vulnerable based on a vulnerability assessment during each compliance period. Each system receiving a waiver shall sample at the frequency specified by the Executive Secretary.

k. If a contaminant listed in R309-103-2.3.b.2 through b.21 is detected at a level exceeding 0.0005 mg/l in any sample, then:

1. The system must monitor quarterly at each sampling point which resulted in a detection.

2. The Executive Secretary may decrease the quarterly monitoring requirement specified in paragraph 4.3.2.k.1 of this section provided it has determined that the system is reliably and consistently below the maximum contaminant level. In no case shall the Executive Secretary make this determination unless a groundwater system takes a minimum of two quarterly samples and a surface water system takes a minimum of four quarterly samples.

3. If the Executive Secretary determines that the system is reliably and consistently below the MCL, the Executive Secretary may allow the system to monitor annually. Systems which monitor annually must monitor during the quarter(s) which previously yielded the highest analytical result.

4. Systems which have three consecutive annual samples with no detection of a contaminant may apply to the Executive Secretary for a waiver as specified in paragraph 4.3.2.g of this section.

5. Groundwater systems which have detected one or more of the following two-carbon organic compounds: trichloroethylene, tetrachloroethylene, 1,2-dichloroethane, 1,1,1-trichloroethane, cis-1,2-dichloroethylene, trans-1,2-dichloroethylene, or 1,1-dichloroethylene shall monitor quarterly for vinyl chloride. A vinyl chloride sample shall be taken at each sampling point at which one or more of the two-carbon organic compounds were detected. If the results of the first analysis do not detect vinyl chloride, the Executive Secretary may reduce the quarterly monitoring frequency of vinyl chloride monitoring to one sample during each compliance period. Surface water systems are required to monitor for vinyl chloride as specified by the Executive Secretary.

l. Systems which violate the maximum contaminant levels as required in R309-103-2.3.b as determined by paragraph 4.3.2.n of this section must monitor quarterly. After a minimum of four consecutive quarterly samples shows the system is in compliance as specified in paragraph 4.3.2.n of this section, and the Executive Secretary determines that the system is reliably and consistently below the maximum contaminant level, the system may monitor at the frequency and time specified in paragraph 4.3.2.k.3 of this section.

m. The Executive Secretary may require a confirmation sample for positive or negative results. If a confirmation sample is required by the Executive Secretary, the result must be averaged with the first sampling result and the average is used for the compliance determination as specified by paragraph 4.3.2.n of this section. The Executive Secretary has the discretion to delete results of obvious sampling errors from this calculation.

n. Compliance with R309-103-2.3.b shall be determined based on the analytical results obtained at each sampling point.

1. For systems which are conducting monitoring at a frequency greater than annual, compliance is determined by a running annual average of all samples taken at each sampling point. If the annual average of any sampling point is greater than the MCL, then the system is out of compliance. If the initial sample or a subsequent sample would cause the annual average to be exceeded, then the system is out of compliance immediately. Any samples below the detection limit shall be calculated as zero for purposes of determining the annual average.

2. If monitoring is conducted annually, or less frequently, the system is out of compliance if the level of a contaminant at any sampling point is greater than the MCL. If a confirmation sample is required by the Executive Secretary, the determination of compliance will be based on the average of two samples.

3. If a public water system has a distribution system separable from other parts of the distribution system with no interconnections, the Executive Secretary may allow the system to give public notice to only that area served by that portion of the system which is out of compliance.

o. The Executive Secretary may allow the use of monitoring data collected after January 1, 1988 for purposes of monitoring compliance providing that the data is generally consistent with the other requirements in this section, the Executive Secretary may use that data (i.e., a single sample rather than four quarterly samples) to satisfy the initial monitoring requirement of paragraph 4.3.2.d of this section. Systems which use grandfathered samples and did not detect any contaminant listed in R309-103-2.3.b shall begin monitoring annually in accordance with 4.3.2.e of this section.

p. The Executive Secretary may increase required monitoring where necessary to detect variations within the system.

q. Each public water system shall monitor at the time designated by the Executive Secretary within each compliance period.

4.3.3 Monitoring Requirements for Total Trihalomethanes

a. Community water systems serving 10,000 or more people and using disinfection must sample for Total Trihalomethane. Non-transient non-community and non-community water systems are not required to monitor for total trihalomethanes.

1. Groundwater systems may choose to monitor for Total Trihalomethane Formation Potential (THMFP) or TTHM compounds with the approval of the Executive Secretary.

2. Surface water systems must monitor using quarterly routine TTHM quenched samples only. THMFP samples shall not be used to determine compliance with this MCL when surface sources are used.

b. Sampling Locations For Trihalomethanes

1. THMFP samples

A THMFP sample shall be collected in a representative manner at the point of entry to the distribution system following disinfection. One sample must be collected for each disinfected source in duplicate. Compliance for each source is based on measurement of this sample. If the results of this sample are well below 100 micrograms per liter, reduced monitoring can be requested of the Executive Secretary.

2. Routine TTHM Samples

Samples shall be collected from the distribution system for routine TTHM quenched analysis and not the source. At least 25% of all samples collected representing each chlorinated source shall represent the extremes of the distribution system to which disinfected water travels. Operators are required to check for a chlorine residual before collecting any TTHM samples. A chlorine residual of at least 0.2 ppm shall be present at all sampling points.

c. Sampling Frequency for Trihalomethanes

For TTHM samples, four samples, all collected on the same day, shall be collected each calendar quarter representing each disinfected source. All samples shall be collected in duplicate, although laboratories may only analyze one of these. This is a required quality control procedure for each certified laboratory.

For THMFP samples, only one sample need be collected (see R309-104-4.3.3.b above).

d. Reduced Sampling for Trihalomethanes

1. Systems with surface sources which have four consecutive calendar quarters of data may petition the Executive Secretary for reduced monitoring if the MCL has been met. Upon approval of reduced monitoring by the Executive Secretary, surface water sources shall be analyzed at least once per calendar year for TTHM compounds. Subsequent samples shall be collected from the extreme end of the distribution system. A chlorine residual of at least 0.2 ppm shall be present at the point of sampling.

2. Systems with groundwater sources that have either completed a THMFP test or that have completed four consecutive calendar quarters may petition the Executive Secretary for reduced monitoring if the MCL has been met. Upon approval of reduced monitoring by the Executive Secretary, groundwater sources shall be analyzed at least once per year for TTHM compounds. Subsequent samples shall be collected from the extreme end of the distribution system. A chlorine residual of at least 0.2 ppm shall be present at the point of sampling.

e. Reporting of Results of Trihalomethane Monitoring

All results of TTHM samples shall be reported to the Executive Secretary within 10 days of the receipt of the analysis.

f. Procedures if Total Trihalomethane MCL is Exceeded

1. If the quarterly average of TTHM samples or THMFP samples exceeds 100 micrograms per liter, the Executive Secretary shall be so informed in writing within 10 days of the end of any month in which these analyses were performed.

2. An accelerated sampling program shall be undertaken as determined by the Executive Secretary.

3. Alteration of the existing treatment processes or installation of new processes for TTHM reduction shall be required if an MCL is not met. A compliance schedule shall be established which outlines any pilot studies necessary together with a plan and time schedule for completion of construction which will remedy the MCL violation. Modifications shall not endanger adequate disinfection of water in the system.

4. When an MCL is violated, or is near the limit, action shall be taken by the suppliers involved. Generally, the Executive Secretary will notify the supplier of special sampling which is necessary on a case by case basis.

Two possibilities in this area are:

(a) A wholesaler-retailer relationship. In general, the burden in this case shall be on the supplier adding the disinfectant to show that the results of additional THMFP tests are well within limitations. Additional THMFP tests and TTHM tests may be required of the supplier distributing this water, but not treating it, to clarify the situation. The Executive Secretary shall decide the responsibility in these cases and send written confirmation of this finding to both suppliers involved.

(b) A situation where not all sources on the system are disinfected, yet deliver water to the same system. In this case, the cause of non-compliance must be determined to

be either a chlorinated source problem, a non-chlorinated source - chlorinated source interaction, a distribution system reaction, or other. The Executive Secretary shall require such tests as are necessary to resolve the problem.

As with any action, this decision may be appealed to the Utah Drinking Water Board.

5. Notification of State and Public

When the maximum contaminant level as set forth in R309-103-2.3.c is exceeded, the supplier of water shall give public notice as required in R309-104-7.

4.4 Radiological Chemicals

4.4.1 Routine Monitoring Requirements

a. Monitoring requirements for gross alpha particle activity, radium-226 and radium-228.

1. Monitoring frequency for community and non-community systems -

(a) Suppliers of water for community systems shall monitor at least once every four years. Compliance shall be based on the analysis of an annual composite of four consecutive quarterly intervals, or the average of the analysis of four samples obtained at quarterly intervals.

(b) A supplier of water shall monitor for radiological chemicals within one year of the introduction of a new water source for a community water system.

(c) A community water system using two 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 Executive Secretary.

(d) Suppliers of water for non-community systems need not monitor unless specifically directed by the Executive Secretary.

2. Reduction of monitoring requirement -

(a) At the discretion of the Executive Secretary when the average annual concentration is less than half the maximum contaminant levels as established by four consecutive quarterly samples, analysis of a single sample may be substituted for the quarterly sampling procedure.

(b) Monitoring for compliance need not include radium-228 except when required by the Executive Secretary provided that the average annual concentration of radium-228 has been assayed at least once using the quarterly sampling procedure.

3. Increase in monitoring requirements -

(a) More frequent monitoring shall be conducted when ordered by the Executive Secretary 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) More frequent monitoring shall be conducted when ordered by the Executive Secretary in the event of possible contamination or when changes in a distribution system or treatment processing occur which may increase the concentration of radioactivity in finished water.

(c) Suppliers of water shall conduct annual monitoring of any community water system in which the radium-226 concentration exceeds 3 pCi/1, when ordered by the Executive Secretary.

4. Substitution of gross alpha particle activity measurement for radium-226 and radium-228 -

(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/1 at a confidence level of 95 percent (1.65 S where S is the standard deviation of the net counting rate of the sample). In localities where radium-228 may be present in drinking water, radium-226 and/or radium-228 analyses must be conducted when the gross alpha particle activity exceeds 2 pCi/1.

(b) When the gross alpha particle activity exceeds 5 pCi/1, the same or an equivalent sample shall be analyzed for radium-226. If the concentration of radium-226 exceeds 3 pCi/1 the same or an equivalent sample shall be analyzed for radium-228.

b. Monitoring requirements for man-made radioactivity in community water systems.

1. Monitoring frequency for community and non-community water systems -

(a) Community water systems using surface water sources and serving more than 100,000 persons and such other community water systems as are designated by the Executive Secretary shall be monitored for compliance by analysis of a composite of four consecutive quarterly samples or analysis of four quarterly samples.

(b) After the initial analysis required by Paragraph a. (above) community water systems shall monitor at least every four years following the procedure given in Paragraph a.

(c) Suppliers of water for non-community systems need not monitor unless specifically directed by the Executive Secretary.

(d) At the discretion of the Executive Secretary, based on a known hazard taking into account the degree of hazard and the time of travel of the contaminant, suppliers of water utilizing only ground water may be required to monitor for man-made radioactivity.

(e) At any time, based on a known hazard taking into account the degree of hazard and the time of travel of the contaminant, suppliers of water may be required to conduct

special additional monitoring, to determine the concentration of manmade radioactivity in principle watersheds designated by the Executive Secretary.

2. Determination of compliance -

(a) Compliance may be assumed without further analysis if the average annual concentration of gross beta particle activity is less than 50 pCi/1 and if the average annual concentrations of tritium and strontium-90 are less than those listed on Table 103-4 provided that if both radionuclides are present the sum of their annual dose equivalents to bone marrow shall not exceed 4 millirem/year.

(b) If the gross beta particle activity exceeds 50 pCi/1, an analysis of the sample must be performed to identify the major radioactivity constituents present and the appropriate organ and total body doses shall be calculated to determine compliance.

3. Systems contaminated by effluents from nuclear facilities -

(a) The supplier of any community water system designated by the Executive Secretary as utilizing waters contaminated by effluents from nuclear facilities shall initiate quarterly monitoring for gross beta particle and iodine-131 radioactivity and annual monitoring for strontium-90 and tritium.

(b) Quarterly monitoring for gross beta particle activity shall be based on the analysis of monthly samples or a composite of three monthly samples. The former is recommended. If the gross beta particle activity in a sample exceeds 15 pCi/1, the same or an equivalent sample shall be analyzed for strontium-89 and cesium-134. If the gross beta particle activity exceeds 50 pCi/1, 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.

(c) For iodine-131, a composite of five consecutive daily samples shall be analyzed once each quarter. As ordered by the Executive Secretary, more frequent monitoring shall be conducted when iodine-131 is identified in the finished water.

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

(e) The Executive Secretary 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 Executive Secretary determines such data is applicable to a particular water system.

4.4.2 Procedures if a Radionuclide MCL is Exceeded

a. Gross alpha and total radium

If the average annual maximum contaminant level for gross alpha particle activity or total radium is exceeded, the supplier of a community water system shall give notice as required by R309-104-7. Monitoring at quarterly intervals shall be continued until the annual average 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.

b. Man-made radioactivity

If the average annual maximum contaminant level for man-made radioactivity set forth in R309-103-2.4 is exceeded, the operator of a community water system shall give notice as required by R309-104-7. 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.

c. An appropriate treatment process as approved by the Executive Secretary may be required.

4.5 Turbidity

4.5.1 Routine Monitoring Requirements for Treatment Facilities utilizing surface water sources or ground water sources under the direct influence of surface water.

a. All public water systems which use a treatment technique to treat water obtained in whole or in part from surface water sources or ground water sources under the direct influence of surface water shall monitor for turbidity at the treatment plant's clearwell outlet. This monitoring shall be independent of the individual filter monitoring required by R309-108-12(3)(b)(vi) and R309-108-12(3)(c)(vii). Where the plant facility does not have an internal clearwell, the turbidity must be monitored at the inlet to a finished water reservoir external to the plant provided such reservoir receives only water from the treatment plant and, furthermore, is located before any point of consumer connection to the water system. If such external reservoir does not exist, turbidity must then be monitored at a location immediately downstream of the treatment plant filters.

b. All treatment plants, with the exception of those utilizing slow sand filtration and other conditions indicated in section c. below, shall be equipped with continuous turbidity monitoring and recording equipment for which the direct responsible charge operator will validate the continuous measurements for accuracy in accordance with paragraph d. below. These plants shall continuously record the finished water turbidity.

c. Turbidity measurements, as outlined below, must be reported to the Division of

Drinking Water within ten days after the end of each month that the system serves water to the public. Systems are required to mark and interpret turbidity values from the recorded charts at the end of each four-hour interval of operation (or some shorter regular time interval) to determine compliance with the turbidity performance criterion. For systems using slow sand filtration the Executive Secretary may reduce the sampling frequency to as little as once per day if the Executive Secretary determines that less frequent monitoring is sufficient to indicate effective filtration performance. For systems serving 500 or fewer persons, the Executive Secretary may reduce the turbidity sampling frequency to as little as once per day, regardless of the type of filtration treatment used, if the Executive Secretary determines that less frequent monitoring is sufficient to indicate effective filtration performance.

The following must be reported and the required percentage achieved for compliance:

1. The total number of interpreted filtered water turbidity measurements taken during the month;

2. The number and percentage of interpreted filtered water turbidity measurements taken during the month which are less than or equal to the turbidity limits specified in R309-103-2.5.a.2 (or increased limit approved by the Executive Secretary). The percentage of measurements which are less than or equal to the turbidity limit must be 95 percent or greater for compliance; and

3. The date and value of any turbidity measurements taken during the month which exceed 5 NTU. The system must inform the Division of Drinking Water as soon as possible, but no later than the next business day if any turbidity measurements exceed 5 NTU.

d. The analytical method which must be followed in making the required determinations shall be Nephelometric Method - Nephelometric Turbidity Unit as set forth in the latest edition of Standard Methods for Examination of Water and Wastewater, 1985, American Public Health Association et al., (Method 214A, pp. 134-136 in the 16th edition). Continuous turbidity monitoring equipment must be checked for accuracy and recalibrated using methods outlined in the above standard at a minimum frequency of monthly. The direct responsible charge operator will note on the turbidity report form when these recalibrations are conducted.

4.5.2 Procedures if a Filtered Water Turbidity Limit is Exceeded

a. Resampling -

If an analysis indicates that the turbidity limit has been exceeded, the sampling and measurement shall be confirmed by resampling as soon as practicable and preferably within one hour.

b. If the result of resampling confirms that the turbidity limit has been exceeded, the system shall collect and have analyzed at least one bacteriologic sample near the first service connection from the source as specified in R309-104-4.6.1.f. The system shall collect this bacteriologic sample within 24 hours of the turbidity exceedance. Sample results from this monitoring shall be included in determining bacteriologic compliance for that month.

c. Initial Notification of the State -

If the repeat sample confirms that the turbidity limit has been exceeded, the supplier shall report this fact to the Executive Secretary as soon as possible, but no later than the next business day. This reporting is in addition to reporting the incident on any monthly reports.

4.5.3 Routine Monitoring Requirements for Public Water Systems utilizing Ground Water Sources

The frequency of required turbidity monitoring or the lack of any required monitoring listed below may be increased or changed by the Executive Secretary. Monitoring and reporting of water characteristics such as turbidity, conductivity, pH, and temperature of ground water sources and nearby surface water sources may be required so as to provide sufficient information on water characteristics so that the Executive Secretary may classify existing ground water sources as required by R309-106-3(1)(c).

a. All community water systems shall monitor ground water sources for turbidity once every three years.

b. Non-transient non-community water systems are not required to monitor ground water sources for turbidity unless so ordered by the Executive Secretary.

c. Non-community water systems are not required to monitor ground water sources for turbidity unless so ordered by the Executive Secretary.

d. Samples may be taken from a representative location in the distribution system. However, the Executive Secretary may require that samples be collected from each individual source.

4.5.4 Procedures if Ground Water Source Turbidity Limit is Exceeded

If the result of an analysis of water from a ground water source or combination of ground water sources indicates that the turbidity limit of 5 NTUs is exceeded, the system shall collect three additional analyses at the same sampling point within one month. When the average of these four analyses (rounded to the same number of significant figures as

the limit) exceeds the maximum turbidity limit, the system shall give public notice as required in R309-104-7.1.a. Where the raw water turbidity of developed spring or well water is in excess of 5 NTU, as measured by the average of the four samples, the spring or well is subject to re-classification by the Executive Secretary and it may be necessary that the raw water receive complete treatment as described in R309-108 of these rules or its equivalent as approved by the Executive Secretary. Monitoring after public notification shall be at a frequency and duration designated by the Executive Secretary.

4.6 Microbiological Quality

4.6.1 Routine Microbiological Monitoring Requirements Applicable to all public water systems (community, non-transient non-community and non-community).

a. Community water systems shall monitor for total coliforms at a frequency based on the population served, as follows:

TABLE 104-5
TOTAL COLIFORM MONITORING FREQUENCY
FOR PUBLIC WATER SYSTEMS

Population served			Minimum number of samples per month
25	to	1,000	1
1,001	to	2,500	2
2,501	to	3,300	3
3,301	to	4,100	4
4,101	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
8,501	to	12,900	10
12,901	to	17,200	15
17,201	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
450,001	to	600,000	210
600,001	to	780,000	240
780,001	to	970,000	270
970,001	to	1,230,000	300
1,230,001	to	1,520,000	330
1,520,001	to	1,850,000	360
1,850,001	to	2,270,000	390
2,270,001	to	3,020,000	420
3,020,001	to	3,960,000	450
3,960,001	or	more	480

The 25 - 1,000 population figure includes public water systems which have at least 15 service connections, but serve fewer than 25 persons.

b. Non-transient non-community water systems shall monitor for total coliforms as follows:

1. A system using only ground water (except ground water under the direct influence of surface water) and serving 1,000 or fewer shall monitor each calendar quarter that the system provides water to the public.

2. A system using only ground water (except ground water under the direct influence of surface water) and serving more than 1,000 persons during any month shall monitor at the same frequency as a like-sized community water system, as specified in Table 104-5. The Executive Secretary may reduce the monitoring frequency for any month the system serves 1,000 persons or fewer. In no case may the required monitoring be reduced to less

than once per calendar quarter.

3. A system using surface water, in total or in part, shall monitor at the same frequency as a like-sized community water system, as specified in Table 104-5.

4. A system using ground water under the direct influence of surface water shall monitor at the same frequency as a like-sized community water system, as specified in Table 104-5. The system shall begin monitoring at this frequency beginning six months after the Executive Secretary determines that the ground water is under the direct influence of surface water.

c. Non-community water systems shall monitor for total coliforms as specified in R309-104-4.6.1.b.

d. The samples shall be collected at points which are representative of water throughout the distribution system according to a written sampling plan. This plan is subject to the approval of the Executive Secretary.

e. A public water system shall collect samples at regular time intervals throughout the month, except that a system which uses only ground water (except ground water under the direct influence of surface water) and serves 4,900 persons or fewer, may collect all required samples on a single day if they are taken from different sites.

f. A public water system that uses inadequately treated surface water or inadequately treated ground water under the direct influence of surface water shall collect and analyze for total coliforms at least one sample each day the turbidity level of the source water exceeds 1 NTU. This sample shall be collected near the first service connection from the source. The system shall collect the sample within 24 hours of the time when the turbidity level was first exceeded. The sample shall be analyzed within 30 hours of collection. Sample results from this coliform monitoring shall be included in determining total coliform compliance for that month. The State may extend the 24 hour limitation if the system has a logistical problem that is beyond the system's control. In the case of an extension the Executive Secretary shall specify how much time the system has to collect the sample.

4.6.2 Procedures if a Routine Sample is Total Coliform-Positive

a. Repeat sampling -

The water system shall collect a set of repeat samples within 24 hours of being notified of the total coliform-positive sample result. The number of repeat samples required to be taken is specified in Table 104-6. The State may extend the 24 hour limitation if the system has a logistical problem that is beyond its control. In the case of an extension the Executive Secretary shall specify how much time the system has to collect the repeat samples.

TABLE 104-6
REPEAT AND ADDITIONAL SAMPLE MONITORING FREQUENCY

Population Served by the system	# Routine Samples per month	# Repeats for each Total-Coliform Positive sample Within 24 hours	# Samples in ADDITION to the Routine samples the following month
25-1000/See Note 1 below	1	4	4
1000-2500	2	3	3
2501-3300	3	3	2
3301-4100	4	3	1
greater than 4100	5 or more	3	No additional samples required. Refer to Table 104-5 for # of Routine samples

NOTE 1: The population category 25 - 1000 includes all non-transient non-community and non-community water systems. Non-transient non-community and non-community systems are only are required to sample once per calendar quarter on a routine basis for those quarters the system is in operation.

Repeat and Additional Routine samples are only required if a Routine Sample is Total Coliform-Positive.

b. Repeat sampling locations -

The system shall collect the repeat samples from the following locations:

1. One from the original sample site;
2. One within 5 service connections upstream;

3. One within 5 service connections downstream;

4. If required, one from any site mentioned above.

If a total coliform-positive sample is at the end of the distribution system, or next to the end of the distribution system, the Executive Secretary may waive the requirement to collect at least one repeat sample upstream or downstream of the original sampling site.

c. The system shall collect all repeat samples on the same day, except that the Executive Secretary may allow a system with a single service connection to collect the required set of repeat samples on consecutive days.

d. Additional repeat samples - If one or more repeat samples in a set is total coliform-positive, the system shall collect an additional set of repeat samples as specified in a., b. and c. of this subsection. The additional repeat samples shall be collected within 24 hours of being notified of the positive result, unless the Executive Secretary extends the time limit because of a logistical problem. The system shall repeat this process until either total coliforms are not detected in one complete set of repeat samples or the system determines that the total coliform MCL has been exceeded and notifies the state and begins the required public notification.

e. If a system collecting fewer than five routine samples per month has one or more total coliform-positive samples and the Executive Secretary does not invalidate the sample under R309-104-4.6.3, it shall collect at least five routine samples during the next month the system provides water to the public. Refer to Table 104-6 for the number of additional samples required.

1. The Executive Secretary may waive the requirement to collect five routine samples the next month the system provides water to the public if the Executive Secretary has determined why the sample was total coliform-positive and establishes that the system has corrected the problem or will correct the problem before the end of the next month the system serves water to the public. In this case:

(a) The Executive Secretary shall document this decision in writing; and

(b) The Executive Secretary or his representative shall sign the document; and

(c) The Executive Secretary will make the document available to the EPA and the public.

2. The Executive Secretary cannot waive the additional samples in the following month solely because all repeat samples are total coliform-negative.

3. If the additional samples in the following month are waived, a system shall still take the minimum number of routine samples required in Table 104-5 of R309-104-4.6.1 before the end of the next month and use it to determine compliance with the total coliform MCL.

f. Samples to be included in calculations - Results of all routine and repeat samples not invalidated in writing by the Executive Secretary shall be included in determining compliance with the total coliform MCL.

g. Samples not to be included in calculations - Special purpose and investigative samples, such as those taken to determine the efficiency of disinfection practices following such operations as pipe replacement or repair, may not be used to determine compliance with the MCL for total coliforms. These samples shall be identified as special purpose or investigative at the time of collection.

4.6.3 Response to violation

a. A public water system which has exceeded the MCL for total coliforms as specified in R309-103-2.6 shall report the violation to the Executive Secretary no later than the end of the next business day after it learns of the violation, and notify the public in accordance with R309-104-7.

b. A public water system which has failed to comply with a coliform monitoring requirement shall report the monitoring violation to the Executive Secretary within ten days after the system discovers the violation and notify the public in accordance with R309-104-7.

4.6.4 Invalidation of Total Coliform-Positive Samples

An invalidated total coliform-positive sample does not count towards meeting the minimum monitoring requirements of R309-104-4.6.1 and R309-104-4.6.2. A total coliform-positive sample may not be invalidated solely on the basis of all repeat samples being total coliform-negative.

a. The Executive Secretary may invalidate a total coliform-positive sample only if one of the following conditions are met:

1. The laboratory establishes that improper sample analysis caused the total coliform-positive result; or

2. On the basis of the results of repeat samples collected as required in R309-104-4.6.2, the total coliform-positive sample resulted from a non-distribution system plumbing problem on the basis that all repeat samples taken at the same tap as the original total coliform-positive are total coliform-positive, but all repeat samples within five service connections are total coliform-negative; or

3. Substantial grounds exist to establish that the total coliform-positive result is

due to a circumstance or condition which does not reflect water quality in the distribution system. In this case:

(a) The Executive Secretary shall document this decision in writing; and

(b) The Executive Secretary or his representative shall sign the document; and.

(c) The Executive Secretary will make the document available to the EPA and the public. The system shall still collect the required repeat samples as outlined in R309-104-4.6.2 in order to determine compliance with the MCL.

b. A laboratory shall invalidate a total coliform sample (unless total coliforms are detected) if the results are indeterminate because of possible interference. A system shall collect and have analyzed, another total coliform sample from the same location as the original sample within 24 hours of being notified of the indeterminate result. The system shall continue to resample within 24 hours of notification of indeterminate results and have the samples analyzed until a valid sample result is obtained. The 24-hour time limit may be waived by the Executive Secretary on a case-by-case basis if the system has logistical problems beyond its control. Interference for each type of analysis is listed below.

1. The sample produces a turbid culture in the absence of gas production when using an analytical method where gas formation is examined.

2. The sample produces a turbid culture in the absence of an acid reaction when using the Presence-Absence Coliform Test.

3. The sample exhibits confluent growth or produces colonies too numerous to count when using an analytical method using a membrane filter.

4.6.5 Fecal coliforms/Escherichia coli (E. coli) testing

a. If any routine sample, repeat sample or additional sample is total coliform-positive, the system shall have the total coliform-positive culture medium analyzed to determine if fecal coliforms are present. The system may test for E. coli in lieu of fecal coliforms.

b. Notification of State and public - If fecal coliforms or E. coli are confirmed present (as per R309-103-2.6.b), the system shall notify the Executive Secretary by the end of the day when the system is notified of the test results. If the system is notified after the Division of Drinking Water has closed, the system shall notify the Executive Secretary before the close of the next business day and begin public notification using the mandatory health effects language R309-104-7) within 72 hours.

c. The Executive Secretary may allow a system to forego the analysis for fecal coliforms or E. coli, if the system assumes that the total coliform positive sample is fecal coliform-positive or E. coli-positive. The system must notify the Executive Secretary of this decision and begin the required public notification.

4.6.6 Best Available Technology

The Executive Secretary may require an appropriate treatment process using the best available technology (BAT) in order to bring the water into compliance with the maximum contaminant level for microbiological quality. The BAT will be determined by the Executive Secretary.

4.7 Treatment Plant Monitoring and Reporting

4.7.1 General

Beginning June 29, 1993, or when treatment facilities are installed, whichever is later, all public water systems which use a treatment technique to treat water obtained in whole or in part from surface water sources or ground water sources under the direct influence of surface water shall monitor the plant's operation as indicated below and report the results to the Division of Drinking Water. Individual plants will be evaluated in accordance with the criteria outlined in R309-104-4.7.6. Based on information submitted and/or plant inspections, the plant will receive credit for treatment techniques other than disinfection that remove pathogens, specifically Giardia lamblia and viruses. This credit (log removal) will reduce the required disinfectant "CT" value which the plant must maintain to assure compliance with R309-103-2.7a(1).

4.7.2 Chemicals Used in Treatment Technique

Treatment plant management shall report the following to the Division of Drinking Water within ten days after the end of each month that the system serves water to the public, except as otherwise noted:

a. For each day;

1. If the plant treats water from multiple sources, the sources being utilized and the ratio for each if blending occurs.

2. The total volume of water treated by the plant,

3. The turbidity of the raw water entering the plant,

4. The pH of the effluent water, measured at or near the monitoring point for disinfectant residual,

5. The temperature of the effluent water, measured at or near the monitoring point for disinfectant residual,

6. The type and amount of chemicals used in the treatment process (clearly indicating the weight and active percent of chemical if dry feeders are used, or the percent solution

and volume fed if liquid feeders are used),

7. The high and low temperature and weather conditions (local forecast information may be used, but any precipitation in the watershed should be further described as light, moderate, heavy, or extremely heavy), and

8. The results of any "jar tests" conducted that day

b. For each filter, each day;

1. The rate of water applied to each (gpm/sq.ft.),

2. The head loss across each (feet of water or psi),

3. Length of backwash (if conducted; in minutes), and

4. Hours of operation since last backwashed.

c. Annually; certify in writing as required by R309-102-7 that when a product containing acrylamide and/or epichlorohydrin is used, the combination of the amount of residual monomer in the polymer and the dosage rate does not exceed the levels specified as follows:

1. Acrylamide: 0.05%, when dosed at 1 part per million, and

2. Epichlorohydrin: 0.01%, when dosed at 20 parts per million.

Certification may rely on manufacturers data.

4.7.3 Turbidity

Treatment plant management shall monitor for turbidity and report to the Division of Drinking Water in accordance with R309-104-4.5.1. For the purpose of individual plant evaluation and establishment of pathogen removal credit for the purpose of lowering the required "CT" value assigned a plant, plant management may do additional turbidity monitoring at other points to satisfy criteria in R309-104-4.7.6.

4.7.4 Residual Disinfectant

Treatment plant management shall continuously monitor disinfectant residuals and report the following to the Division of Drinking Water within ten days after the end of each month that the system serves water to the public, except as otherwise noted:

a. For each day, the lowest measurement of residual disinfectant concentration in mg/l in water entering the distribution system, except that if there is a failure in the continuous monitoring equipment, grab sampling every 4 hours may be conducted in lieu of continuous monitoring, but for no more than 5 working days following the failure of the equipment. Systems serving 3,300 or fewer persons may take grab samples in lieu of providing continuous monitoring on an ongoing basis at the frequencies listed in Table 104-7 below:

TABLE 104-7
RESIDUAL GRAB SAMPLE FREQUENCY

System size by population	Samples/day
Less than 500	1
501 to 1,000	2
1,001 to 2,500	3
2,501 to 3,300	4

Note: The day's samples cannot be taken at the same time. The sampling intervals are subject to Executive Secretary's review and approval.

b. The date and duration of each period when the residual disinfectant concentration in water entering the distribution system fell below 0.2 mg/l and when the Division of Drinking Water was notified of the occurrence. The system must notify the Division as soon as possible, but no later than by the end of the next business day. The system also must notify the Division by the end of the next business day whether or not the residual was restored to at least 0.2 mg/l within four hours.

c. The following information on the samples taken in the distribution system in conjunction with total coliform monitoring pursuant to R309-104-4.6:

1. Number of instances where the residual disinfectant concentration is measured;

2. Number of instances where the residual disinfectant concentration is not measured but heterotrophic bacteria plate count (HPC) is measured;

3. Number of instances where the residual disinfectant concentration is measured but not detected and no HPC is measured;

4. Number of instances where no residual disinfectant concentration is detected and where HPC is greater than 500/ml;

5. Number of instances where the residual disinfectant concentration is not measured and HPC is greater than 500/ml;

6. For the current and previous month the system serves water to the public, the value of "V" in the following formula:

V equals the ratio of ((c+d+e)/(a+b)) x 100, where a = the value in paragraph 4.7.4c(1) of this section, b = the value in paragraph 4.7.4c(2) of this section, c = the value in paragraph 4.7.4c(3) of this section, d = the value in paragraph 4.7.4c(4) of this

section, e = the value in paragraph 4.7.4c(5) of this section.

4.7.5 Waterborne Disease Outbreak

Each public water system, upon discovering that a waterborne disease outbreak as defined in R309-107-8 potentially attributable to their water system has occurred, must report that occurrence to the Division of Drinking Water as soon as possible, but no later than by the end of the next business day.

4.7.6 Criteria for Individual Treatment Plant Evaluation

New and existing water treatment plants must meet specified monitoring and performance criteria in order to ensure that filtration and disinfection are satisfactorily practiced. The monitoring requirements and performance criteria for turbidity and disinfection listed above provide the minimum for the Division of Drinking Water to evaluate the plant's efficiency in removing and/or inactivating 99.9 percent (3-log) of Giardia lamblia cysts and 99.99 percent (4-log) of viruses as required by R309-108-5(2)(a)&(b).

The Division, upon evaluation of individual raw water sources, surface water or ground water under the direct influence of surface water, may require greater than the 3-log, 4-log removal/inactivation of Giardia and viruses respectfully. If a raw water source exhibits an estimated concentration of 1 to 10 Giardia cysts per 100 liters, 4 and 5-log removal/inactivation may be required. If the raw water exhibits a concentration of 10 to 100 cysts per 100 liters, 5 and 6-log removal/inactivation may be required.

The Division, upon individual plant evaluation, may assign the treatment techniques (coagulation, flocculation, sedimentation and filtration) credit toward removal of Giardia cysts and viruses. The greater the number of barriers in the treatment process, the greater the reduction of pathogens, therefore lessor credit will be given to processes such as direct filtration which eliminate one or more conventional barriers. Plants may monitor turbidity at multiple points in the treatment process as evidence of the performance of an individual treatment technique. Studies are being conducted in an effort to correlate turbidity reduction to particulate removal, but results are not yet conclusive.

The nominal credit that will be assigned certain conventional processes are outlined in Table 104-8:

TABLE 104-8
CONVENTIONAL PROCESS CREDIT

Process	Log Reduction Credit Giardia	Viruses
Conventional Complete Treatment	2.5	2.0
Direct Filtration	2.0	1.0
Slow Sand Filtration	2.0	2.0
Diatomaceous Earth Filters	2.0	1.0

Upon evaluation of information provided by individual plants or obtained during inspections by Division staff, the Division may increase or decrease the nominal credit assigned individual plants based on that evaluation.

Items which would augment the treatment process and thereby warrant increased credit are:

1. Facilities or means to moderate extreme fluctuations in raw water characteristics.
2. Sufficient on-site laboratory facilities regularly used to alert operators to changes in raw water quality.
3. Use of pilot stream facilities which duplicate treatment conditions but allow operators to know results of adjustments much sooner than if only monitoring plant effluent.
4. Use of additional monitoring methods such as particle size and distribution analysis to achieve greater efficiency in particulate removal.
5. Regular program for preventive maintenance, records of such, and general good housekeeping.
6. Adequate staff of well trained and certified plant operators.

Items which would be considered a detriment to the treatment process and thereby warrant decreased credit are:

1. Inadequate staff of trained and certified operators.
2. Lack of regular maintenance and poor housekeeping.
3. Insufficient on-site laboratory facilities.

R309-104-5. Unregulated Contaminants.

5.1 Monitoring Requirements

5.1.1. Contaminants.

a. List 1:
1. Chloroform
2. Bromodichloromethane
3. Chlorodibromomethane
4. Bromoform
5. Chlorobenzene
6. m-Dichlorobenzene
7. 1,1-Dichloropropene
8. 1,1-Dichloroethane
9. 1,1,2,2-Tetrachloroethane
10. 1,3-Dichloropropane
11. Chloromethane
12. Bromomethane
13. 1,2,3-Trichloropropane
14. 1,1,1,2-Tetrachloroethane
15. Chloroethane
16. 2,2-Dichloropropane
17. o-Chlorotoluene
18. p-Chlorotoluene
19. Bromobenzene
20. 1,3-Dichloropropene

b. List 2:
1. Aldrin
2. Butachlor
3. Carbaryl
4. Dicamba
5. Dieldrin
6. 3-Hydroxycarbofuran
7. Methomyl
8. Metolachlor
9. Metribuzin
10. Propachlor

5.1.2. Monitoring of the contaminants listed in R309-104-5.1.1. shall be conducted as follows:

a. Each community and non-transient, non-community water system shall take four consecutive quarterly samples at each sampling point for each contaminant listed in R309-104-5.1.1. and report the results to the Executive Secretary. Monitoring must be completed by December 31, 1995. For systems serving a population of less than 3,300, this requirement may be reduced to one sample if the sample is taken prior to October 1, 1993.

b. Each community and non-transient non-community water system may apply to the Executive Secretary for a waiver from the requirements of R309-104-5.1.2.a.

c. The Executive Secretary may grant a waiver for the requirement of R309-104-5.1.2. based on the criteria specified in R309-104-4.3.1.f and R309-104-4.3.2.h.

d. Groundwater systems shall take a minimum of one sample at every entry point to the distribution system which is representative of each well after treatment (hereafter called a sampling point). Each sample must be taken at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.

e. Surface water systems shall take a minimum of one sample at points in the distribution system that are representative of each source or at each entry point to the distribution system after treatment (hereafter called a sampling point). Each sample must be taken at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant. (For purposes of this paragraph, surface water systems include systems with a combination of surface and ground sources.)

f. If the system draws water from more than one source and the sources are combined before distribution, the system must sample at an entry point to the distribution system during periods of normal operating conditions (i.e., when water representative of all sources is being used).

g. The Executive Secretary may require a confirmation sample for positive or negative results.

h. Instead of performing the monitoring required by this section, a community water system or non-transient non-community water system serving fewer than 150 service connections may send a letter to the Executive Secretary stating that the system is available for sampling. This letter must be sent to the Executive Secretary by January 1, 1994. The system shall not send such samples to the Executive Secretary, unless requested to do so by the Executive Secretary.

5.2 Other contaminants

Viruses, protozoans, and other chemical and biological substances which may be present in waters exposed to the environment are presently impractical to monitor on a routine basis. Monitoring programs are not now required.

5.3 Treatment

Surface water sources or ground water sources contaminated by surface sources shall be subjected to complete treatment as described in R309-108, or by its equivalent as approved by the Executive Secretary.

R309-104-6. Reporting Test Results.

If analyses are made by certified laboratories other than the state laboratory, these results must be forwarded to the Executive Secretary as follows:

1. The supplier shall report to the Division of Drinking Water the analysis of water samples which fail to comply with the Primary Drinking Water Standards of R309-103. Except where a different reporting period is specified in R309-104, this report shall be submitted within 48 hours after the supplier receives the report from his lab. The Division of Drinking Water may be reached at (801)538-6159.

2. Monthly summaries of bacteriologic results must be submitted within ten days following the end of each month.

3. All results of TTHM samples shall be reported to the Executive Secretary within 10 days of receipt of analysis.

4. For all samples other than samples showing unacceptable results, bacteriologic samples or TTHM samples, the time between the receipt of the analysis and the reporting of the results to the Executive Secretary shall not exceed 40 days.

R309-104-7. Public Notification.

7.1 Public Notification Requirements

Applicable to all public water systems; Community, Non-transient non-community and Non-community (Refer to R309-104-7.2 for specific requirements for Community, Non-Transient non-community and Non-community water systems).

a. Maximum contaminant level (MCL), treatment technique, waterborne disease outbreak, and variance and exemption schedule violations -

If a public water system fails to comply with an applicable maximum contaminant level (MCL) or treatment technique, or fails to comply with the requirements of any schedule prescribed pursuant to a variance or exemption, the owner or operator of the public water system shall notify persons served by the system as provided in this subsection R309-104-7.1.a.

1. Notification via written notice by mail - Notice of the failure or violation shall be by inclusion of a notice in the first set of water bills of the system issued after the failure or violation and in any event by written notice within forty-five days after the violation or failure. If the system issues water bills less frequently than quarterly, or does not issue water bills, the notice shall be made by or supplemented by another form of mail delivery (direct mail or hand delivery). Such notice shall be repeated at least once every three months so long as the violation or failure exists. The Executive Secretary may waive mail or hand delivery when the Executive Secretary determines that the owner or operator of the public water system in violation has corrected the violation or failure within the forty-five day period. The waiver shall be in writing and within the forty-five day period; and

2. Notification via newspaper -

Notice shall be given by publication in a daily newspaper or newspapers of general circulation in the area served by the system. Such notice shall be completed as soon as possible, but in no case later than fourteen days after the violation or failure.

If the area served by a public water system is not served by a daily newspaper of general circulation, notification by newspaper shall instead be given by publication in a weekly newspaper of general circulation serving the area.

If no weekly or daily newspaper of general circulation serves the area, the system shall comply with the requirements of R309-104-7.2; and

3. For violations of the maximum contaminant levels (MCLs) that pose an acute risk to public health, by furnishing a copy of the notice to the radio and television stations serving the area served by the system. Such notice shall be furnished as soon as possible but in no case later than 72 hours after the violation or failure. Acute violations include but are not limited to microbiological contaminants with fecal coliform present, occurrence of a waterborne disease outbreak, as defined in R309-104-9, nitrates or nitrite.

b. Other violations, variances, exemptions - If a public water system fails to perform any monitoring or fails to comply with an applicable testing procedure, or is granted a variance or an exemption as provided in R309-104 of these rules, the owner or operator of the public water system shall notify persons served by the system as provided in this subsection R309-104-7.1.b.

1. Notification via written notice by mail - Notice of the violation or granting of a variance or exemption shall be by inclusion of a notice in the first set of water bills of the system issued after the violation or granting of a variance or exemption and in any event by written notice within three months after the violation or granting of a variance

or exemption. If the system issues water bills less frequently than quarterly, or does not issue water bills, the notice shall be made by or supplemented by another form of mail delivery (direct mail or hand delivery). Such notice shall be repeated at least once every three months so long as the system's violation continues or the variance or exemption remains in effect; and

2. Notification via newspaper -

Notice shall be given by publication in a daily newspaper or newspapers of general circulation in the area served by the system. Such notice shall be completed within three months after the violation or granting of a variance or exemption.

If the area served by a public water system is not served by a daily newspaper of general circulation, notification by newspaper shall instead be given by publication in a weekly newspaper of general circulation serving the area.

If no weekly or daily newspaper of general circulation serves the area, the system shall comply with the requirements of R309-104-7.2.

7.2 Specific Public Notification Requirements for Community, Non-transient non-community and Non-Community water systems

a. Community water system requirements

1. Miscellaneous notification methods for MCL, treatment techniques and variance and exemption schedule violations - If no weekly or daily newspaper of general circulation serves the area, the owner or operator of the community water system shall give notice within 14 days after the violation or failure by hand delivery or by posting in conspicuous places within the area served by the system. In the case of an acute violation as defined in R309-104-7.1.a.3 hand delivery or posting shall begin as soon as possible but no later than 72 hours after the violation or failure. Posting shall continue for as long as the violation exists. Notice by hand delivery shall be repeated every three months for as long as the violation or failure exists.

2. Miscellaneous notification methods for monitoring violations, failure to comply with testing procedures and issuances of an exemption or variance - If no weekly or daily newspaper of general circulation serves the area, the owner or operator of the community water system shall give notice within three months after the violation or granting of a variance or exemption by hand delivery or by posting the notice in post offices within the area for as long as the violation exists or a variance or exemption remains in effect. Notice by hand delivery shall be repeated at least every three months for as long as the violation or a variance or exemption remains in effect.

3. Notice to new billing units - The owner or operator of a community water system shall give a copy of the most recent public notice for any outstanding violation of any maximum contaminant level, or any treatment technique requirement, or any variance or exemption schedule to all new billing units or new hookups prior to or at the time service begins.

4. Community water systems that exceed the secondary maximum contaminant level for fluoride shall send the notice described in R309-104-7.3.b.1. to:

(a) all billing units annually;

(b) all new billing units at the time of service; and

(c) the Executive Secretary.

b. Non-transient non-community and Non-community water system requirements

1. Miscellaneous notification methods for MCL, treatment techniques and variance and exemption schedule violations - If no weekly or daily newspaper of general circulation serves the area, the owner or operator of the non-transient non-community or non-community water system may give notice within 14 days after the violation or failure by hand delivery or by posting in conspicuous places within the area served by the system. In the case of an acute violation as defined in R309-104-7.1.a.3 hand delivery or posting shall begin as soon as possible but no later than 72 hours after the violation or failure. Posting shall continue for as long as the violation exists. Notice by hand delivery shall be repeated every three months for as long as the violation or failure exists.

2. Miscellaneous notification methods for monitoring violations, failure to comply with testing procedures and issuances of an exemption or variance - If no weekly or daily newspaper of general circulation serves the area, the owner or operator of the non-transient non-community or non-community water system may give notice within three months after the violation or granting of a variance or exemption by hand delivery or by posting the notice in post offices within the area for as long as the violation exists or a variance or exemption remains in effect. Notice by hand delivery shall be repeated at least every three months for as long as the violation or a variance or exemption remains in effect.

7.3 Method of Writing Notice

Applicable to all public water systems; Community, Non-transient non-community and Non-community.

Notices given pursuant to this section shall be written in a manner reasonably designed to fully inform the users of the system. The notice shall be conspicuous and shall not use unduly technical language, unduly 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; when appropriate, a clear statement that a primary drinking water regulation has been violated; any potential adverse health effects; the steps that the public water system is taking to correct the violation; the necessity for seeking alternative water supplies, if any, and any preventative measures that should be taken by the public and the telephone number for the water system where the consumer may obtain additional information. Where appropriate, or where designated by the Executive Secretary, bilingual notice shall be given.

Mandatory Health Effects Language. When providing the information on potential adverse health effects required by this section in notices of violations of maximum contaminant levels or treatment technique requirements, notice of the granting or the continued existence of exemptions or variances, or notices of failure to comply with a variance or exemption schedule, the owner or operator of a public water system shall include the language specified below for each contaminant. If language for a particular contaminant is not specified below at the time notice is required, this paragraph does not apply.

a. Microbiological Contaminants

1. Total coliforms: (To be used when there is a violation of R309-103-2.6.a only)

The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that the presence of total coliforms is a possible health concern. Total coliforms are common in the environment and are generally not harmful themselves. The presence of these bacteria in drinking water, however, generally is a result of a problem with water treatment or the pipes which distribute the water, and indicates that the water may be contaminated with organisms that can cause disease. Disease symptoms may include diarrhea, cramps, nausea, and possibly jaundice, and any associated headaches and fatigue. These symptoms, however, are not just associated with disease-causing organisms in drinking water, but also may be caused by a number of factors other than your drinking water. EPA has set an enforceable drinking water standard for total coliforms to reduce the risk of these adverse health effects. Under this standard, no more than 5.0 percent of the samples collected during a month can contain these bacteria, except that systems collecting fewer than 40 samples/month that have one total coliform-positive sample per month are not violating the standard. Drinking water which meets this standard is usually not associated with a health risk from disease-causing bacteria and should be considered safe.

2. Fecal Coliforms/E. coli: (To be used when there is a violation of R309-103-2.6.b)

The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that the presence of fecal coliforms or E. coli is a serious health concern. Fecal coliforms and E. coli are generally not harmful themselves, but their presence in drinking water is serious because they usually are associated with sewage or animal wastes. The presence of these bacteria in drinking water is generally a result of a problem with water treatment or the pipes which distribute the water, and indicates that the water may be contaminated with organisms that can cause disease. Disease symptoms may include diarrhea, cramps, nausea, and possibly jaundice, and associated headaches and fatigue. These symptoms, however, are not just associated with disease-causing organisms in drinking water, but also may be caused by a number of factors other than your drinking water. EPA has set an enforceable drinking water standard for fecal coliforms and E. coli to reduce the risk of these adverse health effects. Under this standard all drinking water samples must be free of these bacteria. Drinking water which meets this standard is associated with little or none of this risk and should be considered safe. State and local health authorities recommend that consumers take the following precautions: (To be inserted by the public water system, according to instructions from State or local authorities.)

3. Microbiological Contaminants: (To be used when there is a violation of the treatment technique requirements for filtration and disinfection)

The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that the presence of microbiological contaminants are a health concern at certain levels of exposure. If water is inadequately treated, microbiological contaminants in that water may cause disease. Disease symptoms may include diarrhea, cramps, nausea, and possibly jaundice, and any associated headaches and fatigue. These symptoms, however, are not just associated with disease-causing organisms in drinking water, but also may be caused by a number of factors other than your drinking water. EPA has set an enforceable requirements for treating drinking water to reduce the risk of these adverse health effects. Treatment such as filtering and disinfecting the water removes or destroys microbiological contaminants. Drinking water which is treated to meet EPA requirements is associated with little to none of this risk and should be considered safe.

b. Inorganic Contaminants

1. Antimony. The United States Environmental Protection Agency (EPA) sets drinking

water standards and has determined that antimony is a health concern at certain levels of exposure. This inorganic chemical occurs naturally in soils, ground water and surface waters and is often used in the flame retardant industry. It is also used in ceramics, glass, batteries, fireworks and explosives. It may get into drinking water through natural weathering of rock, industrial production, municipal waste disposal or manufacturing processes. This chemical has been shown to decrease longevity, and altered blood levels of cholesterol and glucose in laboratory animals such as rats exposed to high levels during their lifetimes. EPA has set the drinking water standard for antimony at 0.006 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to antimony.

2. Asbestos. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that asbestos fibers greater than 10 micrometers in length are a health concern at certain levels of exposure. Asbestos is a naturally occurring mineral. Most asbestos fibers in drinking water are less than 10 micrometers in length and occur in drinking water from natural sources and from corroded asbestos-cement pipes in the distribution system. The major uses of asbestos were in the production of cements, floor tiles, paper products, paint, and caulking; in transportation-related applications; and in the production of textiles and plastics. Asbestos was once a popular insulating and fire retardant material. Inhalation studies have shown that various forms of asbestos have produced lung tumors in laboratory animals. The available information on the risk of developing gastrointestinal tract cancer associated with the ingestion of asbestos from drinking water is limited. Ingestion of intermediate-range chrysotile asbestos fibers greater than 10 micrometers in length is associated with causing benign tumors in male rats. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standard for asbestos at 7 million long fibers per liter to reduce the potential risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to asbestos.

3. Barium. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that barium is a health concern at certain levels of exposure. This inorganic chemical occurs naturally in some aquifers that serve as sources of ground water. It is also used in oil and gas drilling muds, automotive paints, bricks, tiles and jet fuels. It generally gets into drinking water after dissolving from naturally occurring minerals in the ground. This chemical may damage the heart and cardiovascular system, and is associated with high blood pressure in laboratory animals such as rats exposed to high levels during their lifetimes. In humans, EPA believes that effects from barium on blood pressure should not occur below 2 parts per million (ppm) in drinking water. EPA has set the drinking water standard for barium at 2 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to barium.

4. Beryllium. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that beryllium is a health concern at certain levels of exposure. This inorganic metal occurs naturally in soils, ground water and surface waters and is often used in electrical equipment and electrical components. It generally gets into water from runoff from mining operations, discharge from processing plants and improper waste disposal. Beryllium compounds have been associated with damage to the bones and lungs and induction of cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. There is limited evidence to suggest that beryllium may pose a cancer risk via drinking water exposure. Therefore, EPA based the health assessment on noncancer effects with an extra uncertainty factor to account for possible carcinogenicity. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standard for beryllium at 0.004 part per million (ppm) to protect against the risk of these adverse health effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to beryllium.

5. Cadmium. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that cadmium is a health concern at certain levels of exposure. Food and the smoking of tobacco are common sources of general exposure. This inorganic metal is a contaminant in the metals used to galvanize pipe. It generally gets into water by corrosion of galvanized pipes or by improper waste disposal. This chemical has been shown to damage the kidney in animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Some industrial workers who were exposed to relatively large amounts of this chemical during working careers also suffered damage to the kidney. EPA has set the drinking water standard for cadmium at 0.005 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that

meets the EPA standard is associated with little to none of this risk and is considered safe with respect to cadmium.

6. Chromium. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that chromium is a health concern at certain levels of exposure. This inorganic metal occurs naturally in the ground and is often used in the electroplating of metals. It generally gets into water from runoff from old mining operations and improper waste disposal from plating operations. This chemical has been shown to damage the kidney, nervous system, and the circulatory system of laboratory animals such as rats and mice when the animals are exposed at high levels. Some humans who were exposed to high levels of this chemical suffered liver and kidney damage, dermatitis and respiratory problems. EPA has set the drinking water standard for chromium at 0.1 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to chromium.

7. Copper. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that copper is a health concern at certain exposure levels. Copper, a reddish-brown metal, is often used to plumb residential and commercial structures that are connected to water distribution systems. Copper contaminating drinking water as a corrosion by-product occurs as the result of the corrosion of copper pipes that remain in contact with water for a prolonged period of time. Copper is an essential nutrient, but at high doses it has been shown to cause stomach and intestinal distress, liver and kidney damage, and anemia. Persons with Wilson's disease may be at a higher risk of health effects due to copper than the general public. EPA's national primary drinking water regulation requires all public water systems to install optimal corrosion control to minimize copper contamination resulting from the corrosion of plumbing materials. Public water systems serving 50,000 people or fewer that have copper concentrations below 1.3 parts per million (ppm) in more than 90% of tap water samples (the EPA "action level") are not required to install or improve their treatment. Any water system that exceeds the action level must also monitor their source water to determine whether treatment to remove copper in source water is needed.

8. Cyanide. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that cyanide is a health concern at certain levels of exposure. This inorganic chemical is used in electroplating, steel processing, plastics, synthetic fabrics and fertilizer products. It usually gets into water as a result of improper waste disposal. This chemical has been shown to damage the spleen, brain and liver of humans fatally poisoned with cyanide. EPA has set the drinking water standard for cyanide at 0.2 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to cyanide.

9. Fluoride. The United States Environmental Protection Agency requires that we send you this notice on the level of fluoride in your drinking water. The drinking water in your community has a fluoride concentration of (PWS shall insert the compliance result which triggered notification under this Part.) milligrams per liter (mg/l).

Federal Regulations require that fluoride, which occurs naturally in your water supply, not exceed a concentration of 4.0 mg/l in drinking water. This is an enforceable standard called a Maximum Contaminant Level (MCL), and it has been established to protect the public health. Exposure to drinking water levels above 4.0 mg/l for many years may result in some cases of crippling skeletal fluorosis, which is a serious bone disorder. Federal law also requires that we notify you when monitoring indicates that the fluoride in your drinking water exceeds 2.0 mg/l. This is intended to alert families about dental problems that might affect children under nine years of age. The fluoride concentration of your water exceeds this federal guideline.

Fluoride in children's drinking water at levels of approximately 1 mg/l reduces the number of dental cavities. However, some children exposed to levels of fluoride greater than about 2.0 mg/l may develop dental fluorosis. Dental fluorosis, in its moderate and severe forms, is a brown staining and/or pitting of the permanent teeth.

Because dental fluorosis occurs only when developing teeth (before they erupt from the gums) are exposed to elevated fluoride levels, households without children are not expected to be affected by this level of fluoride. Families with children under the age of nine are encouraged to seek other sources of drinking water for their children to avoid the possibility of staining and pitting.

Your water supplier can lower the concentration of fluoride in your water so that you will still receive the benefits of cavity prevention while the possibility of stained and pitted teeth is minimized. Removal of fluoride may increase your water costs. Treatment systems are also commercially available for home use. Low fluoride bottled drinking water that would meet all standards is also commercially available.

For further information contact your water system (PWS shall insert the name, address and telephone number of a contact person of PWS).

10. Lead. The United States Environmental Protection Agency (EPA) sets drinking

water standards and has determined that lead is a health concern at certain exposure levels. Materials that contain lead have frequently been used in the construction of water supply distribution systems, and plumbing systems in private homes and other buildings. The most commonly found materials include service lines, pipes, brass and bronze fixtures, and solders and fluxes. Lead in these materials can contaminate drinking water as a result of the corrosion that takes place when water comes into contact with those materials. Lead can cause a variety of adverse health effects in humans. At relatively low levels of exposure, these effects may include interference with red blood cell chemistry, delays in normal physical and mental development in babies and young children, slight deficits in the attention span, hearing, and learning abilities of children, and slight increases in the blood pressure of some adults. EPA's national primary drinking water regulation requires all public water systems to optimize corrosion control to minimize lead contamination resulting from the corrosion of plumbing materials. Public water systems serving 50,000 people or fewer that have lead concentrations below 15 parts per billion (ppb) in more than 90% of tap water samples (the EPA "action level") have optimized their corrosion control treatment. Any water system that exceeds the action level must also monitor their source water to determine whether treatment to remove lead in source water is needed. Any water system that continues to exceed the action level after installation of corrosion control and/or source water treatment must eventually replace all lead service lines contributing in excess of 15 ppb of lead to drinking water. Any water system that exceeds the action level must also undertake a public education program to inform consumers of ways they can reduce their exposure to potentially high levels of lead in drinking water.

11. Mercury. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that mercury is a health concern at certain levels of exposure. This inorganic metal is used in electrical equipment and some water pumps. It usually gets into water as a result of improper waste disposal. This chemical has been shown to damage the kidney of laboratory animals such as rats when the animals are exposed at high levels over their lifetimes. EPA has set the drinking water standard for mercury at 0.002 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to mercury.

12. Nickel. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that nickel poses a health concern at certain levels of exposure. This inorganic metal occurs naturally in soils, ground water and surface waters and is often used in electroplating, stainless steel and alloy products. It generally gets into water from mining and refining operations. This chemical has been shown to damage the heart and liver in laboratory animals when the animals are exposed to high levels over their lifetimes. EPA has set the drinking water standard at 0.1 parts per million (ppm) for nickel to protect against the risk of these adverse effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to nickel.

13. Nitrate. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that nitrate poses an acute health concern at certain levels of exposure. Nitrate is used in fertilizer and is found in sewage and wastes from human and/or farm animals and generally gets into drinking water from those activities. Excessive levels of nitrate in drinking water have caused serious illness and sometimes death in infants under six months of age. The serious illness in infants is caused because nitrate is converted to nitrite in the body. Nitrite interferes with the oxygen carrying capacity of the child's blood. This is an acute disease in that symptoms can develop rapidly in infants. In most cases, health deteriorates over a period of days. Symptoms include shortness of breath and blueness of the skin. Clearly, expert medical advice should be sought immediately if these symptoms occur. The purpose of this notice is to encourage parents and other responsible parties to provide infants with an alternate source of drinking water. Local and State health authorities are the best source for information concerning alternate sources of drinking water for infants. EPA has set the drinking water standard at 10 parts per million (ppm) for nitrate to protect against the risk of these adverse effects. EPA has also set a drinking water standard for nitrite at 1 ppm. To allow for the fact that the toxicity of nitrate and nitrite are additive, EPA has also established a standard for the sum of nitrate and nitrite at 10 ppm. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to nitrate.

14. Nitrite. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that nitrite poses an acute health concern at certain levels of exposure. This inorganic chemical is used in fertilizers and is found in sewage and wastes from humans and/or farm animals and generally gets into drinking water as a result of those activities. While excessive levels of nitrite in drinking water have not been observed, other sources of nitrite have caused serious illness and sometimes death in infants under six months of age. The serious illness in infants is caused because nitrite

interferes with the oxygen carrying capacity of the child's blood. This is an acute disease in that symptoms can develop rapidly. However, in most cases, health deteriorates over a period of days. Symptoms include shortness of breath and blueness of the skin. Clearly, expert medical advice should be sought immediately if these symptoms occur. The purpose of this notice is to encourage parents and other responsible parties to provide infants with an alternate source of drinking water. Local and State health authorities are the best source for information concerning alternate sources of drinking water for infants. EPA has set the drinking water standard at 1 part per million (ppm) for nitrite to protect against the risk of these adverse effects. EPA has also set a drinking water standard for nitrate (converted to nitrite in humans) at 10 ppm and for the sum of nitrate and nitrite at 10 ppm. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to nitrite.

15. Selenium. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that selenium is a health concern at certain high levels of exposure. Selenium is also an essential nutrient at low levels of exposure. This inorganic chemical is found naturally in food and soils and is used in electronics, photocopy operations, the manufacture of glass, chemicals, drugs, and as a fungicide and a feed additive. In humans, exposure to high levels of selenium over a long period of time has resulted in a number of adverse health effects, including a loss of feeling and control in the arms and legs. EPA has set the drinking water standard for selenium at 0.05 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to selenium.

16. Thallium. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that thallium is a health concern at certain high levels of exposure. This inorganic metal is found naturally in soils and is used in electronics, pharmaceuticals, and the manufacture of glass and alloys. This chemical has been shown to damage the kidney, liver, brain and intestines of laboratory animals when the animals are exposed at high levels over their lifetimes. EPA has set the drinking water standard for thallium at 0.002 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to thallium.

c. Organic Contaminants. This section includes mandatory health effects language for Pesticides/PCBs/SOCs, Volatile Organic Contaminants and Treatment Chemicals.

1. Acrylamide. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that acrylamide is a health concern at certain levels of exposure. Polymers made from acrylamide are sometimes used to treat water supplies to remove particulate contaminants. Acrylamide has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. Sufficiently large doses of acrylamide are known to cause neurological injury. EPA has set the drinking water standard for acrylamide using a treatment technique to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. This treatment technique limits the amount of acrylamide in the polymer and the amount of the polymer which may be added to drinking water to remove particulates. Drinking water systems which comply with this treatment technique have little to no risk and are considered safe with respect to acrylamide.

2. Alachlor. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that alachlor is a health concern at certain levels of exposure. This organic chemical is a widely used pesticide. When soil and climatic conditions are favorable, alachlor may get into drinking water by runoff into surface water or by leaching into ground water. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standard for alachlor at 0.002 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water that meets this standard is associated with little to none of this risk and is considered safe with respect to alachlor.

3. Aldicarb. The United State Environmental Protection Agency (EPA) sets drinking water standards and has determined that aldicarb is a health concern at certain levels of exposure. Aldicarb is a widely used pesticide. Under certain soil and climatic conditions (e.g. sandy soil and high rainfall), aldicarb may leach into ground water after normal agricultural applications to crops such as potatoes or peanuts or may enter drinking water supplies as a result of surface runoff. This chemical has been shown to damage the nervous system in laboratory animals such as rats and dogs exposed to high levels. EPA has set the drinking water standard for aldicarb at 0.003 parts per million

(ppm) to protect against the risk of adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to aldicarb.

4. Aldicarb sulfoxide. The United State Environmental Protection Agency (EPA) sets drinking water standards and has determined that aldicarb sulfoxide is a health concern at certain levels of exposure. Aldicarb is a widely used pesticide. Aldicarb sulfoxide in ground water is primarily a breakdown product of aldicarb. Under certain soil and climatic conditions (e.g. sandy soil and high rainfall), aldicarb sulfoxide may leach into ground water after normal agricultural applications to crops such as potatoes or peanuts or may enter drinking water supplies as a result of surface runoff. This chemical has been shown to damage the nervous system in laboratory animals such as rats and dogs exposed to high levels. EPA has set the drinking water standard for aldicarb sulfoxide at 0.004 parts per million (ppm) to protect against the risk of adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to aldicarb sulfoxide.

5. Aldicarb sulfone. The United State Environmental Protection Agency (EPA) sets drinking water standards and has determined that aldicarb sulfone is a health concern at certain levels of exposure. Aldicarb is a widely used pesticide. Aldicarb sulfone is formed from the breakdown of aldicarb and is considered for registration as a pesticide under the name of aldoxycarb. Under certain soil and climatic conditions (e.g. sandy soil and high rainfall), aldicarb sulfone may leach into ground water after normal agricultural applications to crops such as potatoes or peanuts or may enter drinking water supplies as a result of surface runoff. This chemical has been shown to damage the nervous system in laboratory animals such as rats and dogs exposed to high levels. EPA has set the drinking water standard for aldicarb sulfone at 0.002 parts per million (ppm) to protect against the risk of adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to aldicarb sulfone.

6. Atrazine. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that atrazine is a health concern at certain levels of exposure. This organic chemical is a herbicide. When soil and climatic conditions are favorable, atrazine may get into drinking water by runoff into surface water or by leaching into ground water. This chemical has been shown to affect offspring of rats and the heart of dogs. EPA has set the drinking water standard for atrazine at 0.003 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to atrazine.

7. Benzene. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that benzene is a health concern at certain levels of exposure. This chemical is used as a solvent and degreaser of metals. It is also a major component of gasoline. Drinking water contamination generally results from leaking underground gasoline and petroleum tanks or improper waste disposal. This chemical has been associated with significantly increased risks of leukemia among certain industrial workers who were exposed to relatively large amounts of this chemical during their working careers. This chemical has also been shown to cause cancer in laboratory animals when the animals are exposed at high levels over their lifetimes. Chemicals that cause increased risk of cancer among exposed industrial workers and in laboratory animals also may increase the risk of cancer in humans who are exposed at lower levels over long periods of time. EPA has set the enforceable drinking water standard for benzene at 0.005 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in humans and laboratory animals. Drinking water which meets this standard is associated with little to none of this risk and should be considered safe.

8. Benzo(a)pyrene. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that benzo(a)pyrene is a health concern at certain levels of exposure. Cigarette smoke and charbroiled meats are common sources of general exposure. The major source of benzo(a)pyrene in drinking water is the leaching from coal tar lining and sealants in water storage tanks. This chemical has been shown to cause cancer in animals such as rats and mice when the animals are exposed at high levels. EPA has set the drinking water standard for benzo(a)pyrene at 0.0002 parts per million (ppm) to protect against the risk of cancer. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to benzo(a)pyrene.

9. Carbofuran. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that carbofuran is a health concern at certain levels of exposure. This organic chemical is a pesticide. When soil and climatic conditions are favorable, carbofuran may get into drinking water by runoff into surface water or by leaching into ground water. This chemical has been shown to damage the nervous and reproductive systems of laboratory animals such as rats and mice exposed at high levels over their lifetimes. Some humans who were exposed to relatively large amounts of this

chemical during their working careers also suffered damage to the nervous system. Effects on the nervous system are generally rapidly reversible. EPA has set the drinking water standard for carbofuran at 0.04 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to carbofuran.

10. Carbon tetrachloride. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that carbon tetrachloride is a health concern at certain levels of exposure. This chemical was once a popular household cleaning fluid. It generally gets into drinking water by improper waste disposal. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals may also increase the risk of cancer in humans who are exposed at lower levels over long periods of time. EPA has set the enforceable drinking water standard for carbon tetrachloride at 0.005 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water which meets this standard is associated with little to none of this risk and should be considered safe.

11. Chlordane. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that chlordane is a health concern at certain levels of exposure. This organic chemical is a pesticide used to control termites. Chlordane is not very mobile in soils. It usually gets into drinking water after application near water supply intakes or wells. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standard for chlordane at 0.002 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to chlordane.

12. Dalapon. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that dalapon is a health concern at certain levels of exposure. This organic chemical is a widely used herbicide. It may get into drinking water after application to control grasses in crops, drainage ditches and along railroads. This chemical has been shown to cause damage to the kidney and liver in laboratory animals when the animals are exposed to high levels over their lifetimes. EPA has set the drinking water standard for dalapon at 0.2 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to dalapon.

13. Dibromochloropropane (DBCP). The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that DBCP is a health concern at certain levels of exposure. This organic chemical was once a popular pesticide. When soil and climatic conditions are favorable, dibromochloropropane may get into drinking water by runoff into surface water or by leaching into ground water. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standard for DBCP at 0.0002 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to DBCP.

14. o-Dichlorobenzene. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that o-dichlorobenzene is a health concern at certain levels of exposure. This organic chemical is used as a solvent in the production of pesticides and dyes. It generally gets into water by improper waste disposal. This chemical has been shown to damage the liver, kidney and the blood cells of laboratory animals such as rats and mice exposed to high levels during their lifetimes. Some industrial workers who were exposed to relatively large amounts of this chemical during working careers also suffered damage to the liver, nervous system, and circulatory system. EPA has set the drinking water standard for o-dichlorobenzene at 0.6 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to o-dichlorobenzene.

15. Para-dichlorobenzene. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that para-dichlorobenzene is a health concern at certain levels of exposure. This chemical is a component of deodorizers, mothballs, and pesticides. It generally gets into drinking water by improper waste disposal. This chemical has been shown to cause liver and kidney damage in laboratory animals such as rats and mice when the animals are exposed to high levels over their

lifetimes. Chemicals which cause adverse effects in laboratory animals also may cause adverse health effects in humans when exposed at lower levels over long periods of time. EPA has set the enforceable drinking water standard for para-dichlorobenzene at 0.075 parts per million (ppm) to reduce the risk of these adverse health effects which have been observed in laboratory animals. Drinking water which meets this standard is associated with little to none of this risk and should be considered safe.

16. 1,1-Dichloroethylene. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that 1,1-dichloroethylene is a health concern at certain levels of exposure. This chemical is used in industry and is found in drinking water as a result of the breakdown of related solvents. The solvents are used as cleaners and degreasers of metals and generally get into drinking water by improper waste disposal. This chemical has been shown to cause liver and kidney damage in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals which cause adverse effects in laboratory animals also may cause adverse health effects in humans who are exposed at lower levels over long periods of time. EPA has set the enforceable drinking water standard for 1,1-dichloroethylene at 0.007 parts per million (ppm) to reduce the risk of these adverse health effects which have been observed in laboratory animals. Drinking water which meets this standard is associated with little to none of this risk and should be considered safe.

17. cis-1,2-Dichloroethylene. The United States Environmental Protection Agency (EPA) establishes drinking water standards and has determined that cis-1,2-dichloroethylene is a health concern at certain levels of exposure. This organic chemical is used as a solvent and intermediate in chemical production. It generally gets into water by improper waste disposal. This chemical has been shown to damage the liver, nervous system, and circulatory system of laboratory animals such as rats and mice when exposed at high levels over their lifetimes. Some humans who were exposed to relatively large amounts of this chemical also suffered damage to the nervous system. EPA has set the drinking water standard for cis-1,2-dichloroethylene at 0.07 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to cis-1,2-dichloroethylene.

18. trans-1,2-Dichloroethylene. The United States Environmental Protection Agency (EPA) establishes drinking water standards and has determined that trans-1,2-dichloroethylene is a health concern at certain levels of exposure. This organic chemical is used as a solvent and intermediate in chemical production. It generally gets into water by improper waste disposal. This chemical has been shown to damage the liver, nervous system, and the circulatory system of laboratory animals such as rats and mice when exposed at high levels over their lifetimes. Some humans who were exposed to relatively large amounts of this chemical also suffered damage to the nervous system. EPA has set the drinking water standard for trans-1,2-dichloroethylene at 0.1 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to trans-1,2-dichloroethylene.

19. 1,2-Dichloroethane. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that 1,2-dichloroethane is a health concern at certain levels of exposure. This chemical is used as a cleaning fluid for fats, oils, waxes, and resins. It generally gets into drinking water from improper waste disposal. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed at lower levels over long periods of time. EPA has set the enforceable drinking water standard for 1,2-dichloroethane at 0.005 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water which meets this standard is associated with little to none of this risk and should be considered safe.

20. Dichloromethane. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that dichloromethane (methylene chloride) is a health concern at certain levels of exposure. This organic chemical is a widely used solvent. It is used in the manufacture of paint remover, as a metal degreaser and as an aerosol propellant. It generally gets into drinking water after improper discharge of waste disposal. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standard for dichloromethane at 0.005 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water which meets this standard is associated with little to none of this risk and should be considered safe with respect to dichloromethane.

21. 1,2-Dichloropropane. The United States Environmental Protection Agency (EPA)

sets drinking water standards and has determined that 1,2-dichloropropane is a health concern at certain levels of exposure. This organic chemical is used as a solvent and pesticide. When soil and climatic conditions are favorable, 1,2-dichloropropane may get into drinking water by runoff into surface water or by leaching into ground water. It may also get into drinking water through improper waste disposal. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standard for 1,2-dichloropropane at 0.005 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to 1,2-dichloropropane.

22. 2,4-D. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that 2,4-D is a health concern at certain levels of exposure. This organic chemical is used as a herbicide and to control algae in reservoirs. When soil and climatic conditions are favorable, 2,4-D may get into drinking water by runoff into surface water or by leaching into ground water. This chemical has been shown to damage the liver and kidney of laboratory animals such as rats exposed at high levels during their lifetimes. Some humans who were exposed to relatively large amounts of this chemical also suffered damage to the nervous system. EPA has set the drinking water standard for 2,4-D at 0.07 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to 2,4-D.

23. Di(2-ethylhexyl)adipate. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that di(2-ethylhexyl)adipate is a health concern at certain levels of exposure. Di(2-ethylhexyl)adipate is a widely used plasticizer in a variety of products, including synthetic rubber, food packaging materials and cosmetics. It may get into drinking water after improper waste disposal. This chemical has been shown to damage liver and testes in laboratory animals such as rats and mice exposed to high levels. EPA has set the drinking water standard for di(2-ethylhexyl)adipate at 0.4 parts per million (ppm) to protect against the risk of adverse health effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to di(2-ethylhexyl)adipate.

24. Di(2-ethylhexyl)phthalate. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that di(ethylhexyl)phthalate is a health concern at certain levels of exposure. Di(2-ethylhexyl)phthalate is a widely used plasticizer, which is primarily used in the production of polyvinyl chloride (PVC) resins. It may get into drinking water after improper waste disposal. This chemical has been shown to cause cancer in laboratory animals such as rats and mice exposed to high levels over their lifetimes. EPA has set the drinking water standard for di(2-ethylhexyl)phthalate at 0.004 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to di(2-ethylhexyl)phthalate.

25. Dinoseb. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that dinoseb is a health concern at certain levels of exposure. Dinoseb is a widely used pesticide and generally gets into drinking water after application on orchards, vineyards and other crops. This chemical has been shown to damage the thyroid and reproductive organs in laboratory animals such as rats exposed to high levels. EPA has set the drinking water standard for dinoseb at 0.007 parts per million (ppm) to protect against the risk of adverse health effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to dinoseb.

26. Diquat. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that diquat is a health concern at certain levels of exposure. This organic chemical is a herbicide used to control terrestrial and aquatic weeds. It may get into drinking water by runoff into surface water. This chemical has been shown to damage the liver, kidney and gastrointestinal tract and causes cataract formation in laboratory animals such as dogs and rats exposed at high levels over their lifetimes. EPA has set the drinking water standard for diquat at 0.02 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to diquat.

27. Endothall. The United States Environmental has determined that endothall is a health concern at certain levels of exposure. This organic chemical is a herbicide used to control terrestrial and aquatic weeds. It may get into water by runoff into surface water. This chemical has been shown to damage the liver, kidney, gastrointestinal tract

and reproductive system of laboratory animals such as rats and mice exposed at high levels over their lifetimes. EPA has set the drinking water standard for endothall at 0.1 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to endothall.

28. Endrin. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that endrin is a health concern at certain levels of exposure. This organic chemical is a pesticide no longer registered for use in the United States. However, this chemical is persistent in treated soils and accumulates in sediments and aquatic and terrestrial biota. This chemical has been shown to cause damage to the liver, kidney and heart in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. EPA has set the drinking water standard for endrin at 0.002 parts per million (ppm) to protect against the risk of these adverse health effects which have been observed in laboratory animals. Drinking water that meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to endrin.

29. Epichlorohydrin. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that epichlorohydrin is a health concern at certain levels of exposure. Polymers made from epichlorohydrin are sometimes used in the treatment of water supplies as a flocculent to remove particulates. Epichlorohydrin generally gets into drinking water by improper use of these polymers. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standard for epichlorohydrin using a treatment technique to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. This treatment technique limits the amount of epichlorohydrin in the polymer and the amount of the polymer which may be added to drinking water as a flocculent to remove particulates. Drinking water systems which comply with this treatment technique have little to no risk and are considered safe with respect to epichlorohydrin.

30. Ethylbenzene. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined ethylbenzene is a health concern at certain levels of exposure. This organic chemical is a major component of gasoline. It generally gets into water by improper waste disposal or leaking gasoline tanks. This chemical has been shown to damage the kidney, liver, and nervous system of laboratory animals such as rats exposed to high levels during their lifetimes. EPA has set the drinking water standard for ethylbenzene at 0.7 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to ethylbenzene.

31. Ethylene dibromide (EDB). The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that EDB is a health concern at certain levels of exposure. This organic chemical was once a popular pesticide. When soil and climatic conditions are favorable, EDB may get into drinking water by runoff into surface water or by leaching into ground water. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standard for EDB at 0.00005 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water that meets this standard is associated with little to none of this risk and is considered safe with respect to EDB.

32. Glyphosate. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that glyphosate is a health concern at certain levels of exposure. This organic chemical is a herbicide used to control grasses and weeds. It may get into drinking water by runoff into surface water. This chemical has been shown to cause damage to the liver and kidneys in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. EPA has set the drinking water standard for glyphosate at 0.7 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to glyphosate.

33. Heptachlor. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that heptachlor is a health concern at certain levels of exposure. This organic chemical was once a popular pesticide. When soil and climatic conditions are favorable, heptachlor may get into drinking water by runoff into surface water or by leaching into ground water. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may

increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standards for heptachlor at 0.0004 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water that meets this standard is associated with little to none of this risk and is considered safe with respect to heptachlor.

34. Heptachlor epoxide. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that heptachlor epoxide is a health concern at certain levels of exposure. This organic chemical was once a popular pesticide. When soil and climatic conditions are favorable, heptachlor epoxide may get into drinking water by runoff into surface water or by leaching into ground water. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standards for heptachlor epoxide at 0.0002 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water that meets this standard is associated with little to none of this risk and is considered safe with respect to heptachlor epoxide.

35. Hexachlorobenzene. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that hexachlorobenzene is a health concern at certain levels of exposure. This organic chemical is produced as an impurity in the manufacture of certain solvents and pesticides. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed to high levels during their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standard for hexachlorobenzene at 0.001 parts per million (ppm) to protect against the risk of cancer and other adverse health effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to hexachlorobenzene.

36. Hexachlorocyclopentadiene. The United States Environmental Protection Agency (EPA) establishes drinking water standards and has determined that hexachlorocyclopentadiene is a health concern at certain levels of exposure. This organic chemical is used as an intermediate in the manufacture of pesticides and flame retardants. It may get into water by discharge from production facilities. This chemical has been shown to damage the kidney and the stomach of laboratory animals when exposed at high levels over their lifetimes. EPA has set the drinking water standard for hexachlorocyclopentadiene at 0.05 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to hexachlorocyclopentadiene.

37. Lindane. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that lindane is a health concern at certain levels of exposure. This organic chemical is used as a pesticide. When soil and climatic conditions are favorable, lindane may get into drinking water by runoff into surface water or by leaching into ground water. This chemical has been shown to damage the liver, kidney, nervous system, and immune system of laboratory animals such as rats, mice and dogs exposed at high levels during their lifetimes. Some humans who were exposed to relatively large amounts of this chemical also suffered damage to the nervous system and circulatory system. EPA has established the drinking water standard for lindane at 0.0002 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to lindane.

38. Methoxychlor. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that methoxychlor is a health concern at certain levels of exposure. This organic chemical is used as a pesticide. When soil and climatic conditions are favorable, methoxychlor may get into drinking water by runoff into surface water or by leaching into ground water. This chemical has been shown to damage the liver, kidney, nervous system, and reproductive system of laboratory animals such as rats exposed at high levels during their lifetimes. It has also been shown to produce growth retardation in rats. EPA has set the drinking water standard for methoxychlor at 0.04 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to methoxychlor.

39. Monochlorobenzene. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that monochlorobenzene is a health concern at certain levels of exposure. This organic chemical is used as a solvent. It generally gets into water by improper waste disposal. This chemical has been shown to damage the liver, kidney and nervous system of laboratory animals such as rats and mice exposed to high levels during their lifetimes. EPA has set the drinking water standard for

monochlorobenzene at 0.1 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to monochlorobenzene.

40. Oxamyl. The United States Environmental Protection Agency (EPA) establishes drinking water standards and has determined that oxamyl is a health concern at certain levels of exposure. This organic chemical is used as a pesticide for the control of insects and other pests. It may get into drinking water by runoff into surface water or leaching into ground water. This chemical has been shown to damage the kidneys of laboratory animals such as rats when exposed at high levels over their lifetimes. EPA has set the drinking water standard for oxamyl at 0.2 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to oxamyl.

41. Picloram. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that picloram is a health concern at certain levels of exposure. This organic chemical is used as a pesticide for broadleaf weed control. It may get into drinking water by runoff into surface water or leaching into ground water as a result of pesticide application and improper waste disposal. This chemical has been shown to cause damage to the kidneys and liver in laboratory animals such as rats when the animals are exposed at high levels over their lifetimes. EPA has set the drinking water standard for picloram at 0.5 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to picloram.

42. Polychlorinated biphenyls (PCBs). The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that polychlorinated biphenyls (PCBs) are a health concern at certain levels of exposure. These organic chemicals were once widely used in electrical transformers and other industrial equipment. They generally get into drinking water by improper waste disposal or leaking electrical industrial equipment. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standard for PCBs at 0.0005 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water that meets this standard is associated with little to none of this risk and is considered safe with respect to PCBs.

43. Pentachlorophenol. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that pentachlorophenol is a health concern at certain levels of exposure. This organic chemical is used as a wood preservative, herbicide, disinfectant, and defoliant. It generally gets into drinking water by runoff into surface water or leaching into ground water. This chemical has been shown to produce adverse reproductive effects and to damage the liver and kidneys of laboratory animals such as rats exposed to high levels during their lifetimes. Some humans who were exposed to relatively large amounts of this chemical also suffered damage to the liver and kidneys. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed to high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standard for pentachlorophenol at 0.001 parts per million (ppm) to protect against the risk of cancer or other adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to pentachlorophenol

44. Simazine. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that simazine is a health concern at certain levels of exposure. This organic chemical is a herbicide used to control annual grasses and broadleaf weeds. It may leach into ground water or runs off into surface water after application. This chemical may cause cancer in laboratory animals such as rats and mice exposed at high levels during their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standard for simazine at 0.004 parts per million (ppm) to reduce the risk of cancer or other adverse health effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to simazine.

45. Styrene. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that styrene is a health concern at certain levels of exposure. This organic chemical is commonly used to make plastics and is sometimes a component of resins used for drinking water treatment. Styrene may get into drinking water from improper waste disposal. This chemical has been shown to damage the liver and nervous system in laboratory animals when exposed at high levels during their lifetimes.

EPA has set the drinking water standard for styrene at 0.1 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to styrene.

46. Tetrachloroethylene. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that tetrachloroethylene is a health concern at certain levels of exposure. This organic chemical has been a popular solvent, particularly for dry cleaning. It generally gets into drinking water by improper waste disposal. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standard for tetrachloroethylene at 0.005 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water that meets this standard is associated with little to none of this risk and is considered safe with respect to tetrachloroethylene.

47. Toluene. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that toluene is a health concern at certain levels of exposure. This organic chemical is used as a solvent and in the manufacture of gasoline for airplanes. It generally gets into water by improper waste disposal or leaking underground storage tanks. This chemical has been shown to damage the kidney, nervous system, and circulatory system of laboratory animals such as rats and mice exposed to high levels during their lifetimes. Some industrial workers who were exposed to relatively large amounts of this chemical during working careers also suffered damage to the liver, kidney and nervous system. EPA has set the drinking water standard for toluene at 1 part per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to toluene.

48. Toxaphene. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that toxaphene is a health concern at certain levels of exposure. This organic chemical was once a pesticide widely used on cotton, corn, soybeans, pineapples and other crops. When soil and climatic conditions are favorable, toxaphene may get into drinking water by runoff into surface water or by leaching into ground water. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standard for toxaphene at 0.003 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water that meets this standard is associated with little to none of this risk and is considered safe with respect to toxaphene.

49. 1,2,4-Trichlorobenzene. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that 1,2,4-trichlorobenzene is a health concern at certain levels of exposure. This organic chemical is used as a dye carrier and as a precursor in herbicide manufacture. It generally gets into drinking water by discharges from industrial activities. This chemical has been shown to cause damage to several organs, including the adrenal glands. EPA has set the drinking water standard for 1,2,4-trichlorobenzene at 0.07 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to 1,2,4-trichlorobenzene.

50. 1,1,2-Trichloroethane. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined 1,1,2-trichloroethane is a health concern at certain levels of exposure. This organic chemical is an intermediate in the production of 1,1-dichloroethylene. It generally gets into water by industrial discharge of wastes. This chemical has been shown to damage the kidney and liver of laboratory animals such as rats exposed to high levels during their lifetimes. EPA has set the drinking water standard for 1,1,2-trichloroethane at 0.005 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to 1,1,2-trichloroethane.

51. Trichloroethylene. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that trichloroethylene is a health concern at certain levels of exposure. This chemical is a common metal cleaning and dry cleaning fluid. It generally gets into drinking water by improper waste disposal. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals may also increase the risk of cancer in humans who are exposed at lower levels over long periods of time. EPA has set forth the enforceable drinking water

standard for trichloroethylene at 0.005 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water which meets this standard is associated with little to none of this risk and should be considered safe.

52. 1,1,1-Trichloroethane. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that the 1,1,1-trichloroethane is a health concern at certain levels of exposure. This chemical is used as a cleaner and degreaser of metals. It generally gets into drinking water by improper waste disposal. This chemical has been shown to damage the liver, nervous system, and circulatory system of laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Some industrial workers who were exposed to relatively large amounts of this chemical during their working careers also suffered damage to the liver, nervous system, and circulatory system. Chemicals which cause adverse effects among exposed industrial workers and in laboratory animals also may cause adverse health effects in humans who are exposed at lower levels over long periods of time. EPA has set the enforceable drinking water standard for 1,1,1-trichloroethane at 0.2 parts per million (ppm) to protect against the risk of these adverse health effects which have been observed in humans and laboratory animals. Drinking water which meets this standard is associated with little to none of this risk and should be considered safe.]

53. 2,3,7,8-TCDD (Dioxin). The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that dioxin is a health concern at certain levels of exposure. This organic chemical is an impurity in the production of some pesticides. It may get into drinking water by industrial discharge of wastes. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standard for dioxin at 0.00000003 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water which meets this standard is associated with little to none of this risk and should be considered safe with respect to dioxin.

54. 2,4,5-TP. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that 2,4,5-TP is a health concern at certain levels of exposure. This organic chemical is used as a herbicide. When soil and climatic conditions are favorable, 2,4,5-TP may get into drinking water by runoff into surface water or by leaching into ground water. This chemical has been shown to damage the liver and kidney of laboratory animals such as rats and dogs exposed to high levels during their lifetimes. Some industrial workers who were exposed to relatively large amounts of this chemical during working careers also suffered damage to the nervous system. EPA has set the drinking water standard for 2,4,5-TP at 0.05 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to 2,4,5-TP.

55. Vinyl chloride. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that vinyl chloride is a health concern at certain levels of exposure. This chemical is used in industry and is found in drinking water as a result of the breakdown of related solvents. The solvents are used as cleaners and degreasers of metals and generally get into drinking water by improper waste disposal. This chemical has been associated with significantly increased risks of cancer among certain industrial workers who were exposed to relatively large amounts of this chemical during their working careers. This chemical has also been shown to cause cancer in laboratory animals when the animals are exposed at high levels over their lifetimes. Chemicals that cause an increased risk of cancer among exposed industrial workers and in laboratory animals also may increase the risk of cancer in humans who are exposed at lower levels over long periods of time. EPA has set the enforceable drinking water standard for vinyl chloride at 0.002 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in humans and laboratory animals. Drinking water which meets this standard is associated with little to none of this risk and should be considered safe.

56. Xylenes. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that xylene is a health concern at certain levels of exposure. This organic chemical is used in the manufacture of gasoline for airplanes and as a solvent for pesticides, and as a cleaner and degreaser of metals. It usually gets into water by improper waste disposal. This chemical has been shown to damage the liver, kidney and nervous system of laboratory animals such as rats and dogs exposed to high levels during their lifetimes. Some humans who were exposed to relatively large amounts of this chemical also suffered damage to the nervous system. EPA has set the drinking water standard for xylene at 10 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated

with little to none of this risk and is considered safe with respect to xylene.

7.4 Public Notice by the Executive Secretary

The State may give notice to the public required by this section on behalf of the owner or operator of the public water system if the State complies with the requirements of this section. However, the owner or operator of the public water system remains legally responsible for ensuring that the requirements of this section are met.

7.5 Unusual Circumstances Requiring Broader Notice

In any instance in which notification by mail is required by this section but notification by newspaper or to radio or television stations is not required, the Executive Secretary may order the supplier of water to provide notification by newspaper and to radio and television stations when circumstances make more immediate or broader notice appropriate to protect the public health.

Where public notification is required by these regulations, the supplier must forward a copy of the public notification to the Executive Secretary and information that shows proper public notification has been carried out. The supplier shall submit the copy of the notice within ten days of completion of each public notification.

R309-104-8. Record Maintenance.

All public water systems shall retain on their premises or at convenient location near their premises the following records:

a. Records of bacteriologic analyses made pursuant to this Section shall be kept for not less than five years. Records of chemical analyses made pursuant to this Section shall be kept for not less than ten years. Actual laboratory reports may be kept, or data may be transferred to tabular summaries, provided that the following information is included:

1. The date, place and time of sampling, and the name of the person who collected the sample;
2. 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.
3. Date of analysis;
4. Laboratory and person responsible for performing analysis;
5. The analytical technique/method used; and
6. The results of the analysis.

b. Lead and copper recordkeeping requirements.

1. Any water system subject to the requirements of R309-104-4.2 shall retain on its premises original records of all sampling data and analyses, reports, surveys, letters, evaluations, schedules, State determinations, and any other information required by R309-104-4.2.
2. Each water system shall retain the records required by this section for no fewer than 12 years.

c. Records of action taken by the system to correct violations of primary drinking water regulations shall be kept for a period not less than three years after the last action taken with respect to the particular violation involved.

d. Copies of any written reports, summaries or communications relating to sanitary surveys of the system conducted by the system itself, by a private consultant, or by any local, State or Federal agency, shall be kept for a period not less than ten years after completion of the sanitary survey involved.

e. Records concerning a variance or exemption granted to the system shall be kept for a period ending not less than five years following the expiration of such variance or exemption.

f. Records that concern the tests of a backflow prevention assembly and location shall be kept by the system for a minimum of not less than five years from the date of the test.

R309-104-9. Definitions.

Action level - is the concentration of lead or copper in water specified in R309-103-2.2 which determines, in some cases, the corrosion control treatment, public education, and lead line replacement requirements that a water system is required to complete.

Best available technology (BAT) - means the best technology, treatment techniques, or other means which the Executive Secretary finds, after examination under field conditions and not solely under laboratory conditions, are available (taking cost into consideration). For the purposes of setting MCLs for synthetic organic chemicals, any BAT must be at least as effective as granular activated carbon for all these chemicals except vinyl chloride. Central treatment using packed tower aeration is also identified as BAT for synthetic organic chemicals.

Board - means the Drinking Water Board.

Compliance cycle - means the nine-year calendar year cycle during which public water systems must monitor. Each compliance cycle consists of three three-year compliance

periods. The first calendar year cycle begins January 1, 1993 and ends December 31, 2001; the second begins January 1, 2002 and ends December 31, 2010; the third begins January 1, 2011 and ends December 31, 2019.

Compliance period - means a three-year calendar year period within a compliance cycle. Each compliance cycle has three three-year compliance periods. Within the first compliance cycle, the first compliance period runs from January 1, 1993 to December 31, 1995; the second from January 1, 1996 to December 31, 1998; the third from January 1, 1999 to December 31, 2001.

Community water system - means a public water system which serves at least fifteen service connections used by year-round residents or regularly serves at least twenty-five year-round residents.

Confirmed SOC contamination area - means an area surrounding and including a plume of SOC contamination of the soil or water which previous monitoring results have confirmed. The area boundaries may be determined by measuring 3,000 feet horizontally from the outermost edges of the confirmed plume. The area includes deeper aquifers even though only the shallow aquifer is the one contaminated.

Confluent growth - means a continuous bacterial growth covering the entire filtration area of a membrane filter, or a portion of the filtration area in which discrete bacterial colonies can not be distinguished.

Contaminant - means any physical, chemical, biological, or radiological substance or matter in water.

Corrosion inhibitor - means a substance capable of reducing the corrosivity of water toward metal plumbing materials, especially lead and copper, by forming a protective film on the interior surface of those materials.

Disinfection - means the use of any oxidant, including but not limited to chlorine, chlorine dioxide, chloramines, and ozone added to water in any part of the treatment process.

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 by the International Commission on Radiologic Units and Measurements (ICRU).

Executive Secretary - means the Executive Secretary of the Drinking Water Board.

First draw sample - means a one-liter sample of tap water, collected in accordance with R309-104-4.2.3.b.2., that has been standing in plumbing pipes at least 6 hours and is collected without flushing the tap.

Geometric Mean - the geometric mean of a set of N numbers X1, X2, X3,...., XN is the Nth root of the product of the numbers.

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

Ground water source - means a source of culinary water captured underground. This term includes wells and springs.

Initial compliance period - means the first full three-year compliance period which begins at least 18 months after promulgation, except for contaminants listed in R309-103-2.3.a(19) to (33), R309-103-2.3.b(19) to (21), and R309-103-2.1.c(1), (5), (8), (11), and (18), initial compliance period means the first full three-year compliance after promulgation for systems with 150 or more service connections (January 1993-December 1995), and first full three-year compliance period after the effective date of the regulation (January 1996-December 1998) for systems having fewer than 150 service connections.

Large water system - for the purposes of R309-104-4.2 only, means a water system that serves more than 50,000 persons.

Lead service line - means a service line made of lead which connects the water main to the building inlet and any lead pigtail, gooseneck or other fitting which is connected to such lead line.

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.

Maximum contaminant level - means the maximum permissible level of a contaminant in water which is delivered to any user of a public water system.

Medium-size water system - for the purposes of R309-104-4.2 only, means a water system that serves greater than 3,300 and less than or equal to 50,000 persons.

Metropolitan area sources - means all sources within a metropolitan area. A metropolitan area is further defined to contain at least 3,300 year round residents. A small water system which has sources within a metropolitan system's service area, may have those sources classified as a metropolitan area source.

Must - means that a particular action is obliged and has to be accomplished.

Near the first service connection - means one of the service connections within the first 20 percent of all service connections that are nearest to the treatment facilities.

Non-community water system - means a public water system that is not a community water system or a non-transient non-community water system.

Non-distribution system plumbing problem - means a coliform contamination problem in a public water system with more than one service connection that is limited to the specific service connection from which a coliform-positive sample was taken.

Non-Transient Non-Community Water System - means a public water system that is not a community system and that regularly serves at least 25 of the same persons for more than six months per year. Examples are separate systems serving workers and schools.

Optimal corrosion control treatment - for the purposes of R309-104-4.2 only, means the corrosion control treatment that minimizes the lead and copper concentrations at users' taps while insuring that the treatment does not cause the water system to violate any national primary drinking water regulations.

PCBs - means a group of chemicals that contain polychlorinated biphenyl.

Picocurie (pCi) - means that quantity of radioactive material producing 2.22 nuclear transformations per minute.

Practical Quantitation Level (PQL) - means the required analysis standard for laboratory certification to perform lead and copper analyses. The PQL for lead is .005 milligrams per liter and the PQL for copper is 0.050 milligrams per liter.

Public Water System - means a system, either publicly or privately owned, providing water for human consumption and other domestic uses which has at least fifteen service connections, or regularly serves an average of at least twenty-five individuals daily for at least sixty days out of the year. Such term includes collection, treatment, storage and distribution facilities under control of the operator and used primarily in connection with the system. Additionally, the term includes collection, pretreatment or storage facilities used primarily in connection with the system but not under such control.

Rem - means the unit of 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.

Repeat compliance period - means any subsequent compliance period after the initial compliance period.

Secondary Maximum Contaminant Level - means the advisable maximum level of a contaminant in water which is delivered to any user of a public water system.

Service line sample - means a one-liter sample of water collected in accordance with R309-104-4.2.3.b.3, that has been standing for at least 6 hours in a service line.

Shall - means that a particular action is obliged and has to be accomplished.

Should - means that a particular action is recommended but does not have to be accomplished.

Single family structure - for the purposes of R309-104-4.2 only, means a building constructed as a single-family residence that is currently used as either a residence or a place of business.

Small water system - for the purposes of R309-104-4.2 only, means a water system that serves 3,300 persons or fewer.

SOCs - means synthetic organic chemicals.

Standard sample - means the aliquot of finished drinking water that is examined for the presence of coliform bacteria.

Supplier of water - means any person who owns or operates a public water system.

Surface water source - means a source of culinary water which lies or travels on the surface prior to its capture for use in a culinary water system.

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

Too numerous to count (TNTC) - means that the total number of bacterial colonies exceeds 200 on a 47 mm diameter membrane filter used for coliform detection.

Total Trihalomethanes (TTHM) - means the MCL for trihalomethanes. This is the sum of four of the ten possible isomers of chlorine/bromine/methane compounds, all known as trihalomethanes (THM). TTHM is defined as the arithmetic sum of the concentrations in micro grams per liter of only four of these, i.e. of chloroform, bromodichloromethane dibromochloromethane, and bromoform, rounded to two significant figures. This measurement is made by samples which are "quenched" meaning that a chlorine neutralizing agent has been added, preventing further THM formation in the samples.

Trihalomethanes (THM) - means any one or all members of this class of organic compounds.

Trihalomethane Formation Potential (THMFP) - means samples that are collected just following disinfection and measure the highest possible TTHM value to be expected in the water distribution system. The distribution system need not be tested if this test is run on groundwater systems. The formation potential is measured by not neutralizing the disinfecting agent at the time of collection, but storing the sample 7 days at 25 degrees C prior to analysis. A chlorine residual must be present in these samples at the end of the seven day period prior to analysis for the samples to be considered valid for this test. Samples without a residual at the end of this period may not be used to determine compliance and must be resampled if this test is desired.

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 appropriate local or State agency.

KEY: drinking water, environmental protection, administrative procedure
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R309. Environmental Quality, Drinking Water.
R309-105. Quantity Requirements.
R309-105-0. General.

The three areas of concern treated in this section are source, storage, and distribution system capacity.

Generally source capacity must be capable of meeting peak daily flow and average yearly flow requirements. Storage capacity must equal or exceed average daily flow requirements. The distribution system must be sized to accommodate peak instantaneous flows with a minimum of 20 psi pressure existing in the system at all points.

When sizing the components of a water system, consideration must be given to anticipated indoor use, outdoor use and fire protection. Requirements for each of these categories are given herein. They must be added together before commencing design.

If acceptable data are presented showing that the requirements made herein are excessive for a given project, the requirements may be appropriately reduced on a case by case basis by the Executive Secretary.

Requirements for storage capacity may be reduced by the Executive Secretary if a reliable source with sufficient excess capacity is available. See Section 111-1.

Some of the standards given herein are written in terms of "Per Equivalent Residential Connection". When evaluating a community water system the designer must ascertain if any connections to the water system are non-residential in character. The expected potable water demand by any non-residential connection can be reduced to an equivalent (e.g. an industrial connection may be considered to be five "Equivalent Residential Connections"). Table 5.1 can provide guidance in this evaluation.

R309-105-1. Indoor Water Use.

1.1 Community Water Systems, Indoor Use

a. Source Capacity -

Source(s) must be capable of providing 800 GPD/equivalent residential connection for indoor use. They must also be capable of providing a total of 146,000 gallons per equivalent residential connection per year for indoor use. The water supplier must have a legal right to use the required amount of water.

b. Storage Capacity -

Finished water storage shall have a capacity of 400 gallons per equivalent residential connection for indoor use.

c. Distribution System -

The distribution system shall be designed to insure that a minimum of 20 psi exists at all points within the system during peak instantaneous flow conditions.

Peak instantaneous flow to be assumed for indoor use is as follows:

Q = 10.8 N0.64

Where N equals the total number of equivalent residential connections, and Q equals the total flow (in GPM) delivered to these connections.

1.2 Non-Community Water Systems, Indoor Use

1.2.1 Recreation Camps

1.2.1a Modern Recreation Camps, Indoor Use

a. Definition -

Modern Camp means a campground accessible by any type of vehicular traffic. The camp is used wholly or in part for recreation, training or instruction, social, religious activity or physical education or whose primary purpose is to provide an outdoor group living experience. The site is equipped with permanent buildings for the purpose of sleeping, a culinary water supply under pressure, food service facilities, and may be operated on a seasonal or short term basis. These types of camps shall include but are not limited to privately owned campgrounds such as youth camps, church camps, boy or girl scout camps, mixed age groups, family group camps, etc.

b. Assumed Demands, Indoor Use

Source Capacity - 60 GPD/person

Storage capacity - 30 gal/person

The distribution system serving modern camps with full facilities and day use areas shall maintain water system pressure in excess of 20 psi at all points in the distribution system during peak instantaneous flow conditions. Non-community systems in remote areas can be exempted from this requirement, on a case-by-case basis, if flow from the system is always unregulated and free-flowing. The peak instantaneous flow will be calculated on the number of fixture units as presented in the Utah Plumbing Code.

1.2.1b Semi-Developed Camps, Indoor Use

a. Definition -

Semi-developed Camp. A campground accessible by any type of vehicular traffic. Facilities are provided for both protection of site and comfort of users. Roads, trails and campsites are defined and basic facilities (water, flush toilets and/or vault toilets, tables, fireplaces or tent pads) are provided. The camps include but are not limited to

National Forest campgrounds, Bureau of Reclamation campgrounds, and youth camps.

b. Assumed Demands, Indoor Use

Source Capacity for indoor use at semi-developed camps with basic facilities shall be a minimum of 5 GPD/person. Where flush toilets are utilized source capacity shall be 20 gpd/person.

Storage capacity shall be a minimum of 2.5 gal/person. Where flush toilets are utilized storage capacity shall be 10 gal/person.

The Distribution System serving semi-developed camps and day use areas shall maintain a water system pressure in excess of 20 psi at all points in the distribution system during peak instantaneous flow conditions. Non-community systems in remote areas can be exempted from this requirement, on a case-by-case basis, if flow from the system is always unregulated and free-flowing. The peak instantaneous flow will be calculated on the number of fixture units as presented in the Utah Plumbing Code.

1.2.2 Hotels, Motels and Resorts, Indoor Use

a. Definition -

Hotel, Motel or Resort shall include tourist court, motor hotel, resort camps, hostels, lodges, dormitories and similar facilities, and shall mean every building, or structure with all buildings and facilities in connection, kept, used, maintained as, advertised as, or held out to the public to be, a place where living accommodations are furnished to transient guests or to groups normally occupying such facilities on a seasonal or short term basis.

b. Assumed Demands, Indoor Use

Source Capacity - 150 GPD/ hotel, motel or resort unit for indoor use.

Storage Volume - 75 gal/ hotel, motel or resort unit for indoor use.

Distribution System Capacity shall maintain a water system pressure in excess of 20 psi at all points in the distribution system during peak instantaneous flow conditions. The peak instantaneous flow should be calculated for the number of fixture units as presented in the Utah Plumbing Code.

1.2.3 Labor Camps, Indoor Use

a. Definition -

Labor Camp shall mean one or more buildings, structures, or grounds set aside for use as living quarters for groups of migrant laborers or temporary housing facilities intended to accommodate construction, industrial, mining or demolition workers, etc.

b. Assumed Demands, Indoor Use

Source Capacity for indoor use at labor camps shall be 50 GPD/person.

Storage capacity shall be 25 gal/person.

The Distribution System serving labor camps shall maintain a water system pressure in excess of 20 psi at all points in the distribution system during peak instantaneous flow conditions. The peak instantaneous flow will be calculated on the number of fixture units as presented in the Utah Plumbing Code. Non-community systems in remote areas can be exempted from this requirement, on a case-by-case basis, if flow from the system is always unregulated and free-flowing.

1.2.4 Recreational Vehicle Parks, Indoor Use

a. Definition -

Recreational Vehicle Park shall mean any site, tract or parcel of land on which facilities have been developed to provide temporary living quarters for recreational vehicles. Such a park may be developed or owned by a private, public or non-profit organization catering to the general public or restricted to the organizational or institutional member and their guests only.

b. Assumed Demands, Indoor Use

Source capacity - 100 GPD/ per vehicle for indoor use.

Storage volume shall be 50 gal/ vehicle space for indoor use.

The Distribution system shall maintain a water system pressure in excess of 20 psi at all points in the distribution system during peak instantaneous flow conditions. Non-community systems in remote areas can be exempted from this requirement, on a case-by-case basis, if flow from the system is always unregulated and free-flowing. The peak instantaneous flow for indoor use shall be based on the following:

TABLE

No. Connections	Formula
0 to 59	Q = 4N
60 to 239	Q = 80 + 20(N)1/2
240 or greater	Q = 1.6N

Where Q is total peak instantaneous demand in (GPM) and N is the maximum number of connections. However, if the only winter use is via service buildings the peak instantaneous flow shall be calculated for the number of fixture units as presented in the

Utah Plumbing Code.

1.2.5 Roadway Rest Stop, Indoor Use

a. Definition -

Roadway Rest Stop shall mean any building, or buildings, or grounds, parking areas, including the necessary toilet, hand washing, water supply and wastewater facilities intended for the accommodation of people using such facilities while traveling on public roadways. It does not include scenic view or roadside picnic areas or other parking areas if these are properly identified as not offering public facilities.

b. Source Capacity shall be 7 gal/ vehicle served during peak day (with flushometer valves).

c. Storage Volume shall be 3.5 gal/ vehicle served during peak day (with flushometer valves).

d. The Distribution System shall maintain water system pressure in excess of 20 psi at all points in the distribution system during peak instantaneous flow conditions. The peak instantaneous flow shall be calculated on a per building basis for the number of fixture units as presented in the Utah Plumbing Code. Non-community systems in remote areas can be exempted from this requirement, on a case-by-case basis, if flow from the system is always unregulated and free-flowing.

1.2.6 Summer Home Developments, Indoor Use

a. Definition -

Summer Home Developments are subdivision-type developments intended to be occupied only during the moderate months of the year when road closure due to snow does not occur. A water system serving such a development must be drained during part of the year in order to qualify for the quantities given below. A statement that the water system will be shut down during the off-season must be included in the restrictive covenants of the subdivision.

b. Source Capacity - Source(s) must be physically and legally capable of providing 400 GPD/connection and meet the anticipated yearly demand for indoor use.

c. Storage Capacity - Finished water storage shall have a capacity of 300 gallons per connection for indoor use.

d. Distribution System Capacity - shall maintain a dynamic water system pressure in excess of 20 psi during peak instantaneous flow conditions. The peak instantaneous flows must be determined from the following:

$Q = 10.8\ N^{0.64}$

Where N equals the total number of connections and Q equals the total flow (in GPM) delivered to these connections.

1.2.7 Miscellaneous Non-Community Systems, Indoor Use

Water supply requirements for a variety of non-community institutions are given in Table 5.1.

Water supply requirements for institutions not specifically described in this section shall be judged using the best available information.

TABLE 5.1
NON-COMMUNITY SYSTEMS
ESTIMATED INDOOR WATER REQUIREMENTS (a)
(does not include irrigation or fire flow)

NOTE:

1. Source capacity must at least equal the peak daily demand of the system. Determine this by assuming the facility is used to its maximum.

2. Generally, storage capacity must at least equal one average day's flow.

3. Peak instantaneous flows should be determined by fixture unit analysis as per the Utah Plumbing Code.

Type of Establishment	Gallons
Airports	
a. per passenger	3
b. per employee	15
Boarding Houses	
a. for each resident boarder and employee	50
b. additional for each nonresident boarders	10
Bowling Alleys	

a. with snack bar	100	per alley
b. with no snack bar	85	per alley
Churches		
a. per person	5	
Country Clubs		
a. per resident member	100	
b. per nonresident member present	25	
c. per employee	15	
Dentist's Office		
a. per chair	200	
b. per staff member	35	
Doctor's Office		
a. per patient	10	
b. per staff member	35	
Fairgrounds	1	per person
Fire Stations		
a. with full-time employees and food preparation	70	per person
b. with no full-time employees and no food preparation	5	per person
Gyms		
a. per participant	25	
b. per spectator	4	
Hairdresser		
a. per chair	50	
b. per operator	35	
Hospitals	250	per bed space
Industrial Buildings (exclusive of industrial waste)		
a. with showers, per 8 hour shift	35	per person
b. with no showers, per 8 hour shift	15	per person
Launderette	580	per washer
Movie Theaters		
a. auditorium	5	per seat
b. drive-in	10	per car space
Nursing Homes	200	per bed space
Office Buildings and Business Establishments (sanitary wastes only, per shift)		
a. with cafeteria	25	per employee
b. with no cafeteria	15	per employee
Picnic Parks (toilet wastes only)	5	per person
Restaurants		
a. ordinary restaurants (not 24 hour service)	35	per seat
b. 24 hour service	50	per seat
c. single service customer utensils only	2	per customer
d. or, per customer served (includes toilet and kitchen wastes)	10	
Rooming House	40	per person
Schools		
a. boarding	75	per person
b. day, without cafeteria, gym or showers	15	per person
c. day, with cafeteria, but no gym or showers	20	per person
d. day, with cafeteria, gym and showers	25	per person
Service Stations (b) (per vehicle served)	10	
Skating Rink, Dance Halls, etc.		
a. no kitchen wastes	10	per person

b. Additional for kitchen wastes	3 per person
Ski Areas (no kitchen wastes)	10 per person
Stores	
a. per public toilet room	500
b. per employee	11
Swimming Pools and Bathhouses (c)	10 per person
Taverns, Bars, Cocktail Lounges	20 per seat
Visitor Centers	5 per visitor

(a) When more than one use will occur, the multiple use shall be considered in determining total flow. Small industrial plants maintaining a cafeteria and/or showers and club houses or motels maintaining swimming pools and/or laundries are typical examples of multiple uses. Uses other than those listed above shall be considered in relation to established flows from known or similar installations.

(b) or 250 GPD per pump or,
(c) 20 x (Water Area (F2) / 30) + Deck Area (Ft2)

R309-105-2. Irrigation Requirements.

2.1 General

Often-times, a culinary water system must provide all, or part, of the irrigation water in a given service area. Where this is the case, these demands must be added to indoor demands (Section 105-1) and fire flow requirements (Section 105-3).

The information provided herein is given as a guideline for the design engineer. In the absence of other acceptable data, however, the criteria given herein will be used by the Bureau of Public Water Supplies in evaluating irrigation demands.

2.2 Procedure for Determining Irrigation Demands

1. Determine the location of the water system on Map 5-1 and find which zone (i.e. 1, 2, 3, 4, 5, or 6) it lies within.

2. Determine the net number of acres which will be irrigated. If the gross acreage is known, subtract out area of pavement and housing foundations, etc., to determine actual number of irrigated acres.

Before any other land area which may be considered "non-irrigated" (e.g. steep slopes, wooded areas, etc.) is subtracted from the gross area, the Bureau of Public Water Supplies must be consulted and agree that the land in question will not be irrigated. For instance, in the case of a heavily wooded mountain home subdivision, it may be claimed that large lawns will not be put in by the lot owners. The Bureau must review and concur with this judgement.

3. Refer to Table 5-2 to determine peak day (source), peak instantaneous (distribution system) and storage requirements.

4. Add these requirements to indoor and fire flow requirements (Section 105-1 and 105-3).

2.3 Limitations on Outdoor Use

Where an engineer, developer or water supplier claims that there will be no outside use of water (e.g. in a summer home development) documentation (typically a copy of the restrictive covenants) must be provided to prove that legal means exists to restrict outside use.

TABLE 5-2
IRRIGATION DEMANDS
(to be added to indoor and fire flow demands)

Zone	Peak Day Demand (1) (GPM/Irr. acre)	Average Yearly Demand (2) (A-ft/Yr per Irr. acre)	Storage Requirement (Gal/Irr. acre)	Peak Instantaneous Demand (3) (GPM/Irr. acre)
1	2.26	1.17	1,782	4.52
2	2.80	1.23	1,873	5.60
3	3.39	1.66	2,528	6.78
4	3.96	1.87	2,848	7.92
5	4.52	2.68	4,081	9.04
6	4.90	3.26	4,964	9.80

(1) Source(s) must be legally and physically capable of meeting peak day demands.

(2) Source(s) must be legally and physically capable of meeting average yearly

demand.

(3) For distribution system sizing.

R309-105-3. Fire Flow Requirements.

Public water supplies are not required to provide fire protection by these regulations. Fire protection may be required, however, by other jurisdictions such as local health departments, planning commissions, county commissions, etc. It is highly recommended that fire protection be designed into a water system particularly where a community is being served.

Where a water system is to provide fire protection (as evidenced by the presence of fire hydrants) certain requirements are made by these regulations. See Sections 111-1, 112-0.1, 112-0.2., 112-0.3 and 112-0.4.

The desired degree of fire protection will influence the design of storage and distribution systems. In order for the Bureau of Public Water Supplies to evaluate the facility design, it will be necessary for the designing engineer to provide information on the assumed fire flows and water storage volume devoted to fire protection. Note that fire protection requirements are to be added to indoor and irrigation requirements as determined from Sections 105-1 and 105-2.

Generally, fire flow must be at least 500 GPM and may be significantly more. For additional information refer to the "Fire Suppression Rating Schedule" published by the Insurance Service Office (160 Water Street, N.Y., N.Y. 10038) or local codes or regulations.

KEY: drinking water, environmental health
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Notice of Continuation 1993

R309. Environmental Quality, Drinking Water.
R309-106. Source Development.
R309-106-1. Definitions.

"Board" means the Drinking Water Board.

"Community water system" means a public water system which serves at least fifteen service connections used by year-round residents or regularly serves at least twenty-five year-round residents.

"Executive Secretary" means the executive secretary of the board.

"Non-community water system" means a public water system that is not a community water system or a non-transient non-community water system.

"Non-Transient Non-Community Water System" means a public water system that is not a community system and that regularly serves at least 25 of the same persons for more than six months per year. Examples are separate systems serving workers and schools.

R309-106-2. Authority and Purpose.

(1) This rule is authorized by Section 19-4-104(1)(a), Utah Code Unannotated 1992, which allows the Board to make rules in accordance with Title 63, Chapter 46a, Utah Administrative Rulemaking Act, for the purposes outlined in Section 19-4-104.

(2) The purpose of this rule is to specify standards for the development of culinary water sources for use in public water systems.

R309-106-3. General.

(1) In selecting a source of water for development, the designing engineer shall demonstrate to the satisfaction of the Executive Secretary that the source or sources selected for use in culinary water systems shall be of satisfactory quality. To accomplish these goals the water utility shall develop the best available source which is economically and technically feasible.

(a) Required Quantity

Generally, the total developed source capacity(ies) shall equal or exceed the peak daily demand of the system. Refer to R309-105 of these rules for required system capacity.

(b) Required Quality

Each new source shall monitor for drinking water contaminants in accordance with their respective water system category requirements (Community, Non-transient non-community or Non-community) as indicated in R309-104 and the finished quality of water developed from the source must comply with the standards as set forth in R309-103 of these rules.

In addition all new drinking water sources, regardless of system category, shall submit initial sample(s) which include all the primary and secondary inorganic contaminants listed in R309-103, Table 103-1 and Table 103-5 (excluding Asbestos unless it would be required by R309-104-4.1.2); along with the following: Ammonia as N; Boron; Calcium; Chromium, Hex as Cr; Copper; Lead; Magnesium; Potassium; Turbidity, as NTU; Specific Conductivity at 25 degrees celsius, u mhos/cm; Bicarbonate; Carbon Dioxide; Carbonate; Hydroxide; Phosphorous, Ortho as P; Silica, dissolved as SiO_2; Surfactant as MBAS; Total Hardness as $CaCO_3$; and Alkalinity as $CaCO_3$.

All analyses shall be performed by a certified laboratory as required by R309-104-3. Specially prepared sample bottles are required.

(c) Classification

The Executive Secretary shall classify all existing or new sources as either:

(i) surface water or ground water under direct influence of surface water which will require conventional complete treatment or an approved equivalent, or as

(ii) ground water not under the direct influence of surface water.

(d) Location

The latitude and longitude, to at least the nearest second, of each new source shall be submitted to the Executive Secretary prior to source approval.

(2) Upon determination that a source is under the direct influence of surface water, conventional complete treatment or an approved equivalent must be installed within 18 months or the source abandoned. Classification of existing sources will be based upon evaluation of part or all of the following:

(a) Records review; including review of plans and specifications used for construction of collection facilities as submitted for review and approval prior to construction; review of as-built plans as submitted after construction, especially where springs are concerned; review of previous sanitary surveys; and review of any system bacteriological violations which may be linked directly to a source.

(b) Results of written survey form.

(c) On-site inspection by Division personnel.

(d) Special tests such as Microscopic Particulate Analysis (MPA), dye tracer studies, or time of travel studies done in conjunction with the source protection program. Because of critical timing for tests such as the MPA, accelerated monitoring and reporting of

water characteristics as mentioned in R309-104-4.5.3 may be required prior to MPA sampling.

(3) Classification of existing ground water sources, as to whether or not they are under direct influence of surface water, shall be made by the Executive Secretary on or before June 29, 1994 for community systems and on or before June 29, 1999 for non-community systems. System operators and engineers are encouraged to start immediately to monitor existing or planned sources so as to determine the possibility of surface water influence. Frequent monitoring of turbidity, temperature, pH and conductivity of source water, in conjunction with similar monitoring of nearby surface waters may, if properly documented, provide sufficient evidence that the source is not influenced. System operators and engineers are encouraged to contact the Division of Drinking Water for further advice prior to any such monitoring.

R309-106-4. Surface Water.

(1) A surface water source is as later defined in R309-106-7 and shall include, but not be limited to, tributary systems, drainage basins, natural lakes, artificial reservoirs, impoundments and springs or wells which have been classified as being directly influenced by surface water. Surface water sources will not be considered for culinary use unless they can be rendered acceptable by conventional complete treatment or other equivalent treatment techniques acceptable to the Executive Secretary.

(2) Information to be Submitted

The following information must be submitted to the Executive Secretary and approved in writing before commencement of design of diversion structures and/or water treatment facilities:

(a) A copy of the chemical analyses required by R309-106-3(1)(b).

(b) A sanitary survey of the watershed tributary to the watercourse along which diversion structures are proposed. The sanitary survey shall include the location and an evaluation of the extent of all factors both natural and man-made which may affect the quality of the water supply source. Handouts are available from the Division of Drinking Water for suggested topics of the survey report.

(3) Following approval of a surface water source, the following additional information must be submitted for review and approval prior to commencement of construction:

(a) Evidence that the water system owner has a legal right to divert water from the proposed source for domestic or municipal purposes.

(b) Documentation regarding the minimum firm yield which the watercourse is capable of producing.

(c) Complete plans and specifications and supporting documentation for the proposed treatment facilities.

(4) Quantity

The quantity of water from surface sources shall:

(a) Be assumed to be no greater than the low flow of a 25 year recurrence interval or the low flow of record for these sources when 25 years of records are not available,

(b) Meet or exceed the anticipated peak daily water demand and provide a reasonable surplus for anticipated growth as required in R309-105,

(c) Be adequate to compensate for all losses such as silting, evaporation, seepage, and sludge disposal which would be anticipated in the normal operation of the treatment facility.

(5) Diversion Structures

Design of intake structures shall provide for:

(a) Withdrawal of water from more than one level if quality varies with depth,

(b) Separate facilities for release of less desirable water held in storage,

(c) Minimizing frazil ice formation. Holding the velocity or flow into the intake structure to a minimum generally not to exceed 0.5 feet per second is recommended,

(d) Adequate protection against rupture due to ice build up where applicable,

(e) a diversion device capable of keeping large quantities of fish or debris from entering an intake structure,

(f) suitable protection of pumps where used to transfer diverted water. Refer to R309-110-2.8.

(6) Impoundments

The design of an impoundment reservoir shall provide for, where applicable:

(a) Removal of brush and trees to the high water level,

(b) Protection from floods during construction,

(c) Abandonment of all wells which may be inundated. The applicable requirements of the Utah State Division of Water Rights must be met,

(d) Adequate precautions to limit nutrient loads.

R309-106-5. Ground Water - Wells.

(1) If properly developed, water from wells may be suitable for culinary use without

treatment. A determination as to whether treatment may be required can only be made after the source has been developed and evaluated.

The Utah Division of Water Rights (State Engineer's Office) regulates the drilling of water wells. Their administrative rules for water well drillers should also be consulted.

(2) Information Required Prior to Well Drilling

The following information must be submitted and receive a favorable review prior to the start of drilling a public water culinary well:

(a) Specifications governing the well drilling,

(b) A location map showing land ownership.

(c) A Preliminary Evaluation Report in accordance with R309-113-13(2).

(3) Information Required After Completion of Well Drilling

After completion of the well drilling the following information must be submitted and receive a favorable review before the water from the well can be introduced into a public water system:

(a) A copy of the "Report of Well Driller" as required by the State Engineer's Office which is complete in all aspects and has been stamped as received by the same,

(b) Inspection and confirmation by the Executive Secretary that the well was grouted in accordance with the well drilling specifications and the requirements of this rule,

(c) A copy of the pump test including the yield vs. drawdown test as described in R309-106-5(6)(a),

(d) A copy of the chemical analyses required by R309-106-3(1)(b). The samples for the analysis should be collected after the well has been continuously pumped for 24 hours.

(e) Documentation indicating that the water system owner has a right to divert water for domestic or municipal purposes from the well source,

(f) A copy of complete plans and specifications covering the well equipment and diversion piping necessary to introduce the water from the well into the distribution system,

(g) A bacteriological analysis of water obtained from the well after installation of permanent equipment, disinfection and flushing.

(4) Protection Zones

(a) Refer to R309-113 for the Drinking Water Source Protection Rule.

Where necessary to protect the quality of the well water the Executive Secretary may require that certain wells be fenced in a manner similar to fencing required around spring areas.

(b) Sewers Within Well Protection Zones

If certain precautions are taken, sewer lines may be permitted at the discretion of the Executive Secretary.

Sewer Lines may be permitted as follows:

(i) Zone One of Confined Aquifers - Specially constructed sewer lines (see R309-106-5(4)(c)) may be permitted to be located no less than ten feet from the well head.

(ii) Zones One and Two of Unconfined Aquifers - Specially constructed sewers (see R309-106-5(4)(c)) may be located no less than 300 feet from the wellhead on all lands equal to or above the operating water level in the well. These same facilities may be permitted to be no less than 30 feet downhill from the intersection of the operating water level elevation with the ground surface or 300 feet from the well head, whichever is less.

(c) Required Special Sewer Construction Within Zone One of Confined Aquifers and Zones One and Two of Unconfined Aquifers

(i) Pipe

(A) Sewer pipe main and laterals shall be constructed of mechanical joint ductile iron pipe.

(B) Lateral to main connections shall be shop fabricated or saddled with mechanical clamping watertight devices.

(ii) Manholes

(A) The sewer manhole base and walls to a depth of at least 12 inches above the pipe soffit of the connecting sewer pipe shall be shop fabricated in a single concrete pour.

(B) Concrete manholes shall be adequately reinforced with steel.

(C) Sewer pipe to manhole connections shall be made using a shop fabricated sewer pipe seal ring cast into the concrete manhole base. Further, a mechanical joint pipe connection must be installed within 12 inches of the manhole base on each pipeline connection within the manhole.

(iii) Testing

Following installation, the sewer main, laterals and manholes shall be air pressure tested and comply with recommendations as presented in the April 1964 issue of the Journal of Sanitary Engineering Division Proceedings of the American Society of Civil Engineers before being accepted for use.

(5) Well Materials - Design and Construction

When any product is used to coat, seal, patch or otherwise attach itself to the surface of any well construction material in such a way as to come into contact with the drinking water, effective June 29, 1993, the product shall comply with National Sanitation Foundation (NFS) Standard 61.

(a) Permanent Steel Casing Pipe Shall:

(i) Be new pipe meeting AWWA specifications for a minimum weight and thickness as given in Table 106-1,

(ii) Have additional thickness and weight if minimum thickness is not considered sufficient to assure reasonable life expectancy of the well,

(iii) Be capable of withstanding forces to which it is subjected,

(iv) Be equipped with a drive shoe when driven,

(v) Have full circumferential welds or threaded coupling joints,

(vi) Project at least 18 inches above the anticipated final ground surface and at least 12 inches above the anticipated pump house floor level. At sites subject to flooding the top of the well casing shall terminate at least five feet above the highest known flood elevation.

TABLE 106-1
MINIMUM WALL THICKNESS FOR STEEL WELL CASING

Nominal Size In Inches	Diameters External	In Inches Internal	Wall Thickness In Inches	Schedule Number
2	2.375	2.067	0.154	40
2-1/2	2.875	2.469	0.203	40
3	3.500	3.068	0.216	40
3-1/2	4.000	3.548	0.226	40
4	4.500	4.026	0.237	40
5	5.563	5.047	0.258	40
6	6.625	6.065	0.280	40
8	8.625	8.071	0.277	30
10	10.750	10.136	0.307	30
12	12.750	12.090	0.330	30
14	14.000	13.250	0.375	30
16	16.000	15.250	0.375	30
18	18.000	17.124	0.438	30
20	20.000	19.250	0.375	20
24	24.000	23.250	0.375	20

(b) Non-Ferrous Casing Material

The use of any non-ferrous material for a well casing shall receive prior approval of the Executive Secretary based on the ability of the material to perform its desired function. Thermoplastic water well casing pipe shall meet ANSI/ASTM Standard F480-76 and shall bear the logo NSF-wc indicating approval by the National Sanitation Foundation.

(c) Packers

Packers, if used, shall be of material that will not impart taste, odor, toxic substances or bacterial contamination to the well water. Lead, or partial lead packers are specifically prohibited.

(d) Screens

The use of well screens is recommended where appropriate and, if used, they shall:

(i) Be constructed of material resistant to damage by chemical action of groundwater or cleaning operations,

(ii) Have size of openings based on sieve analysis of formations or gravel pack materials,

(iii) Have sufficient diameter to provide adequate specific capacity and low aperture entrance velocities. Usually the entrance velocities should not exceed 0.1 feet per second,

(iv) Be installed so that the operating water level remains above the screen under all pumping conditions,

(v) Where applicable be designed and installed to permit removal or replacement without adversely affecting watertight construction of the well.

(e) Plumbness and Alignment Requirements

(i) Every well should be tested for plumbness and vertical alignment in accordance with AWWA Standard A100.

(ii) The test method and allowable tolerances should be clearly stated in the specifications.

(iii) If the well fails to meet the requirements it may, at the discretion of the design engineer, be accepted if it does not interfere with the installation or operation

of the pump or uniform placement of grout.

(f) Casing Perforations

The placement of perforations in the well casing shall:

(i) Be so located to permit as far as practical the uniform collection of water around the circumference of the well casing,

(ii) Be of dimensions and size to restrain the water bearing soils from entrance into the well.

(g) Grouting Techniques and Requirements

All permanent well casing should be grouted in order to prevent the seepage of undesirable surface or ground water along the casing into the water bearing aquifer. If a well is to be considered in a confined aquifer, the grouting requirements of this section must be met.

(i) Consideration During Well Construction

(A) Sufficient annular opening shall be provided to permit a minimum of two inches of grout around permanent casings, including couplings. However, this requirement can be waived if a well drilled by cable tool method or another previously reviewed acceptable method wherein the casing is driven closely behind the drill tool and the casing penetrates a continuous clay strata of at least 30 feet in thickness located above the water bearing aquifer and a tight seal between the clay strata and the casing is thereby achieved. If the clay strata is expansive or if to reduce friction between the borehole wall and the casing, the driller adds a drilling fluid slurry around the outside of the casing during driving which contains a swelling bentonite compound; and as a result of either of the above, the potentiometric surface of the production aquifer is substantially higher than the potentiometric surface of the overlying aquifer such that the well can be classified as "a well in a confined aquifer" as defined in R309-113 then no additional grout seal may be required. The driller must notify the Division of Drinking Water, supplying sufficient information about the drill site, geologic formations and his drilling equipment, and receive approval from the Executive Secretary prior to seeking this waiver.

(B) Additional information is available from the Division of Drinking Water for recommended construction methods for grout placement.

(C) The casing(s) must be provided with sufficient guides welded to the casing to permit unobstructed flow and uniform thickness of grout.

(ii) Grouting Materials

(A) Neat Cement Grout

Cement, conforming to ASTM Standard C150, and water, with no more than six gallons of water per sack of cement, must be used for two inch openings. Additives may be used to increase fluidity subject to approval by the Executive Secretary.

(B) Concrete Grout

Equal parts of cement conforming to ASTM standard C150, and sand, with not more than six gallons of water per sack of cement may be used for openings larger than two inches.

(C) Clay Seal

Where an annular opening greater than six inches is available a clay seal of clean local clay mixed with at least ten percent swelling bentonite may be used when approved by the Executive Secretary.

(iii) Application

(A) When the annular opening is less than four inches, grout shall be installed under pressure, by means of a positive displacement grout pump, from the bottom of the annular opening to be filled.

(B) When the annular opening is four or more inches and 100 feet or less in depth, and concrete grout is used, it may be placed by gravity through a grout pipe installed to the bottom of the annular opening in one continuous operation until the annular opening is filled.

(C) All temporary construction casings should be removed but shall be withdrawn at least five feet during the grouting operation to ensure grout contact with the native formations.

(D) When a "well in a confined aquifer" classification is desired, the grout seal must extend from the surface down to, and into, an effective geologic sealing strata for a distance of at least five feet.

(E) After cement grouting is applied, work on the well shall be discontinued until the cement or concrete grout has properly set; usually a period of 48 hours.

(h) Water Entered Into Well During Construction

Any water entering a well during construction shall not be contaminated and should be obtained from a chlorinated municipal system. Where this is not possible the water must be dosed to give a 100 mg/l free chlorine residual. Refer also to the administrative rules of the Division of Water Rights in this regard.

(i) Gravel Pack Wells

The following shall apply to gravel packed wells:

(i) The gravel pack material shall be of well rounded particles, 95 percent siliceous

material, that are smooth and uniform, free of foreign material, properly sized, washed and then disinfected immediately prior to or during placement.

(ii) Gravel pack shall be placed in one uniform continuous operation.

(iii) Gravel refill pipes, when used, shall be Schedule 40 steel pipe incorporated within the pump foundation and terminated with screwed or welded caps at least 12 inches above the pump house floor or concrete apron.

(iv) Gravel refill pipes located in the grouted annular opening shall be surrounded by a minimum of 1.5 inches of grout.

(v) Protection from leakage of grout into the gravel pack or screen shall be provided.

(vi) Permanent inner and outer casings shall meet requirements of R309-106-5(5)(a) or R309-106-5(5)(b).

(6) Well Development

Following completion of the well drilling activities the well shall be developed as appropriate and as designated by the engineer except that toxic washing chemicals shall not be used without prior approval of the Executive Secretary.

(a) Yield and Drawdown Test

Preliminary to the constant-rate test required below, it is recommended that a step-drawdown test (uniform increases in pumping rates over uniform time intervals with single drawdown measurements taken at the end of the intervals) be conducted so as to determine the maximum pumping rate for the desired intake setting.

A "constant-rate" yield and drawdown test shall:

(i) Be performed on every production well after construction or subsequent treatment and prior to placement of the permanent pump,

(ii) Have the test methods clearly indicated in the specifications,

(iii) Have a test pump with sufficient capacity that when pumped against the maximum anticipated drawdown, it will be capable of pumping at least 1.5 times the desired design discharge rate,

(iv) Provide for continuous pumping for at least 24 hours or until stabilized drawdown has continued for at least six hours when test pumped at a constant rate equal to 1.5 times the desired design discharge rate,

(v) Provide the following data:

(A) Test pump capacity vs. head characteristics (manufacturer's pump curve)

(B) Static water level (in feet to the nearest tenth, as measured from an identified datum; usually the top of casing)

(C) Depth of test pump setting

(D) Time and date of starting and ending test(s)

(vi) For the constant-rate test provide the following at time intervals sufficient for at least ten essentially uniform intervals for each log cycle of the graphic evaluation required below,

(A) Record the time since starting test (in minutes)

(B) Record the actual pumping rate

(C) Record the pumping water level (in feet to the nearest tenth, as measured from the same datum used for the static water level)

(D) Record the drawdown (pumping water level minus static water level in feet to the nearest tenth)

(E) Provide graphic evaluation on semilogarithmic graph paper by plotting the drawdown measurements on the arithmetic scale at locations corresponding to time since starting test on the logarithmic scale

(vii) Immediately after termination of the constant-rate test, and for a period of time until there are no changes in depth to water level measurements for at least six hours, record the following at time intervals similar to those used during the constant-rate pump test,

(A) Time since stopping pump test (in minutes)

(B) Depth to water level (in feet to the nearest tenth, as measured from the same datum used for the pumping water level)

(b) Well Disinfection

Every new, modified, or reconditioned well including pumping equipment shall be disinfected before being placed into service for culinary water use. These shall be disinfected according to AWWA Standard C654 published by the American Water Works Association as modified to incorporate the following as a minimum standard:

(i) The well shall be disinfected with a chlorine solution of sufficient volume and strength and so applied that a concentration of at least 50 parts per million is obtained in all parts of the well and comes in contact with equipment installed in the well. This solution shall remain in the well for a period of at least eight hours.

(ii) A satisfactory bacteriologic water sample analysis must be obtained prior to the use of the well as a culinary water source.

(7) Well Equipping

(a) Naturally Flowing Wells

(i) Flow shall be controlled.

(ii) Permanent casing and grout shall be provided.

(iii) If erosion of the confining bed adjacent to the well appears likely, special protective construction may be required by the Division of Drinking Water.

(b) Line Shaft Pumps

Wells equipped with line shaft pumps shall

(i) Have the casing firmly connected to the pump structure or have the casing inserted into the recess extending at least 0.5 inches into the pump base,

(ii) Have the pump foundation and base designed to prevent water from coming into contact with joints between the pump base and the casing,

(iii) Be designed such that the intake of the well pump is at least ten feet below the maximum anticipated drawdown elevation.

(c) Submersible Pumps

Where a submersible pump is used

(i) The top of the casing shall be effectively sealed against the entrance of water under all conditions of vibration or movement of conductors or cables,

(ii) The electrical cable shall be firmly attached to the riser pipe at 20 foot intervals or less,

(iii) A casing vent shall be provided if rapid water drawdown is expected,

(iv) The intake of the well pump must be at least ten feet below the maximum anticipated drawdown elevation.

(d) Pitless Well Units and Adapters

Pitless well units and adapters shall

(i) Not be used unless the specific application has been approved by the Executive Secretary,

(ii) Terminate at least 18 inches above final ground elevation or five feet above the highest known flood elevation whichever is greater,

(iii) Be approved by the National Sanitation Foundation or the Pitless Adapter Association or other appropriate Review Authority,

(iv) Have access to disinfect the well,

(v) Have a properly constructed casing vent meeting the requirements of R309-106-5(7)(f),

(vi) Have facilities to measure water levels in the well (see R309-106-5(7)(g)),

(vii) Have a cover at the upper terminal of the casing that will prevent the entrance of contamination,

(viii) Have a contamination-proof entrance connection for the electrical cable,

(ix) Allow at least one check valve within the well casing,

(x) Be lockable or otherwise protected against vandalism or sabotage.

(xi) Be shop-fabricated from the point of connection with the well casing to the unit cap or cover,

(xii) Be of watertight construction throughout,

(xiii) Be of materials and weight at least equivalent and compatible to the casing,

(xiv) Have field connection to the lateral discharge from the pitless unit of threaded, flanged or mechanical joint connection,

(xv) Be threaded or welded to the well casing. If the connection to the casing is by field weld, the shop assembled unit must be designed specifically for field welding to the casing. The only field welding permitted on the pitless unit will be that needed to connect a pitless unit to the casing, and

(xvi) Have an inside diameter as great as that of the well casing, up to and including casing diameters of 12 inches, to facilitate work and repair on the well, pump, or well screen.

(e) Well Discharge Piping

(i) The discharge piping shall

(A) Be designed so that the friction loss will be low,

(B) Have control valves and appurtenances located above the pump house floor when an above-ground discharge is provided,

(C) Be protected against the entrance of contamination,

(D) Be equipped with (in order of placement from the well head) a smooth nosed sampling tap, a check valve, a pressure gauge, a means of measuring flow and a shutoff valve,

(E) Where a well pumps directly into a distribution system, be equipped with an air release vacuum relief valve located upstream from the check valve, with exhaust/relief piping terminating in a down-turned position at least six inches above the floor and covered with a No. 14 mesh corrosion resistant screen. An exception to this requirement will be allowed provided specific proposed well head valve and piping design includes provisions for pumping to waste all trapped air before water is introduced into the distribution system,

(F) Have all exposed piping valves and appurtenances protected against physical

damage and freezing,

(G) Be properly anchored to prevent movement, and

(H) Be protected against surge or water hammer.

(ii) The discharge piping should be provided with a means of pumping to waste, but shall not be directly connected to a sewer. The discharge end of the pump-to-waste line shall be covered with No. 4 mesh corrosion resistant screen.

(f) Casing Vent

Provisions should be made for venting the well casing to atmosphere, particularly if a large or sudden water drawdown is expected. The vent shall terminate in a downturned position, at or above the top of the casing or pitless unit in a minimum 1.5 inch diameter opening covered with a No. 14 mesh, corrosion resistant screen. The pipe connecting the casing to the vent shall be of adequate size to provide rapid venting of the casing.

(g) Water Level Measurement

(i) Provisions shall be made to permit periodic measurement of water levels in the completed well.

(ii) Where permanent water level measuring equipment is installed it shall be made using corrosion resistant materials attached firmly to the drop pipe or pump column and installed in such a manner as to prevent entrance of foreign materials.

(h) Observation Wells

Observation wells shall be

(i) Constructed in accordance with the requirements for permanent wells if they are to remain in service after completion of a water supply well,

(ii) Protected at the upper terminal to preclude entrance of foreign materials.

(i) Electrical Protection

Sufficient electrical controls should be placed on all pump motors to eliminate electrical problems due to phase shifts, surges, lightning, etc.

(8) Well House Construction

The use of a well house is strongly recommended, particularly in installations utilizing above ground motors.

In addition to applicable provisions of R309-110, well pump houses shall conform to the following:

(a) The permanent casing for all ground water wells shall project at least 12 inches above the pump house floor or concrete apron surface and at least 18 inches above the final ground surface. However, casings terminated in underground vaults may be permitted if the vault is provided with a drain to daylight sized to handle in excess of the well flow and surface runoff is directed away from the vault access.

(b) Where a well house is constructed the floor surface shall be at least six inches above the final ground elevation and shall be sloped to provide drainage. A "drain-to-daylight" must be provided unless highly impractical.

(c) Sites subject to flooding shall be provided with an earth berm terminating at an elevation at least two feet above the highest known flood elevation or other suitable protection as determined by the Executive Secretary.

(d) The top of the well casing at sites subject to flooding shall terminate at least five feet above the highest known flood elevation.

(e) The well house shall be ventilated, heated and lighted in such a manner as to assure adequate protection of the equipment.

R309-106-6. Ground Water - Springs.

(1) General

Springs vary greatly in their characteristics and they should be observed for some time prior to development to determine any flow and quality variations. Some springs yield water which has been filtered underground for years, other springs yield water which has been filtered underground only a matter of hours. Even with proper development, the untreated water from certain springs may exhibit turbidity and high coliform counts. This indicates that the spring water is not being sufficiently filtered in underground travel.

(2) Information Required for Submission Before Spring Development

Before commencement of construction of spring development improvements the following information must be submitted to the Executive Secretary and approved in writing.

(a) Detailed plans and specifications covering the development work.

(b) A copy of an engineer's statement indicating the measured and/or anticipated flow from the spring source.

(c) A copy of documentation indicating the water system owner has a right to divert water for culinary purposes from the spring source.

(d) A copy of the chemical analyses required by R309-106-3(1)(b).

(e) A location map showing land ownership.

(f) A Preliminary Evaluation Report in accordance with R309-113-13(2).

(3) Information Required for Submission After Spring Development

After development of a culinary spring, the following information must be submitted:

(a) Proof of satisfactory bacteriologic quality.

(b) Information on the rate of flow developed from the spring.

(c) As-built plans of spring development.

The spring can be introduced into a public water supply only after it has been approved for use, in writing, by the Executive Secretary.

(4) Protection Zone

(a) Refer to R309-113 for the Drinking Water Source Protection Rule.

(b) Sewers Within Spring Protection Zones

If certain precautions are taken, sewer lines may be permitted at the discretion of the Executive Secretary.

Specially constructed sewer (see R309-106-5(4)(c)) may be permitted no less than 300 feet from a spring on all lands equal to, or above, the spring elevation. On lands below the spring elevation, these facilities may be permitted to no less than thirty feet from the spring.

(5) Spring Development

The development of springs for culinary purposes must comply with the following requirements:

(a) The spring collection device, whether it be collection tile, perforated pipe, imported gravel, infiltration boxes or tunnels must be covered with a minimum of ten feet of relatively impervious soil cover. Such cover must extend a minimum of 15 feet in all horizontal directions from the spring collection device.

(b) Where it is impossible to achieve the ten feet of relatively impervious soil cover, an acceptable alternate will be the use of an impermeable liner provided that:

(i) The liner has a total thickness of at least 12 mils,

(ii) All seams in the liner are folded or welded to prevent leakage,

(iii) The liner shall comply, effective June 29, 1993, with National Sanitation Foundation (NSF) Standard 61. This requirement is waived if certain that potable water will not contact the liner;

(iv) The liner is installed in such a manner as to assure its integrity. No stones, two inch or larger or sharp edged, shall be located within two inches of the liner,

(v) A minimum of two feet of relatively impervious soil cover is placed over the impermeable liner,

(vi) The soil and liner cover are extended a minimum of 15 feet in all horizontal directions from the collection devices.

(c) Each spring collection area must be provided with at least one junction box to permit spring inspection and testing.

(d) All junction boxes and collection boxes, must comply with R309-111 with respect to access manholes, air vents, and overflow piping. All lids for spring boxes must be gasketed and the chamber must be adequately vented.

(e) The spring collection area shall be surrounded by a fence located a distance of 50 feet (preferably 100 feet if conditions allow) from all collection devices on land at an elevation equal to or higher than the collection device, and a distance of 15 feet from all collection devices on land at an elevation lower than the collection device.

The elevation datum to be used is the surface elevation at the point of collection. The fence shall be at least stock tight. In remote areas where no grazing or public access is possible, the fencing requirement may be waived by the Executive Secretary. In populated areas a six foot high fence with three strands of barbed wire may be required.

(f) Within the fenced area all vegetation which has a deep root system shall be removed.

(g) A diversion channel capable of diverting all anticipated surface water runoff away from the spring area must be constructed and should be located immediately inside the fenced area.

(h) A Permanent flow measuring device shall be installed. Flow measurement devices such as critical depth meters or weirs shall be properly housed and otherwise protected.

(i) The spring shall be developed as thoroughly as possible so as to minimize the possibility of excess spring water ponding within the collection area. Where the ponding of spring water is unavoidable, the excess shall be collected by shallow piping or french drain and be routed beyond the immediate collection area.

R309-106-7. Additional Definitions.

"Ground water" means any water beneath the surface of the ground with sufficient natural filtration from geologic formations such that there are no significant occurrence of insects or other macroorganisms, algae, or large-diameter pathogens such as Giardia lamblia, nor any significant and relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity, or pH which closely correlate to climatological or surface water conditions, and for which the collection or diverting works have been reviewed for compliance with and constructed in accordance with requirements herein.

"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) any 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 will be determined for individual sources in accordance with criteria established by the Executive Secretary. The determination of direct influence may be based on site-specific measurements of water quality and/or documentation of well or spring construction and geology with field evaluation.

"Surface water" means all water which is open to the atmosphere and subject to surface runoff.

KEY: drinking water, environmental health
199419-4-104(1)(a)

R309. Environmental Quality, Drinking Water.
R309-107. Disinfection.
R309-107-1. Definitions.
"Board" means the Drinking Water Board.
"Executive Secretary" means the executive secretary of the board.

R309-107-2. Authority and Purpose.
(1) This rule is authorized by Section 19-4-104(1)(a), Utah Code Unannotated 1992, which allows the Board to make rules in accordance with Title 63, Chapter 46a, Utah Administrative Rulemaking Act, for the purposes outlined in Section 19-4-104.
(2) The purpose of this rule is to specify standards for different types of disinfecting agents utilized with drinking water.

R309-107-3. General.
Continuous disinfection is recommended for all water sources. It shall be required of all ground water sources which do not consistently meet standards of bacteriologic quality. Surface water sources or ground water sources under direct influence of surface water must be disinfected during the course of required conventional complete treatment. Disinfection shall not be considered a substitute for inadequate collection facilities.
Successful disinfection assures 99.9 percent inactivation of Giardia lamblia cysts and 99.99 percent inactivation of enteric viruses. Both filtration and disinfection are considered treatment techniques to protect against the potential adverse health effects of exposure to Giardia lamblia, viruses, Legionella, and heterotrophic bacteria in water. Minimum disinfection levels are set by "CT" values as defined in R309-107-11 and R309-103-5. Systems utilizing surface water sources or ground water sources under direct influence of surface water must comply with the disinfection requirements of R309-103-2.6. In addition, a minimum disinfectant residual of 0.2 mg/l must be maintained in water entering the distribution system and a detectable disinfectant residual must be found throughout the distribution system. Systems having ground water sources classified as under direct influence of surface water must start disinfection immediately on those sources and monitor in accordance with R309-104-4.6 as well as maintain satisfactory "CT" values in accordance with R309-103-2.6 during the 18 month interim period before filtration is installed. Chlorine, chlorine dioxide, chloramine, and ozone are considered capable of attaining required levels of disinfection.
Primary disinfection is defined as means for providing adequate levels of inactivation of bacteria and pathogens within the treatment process. Its effectiveness is measured through the "CT" values. Only three disinfectants; chlorine, ozone, and chlorine dioxide are allowable for primary disinfection.
Secondary disinfection is intended to provide an adequate disinfectant residual in the distribution system to maintain the bacteriological quality of treated water. Its effectiveness is measured through maintaining a detectable disinfectant residual throughout the distribution system. Allowable disinfectants are chlorine, chloramine, and chlorine dioxide.
Chlorine is the preferred disinfecting agent. Other disinfecting agents will be considered, providing reliable application equipment is available, adequate disinfection contact time can be maintained, and testing procedures for a residual are recognized in "Standard Methods for the Examination of Water and Wastewater", latest edition. Disinfection is considered as treatment of culinary drinking water and therefore plan review and approval is required in accordance with R309-102-2.3b prior to construction of facilities or start-up.

R309-107-4. Siting.
Disinfection installations must be sited to permit convenient access through the entire year.

R309-107-5. Chlorine.
(1) General Requirements for all Chlorination Installations
(a) Chemical Types
Disinfection by chlorination may be accomplished with gaseous chlorine or liquid solutions of calcium or sodium hypochlorites.
(b) Feeding Equipment
Solution-feed gas type chlorinators, direct-feed gas type chlorinators or hypochlorite liquid feeders of a positive displacement type must be provided. Solution-feed gas type chlorinators are preferred. However, for small supplies requiring less than four pounds per day, liquid hypochlorinators are advised.
(c) Capacity
The design of each chlorinator shall permit:
(i) An application rate of 1.5 mg/l chlorine during peak flow conditions, and

(ii) Maintenance of a free chlorine residual of at least 0.2 mg/l in water entering the distribution system during peak flow conditions, and

(iii) Assurance that a detectable chlorine residual, combined or free, can be maintained at all times, at all points in the distribution system.

(d) Automatic Proportioning

Automatic proportioning chlorinators will be required where the daily rate of flow is not reasonably constant.

(e) Contact Time and Point of Application

Due consideration shall be given to the contact time of the chlorine in water with relation to pH, ammonia, taste producing substances, temperature, biological quality, and other pertinent factors. Chlorine should be applied at a point which will provide the maximum contact time and mixing. Where possible, the design should minimize the formation of chloro-organic compounds which are of health significance. At plants treating surface water or ground water under the direct influence of surface water, provisions can be made for applying chlorine to raw water, applied water, filtered water, and water entering the distribution system.

When treating ground water, provisions shall be made for applying chlorine to at least a reservoir inlet or transmission pipeline which will provide maximum contact time.

(f) Chlorinator Piping

The chlorinator water supply piping shall be designed to prevent contamination of the treated water supply by sources of questionable quality. At all facilities treating surface water, pre- and post-chlorination systems must be independent where solution water is not finished water. All chlorinator solution water shall be at least of equal quality to the water receiving the chlorine solution.

(g) Water Measurement

A means to measure water flow to be treated must be provided.

(h) Residual Testing Equipment

Chlorine residual test equipment recognized in the latest edition of "Standard Methods for the Examination of Water and Wastewater" shall be provided and should be capable of measuring residuals to the nearest 0.1 mg/l in the range below 0.5 mg/l, to the nearest 0.3 mg/l between 0.5 mg/l and 1.0 mg/l and to the nearest 0.5 mg/l between 1.0 mg/l and 2.0 mg/l. Automatic chlorine residual recorders should be provided where the chlorine demand varies appreciably over a short period of time.

The N,N-Diethyl-p-phenylendiamine (DPD) method of chlorine residual determination is recommended. Information on the suppliers of this equipment is available from the Division of Drinking Water.

(i) Backup Equipment

A spare parts kit shall be provided and maintained for all chlorinators to repair parts subject to wear and breakage. If the system management demonstrates an inability to maintain the spare parts or an inability to expeditiously repair the chlorinator, a complete backup set of chlorination equipment shall be required.

(j) Heating, Lighting, Ventilation

Chlorinator houses should be heated, lighted and ventilated as necessary to assure proper operation of the equipment, and serviceability.

(2) Additional Requirement for Gas Chlorinators

(a) Heat

The design of the chlorination room shall assure that the temperature in the room will never fall below 32 degrees F or that temperature required for proper operation of the chlorinator, whichever is greater. Minimum operating temperature of chlorinators may vary from manufacturer to manufacturer.

Where space heaters are used, the cylinders should be protected from direct heat.

Care must be taken to avoid chlorine condensation in feed equipment lines caused by the feed equipment being cooler than the chlorine cylinder.

(b) Ventilation

When chlorine gas is used, ventilation shall be provided which will give one complete air change per minute. The air outlet from the room shall be near the floor, and the point of discharge shall be so located as not to contaminate air inlets to any buildings and areas used by people. Air inlets should be through louvers near the ceiling.

Switches for fans and lights should be outside of the room, at the entrance to the chlorination equipment room. For chlorinators which lack proper security, switches may be located just inside the door. A signal light indicating fan operation should be provided at each entrance when the fan can be controlled from more than one point.

The vent hose from the feeder shall discharge to the outside atmosphere above grade at a point least susceptible to vandalism and shall have the end covered with a non-corrodible screen having a #14 or finer mesh.

(c) Housing

Adequate housing must be provided for the chlorination equipment and for storing the chlorine.

(d) Housing at Large Water Treatment Plants

At large installations, separate rooms for cylinders and feeding equipment shall be provided. Chlorine gas feed and storage shall be enclosed and separated from other operating areas. The chlorine room shall be:

(i) Provided with a shatter resistant inspection window installed in an interior wall and preferably located so that an operator may read the weighing scales without entering the chlorine room,

(ii) Constructed in a manner that all openings between the chlorine room and the remainder of the plant are sealed, and

(iii) Provided with doors assuring ready means of exit and opening only to the building exterior.

(e) Cylinder Security

Full and empty cylinders of chlorine gas should be

(i) Isolated from operating areas,

(ii) Restrained in position to prevent upset,

(iii) Stored in rooms separated from ammonia storage, and

(iv) Stored in areas not in direct sunlight or exposed to excessive heat.

(f) Feed Line Routing

Chlorine feed lines shall not carry pressurized chlorine gas beyond the chlorinator room. Only vacuum lines may be routed to other portions of the building outside the chlorine room and any openings for these lines must be adequately sealed.

(g) Weighing Scales

Scales shall be provided for weighing cylinders. Scales should be of a corrosion resistant material and should be placed in a location remote from any moisture. Scales must be accurate enough to indicate loss of weight to the nearest one-half pound.

(h) Pressure Gauges

A pressure gauge shall be provided on the water feed line immediately upstream of the chlorine injector and a pressure gauge shall be located at the point of chlorine injection into the main stream of water.

(i) Injector Protection

A suitable screen to prevent small debris from clogging a chlorine injector shall be provided. Provision for flushing of the screen is required.

(j) Chlorine Vent Line Protection

A non-corrodible fine mesh (#14 or finer) screen shall be placed over the discharge ends of all vent lines. All vent lines shall discharge to the outside atmosphere above grade and at locations least susceptible to vandalism.

(k) Gas Masks

Gas masks meeting the requirements of the National Institute for Occupational Safety and Health (NIOSH) are required and shall be readily available where one-ton chlorine cylinders are used.

Masks must be of the self contained breathing apparatus type, have at least a thirty minute capacity, and be compatible with units used by the fire department responsible for the protection of the plant.

The mask(s) shall be available where chlorine gas is handled. It shall be stored at a convenient location, but not inside any room where chlorine is used or stored.

Where smaller chlorine cylinders are used, suitable gas masks must be provided.

(l) Chlorine Leak Detection and Repair

A bottle of concentrated Ammonium Hydroxide (approximately thirty-five percent solution) shall be available for chlorine leak detection; where ton containers are used, a leak repair kit approved by the Chlorine Institute shall be provided. The use of automatic chlorine detectors is highly recommended for larger installations.

R309-107-6. Ozone.

Proposals for the use of Ozone as a disinfectant should be discussed with the Division of Drinking Water prior to the preparation of final plans and specifications.

Ozone will be permitted where pilot studies indicate the capacity of the equipment will meet the ozone demand of the water. Following the use of ozone, secondary disinfection will be required. Maintenance of the required level(s) of disinfectant residual in water entering, as well as throughout, the distribution system must be accomplished.

R309-107-7. Chlorine Dioxide.

Proposals for the use of Chlorine Dioxide as a disinfectant should be discussed with the Division of Drinking Water prior to the preparation of final plans and specifications.

The "CT" values for the inactivation of Giardia cysts using chlorine dioxide are independent of pH, with only temperature affecting the value. For chlorine dioxide, a 3-log inactivation of Giardia cysts will generally result in greater than 4-log virus inactivation, and assure meeting requirements. However, for chlorine dioxide, unlike chlorine where this relationship always hold true, at certain temperatures, the 4-log

virus CT may be higher than the 3-log Giardia cyst CT.

R309-107-8. Chloramines.

Proposals for the use of Chloramines as a disinfectant should be discussed with the Division of Drinking Water prior to the preparation of final plans and specifications.

Chloramines are a much weaker oxidant than free chlorine, ozone or chlorine dioxide and therefore the "CT" values for inactivation of Giardia cysts by chloramines are extremely high and may not be achievable for some systems. Chloramines may be utilized only for secondary disinfection, as necessary to maintain required disinfectant residual concentrations in water entering, or throughout, the distribution system.

Chlorine may be added prior to ammonia in producing chloramines, or ammonia prior to chlorine, or even ammonia and chlorine added concurrently. The order of application of chlorine and ammonia to form chloramines is important and source waters must be evaluated to determine which method is most effective.

R309-107-9. Ultraviolet Light.

Proposals for use of ultraviolet disinfection should be discussed with the Division of Drinking Water prior to the preparation of final plans and specifications.

Secondary disinfection and maintenance of the required residual will be necessary where disinfection of the supply is required.

Ultraviolet disinfection will be permitted where the design conforms to the minimum recommendations of the U.S. Public Health Service listed below.

(1) Ultraviolet radiation at a level of 2,537 Angstrom units must be applied at a minimum dosage of 16,000 microwatt-seconds per square centimeter per second (1,600 Finsen Units) at all points throughout the water disinfection chamber.

(2) Maximum water depth in the chamber, measured from the tub surface to the chamber wall, shall not exceed three inches.

(3) The ultraviolet tubes shall be:

(a) Jacketed so that a proper operating tube temperature of about 105 degrees F is maintained.

(b) The jacket shall be of quartz or high silica glass with similar optical characteristics.

(4) A flow or time delay mechanism shall be provided to permit a two minute tube warm-up period before water flows from the unit.

(5) The unit shall be designed to permit frequent mechanical cleaning of the water contact surface of the jacket without disassembly of the unit.

(6) An automatic flow control valve, accurate within the expected pressure range, shall be installed to restrict flow to the maximum design flow of the treatment unit.

(7) An accurately calibrated ultraviolet intensity meter, properly filtered to restrict its sensitivity to the disinfection spectrum, shall be installed in the wall of the disinfection chamber at the point of greatest water depth from the tube or tubes.

(8) A flow diversion valve or automatic shut-off valve shall be installed which will permit flow into the potable water system only when at least the minimum ultraviolet dosage is applied. When power is not being supplied to the unit, the valve should be in a closed position which prevents the flow of water into the potable water system.

(9) An automatic, audible alarm shall be installed to warn of malfunction or impending shutdown.

(10) The materials of construction shall not impart toxic materials into the water either as a result of the presence of toxic constituents in materials of construction or as a result of physical or chemical changes resulting from exposure to ultraviolet energy.

(11) The unit shall be designed to protect the operator against electrical shock or excessive radiation.

(12) As with any potable water treatment process, due consideration must be given to the reliability, economics, and competent operation of the disinfection process and related equipment, including:

(a) Installation of the unit in a protected enclosure not subject to extremes of temperature which could cause malfunction.

(b) Provision of a spare UV tube and other necessary equipment to effect prompt repair by qualified personnel properly instructed in the operation and maintenance of the equipment.

R309-107-10. Iodine.

Proposals for use of Iodine as a disinfectant should be discussed with the Division of Drinking Water prior to preparation of final plans and specifications.

Iodination of public water supplies will be accepted only in those remote locations where power is not available and which serve non-community systems upon the following conditions:

(1) The exposure of any one person to an iodized water supply should not exceed three

weeks in one season.

(2) Plans showing the details of these installations and the relation of the disinfection unit to overall water supply systems will be submitted to and approved by the Executive Secretary prior to construction.

(3) Iodine residuals in water entering, and throughout, the distribution systems shall be tested regularly. The tests must be made daily at a time when peak delivery is anticipated. However, allowance may be given for residual testing to coincide with water system personnel inspections at less frequent intervals. N,N-Diethyl-p-phenylendiamine (DPD) testing methods for residuals are acceptable.

(4) The daily calculated "CT" value must equal or exceed the value assigned by the Executive Secretary for water prior to being delivered to any consumer. This may necessitate the addition of appropriately sized storage vessels near the treatment unit.

(5) Iodination units using saturator feeders:

(a) Will be installed at a lower elevation than the line into which iodine is being injected

(b) Will have the iodinator control valve adjusted as necessary to consistently maintain the required iodine residual in the water system.

(6) "Bypass" type saturator feeders will be approved only when uniform flow is guaranteed by the water system design. Otherwise a positive displacement feeder paced by the flow in the system will be required.

R309-107-11. Additional Definitions.

"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 disinfectant 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). "CT99.9" is the CT value required for 99.9 percent (3-log) inactivation of Giardia lamblia cysts. CT99.9 for a variety of disinfectants and conditions appear in Tables 1.1-1.6, 2.1, and 3.1 of Section 141.74(b)(3) of the Federal Register, Vol. 54, No. 124, Thursday, June 29, 1989, pages 27532 through 27534 (also available from the Division of Drinking Water). CTcalc/CT99.9 is the inactivation ratio. The sum of the inactivation ratios, or total inactivation ratio shown as "Summation sign (CTcalc)/(CT99.9)" 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.

"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 where residual disinfectant concentration ("C") is measured. Where more than one "C" is measured, "T" is (a) for the first measurement of "C", the time in minutes that it takes for water to move from the first or only point of disinfectant application to a point before or at the point where the first "C" is measured and (b) for subsequent measurements of "C", the time in minutes that it takes for water to move from the previous "C" measurement point to the "C" measurement point for which the particular "T" is being calculated. 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.

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

"Legionella" means a genus of bacteria, some species of which have caused a type of pneumonia called Legionnaires Disease.

"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.

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

"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 appropriate local or State agency.

"Virus" means a virus of fecal origin which is infectious to humans by waterborne transmission.

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R309. Environmental Quality, Drinking Water.
R309-108. Conventional Complete Treatment.
R309-108-1. Definitions.
"Board" means the Drinking Water Board.
"Executive Secretary" means the executive secretary of the board.

R309-108-2. Authority and Purpose.
(1) This rule is authorized by Section 19-4-104(1)(a), Utah Code Unannotated 1992, which allows the Board to make rules in accordance with Title 63, Chapter 46a, Utah Administrative Rulemaking Act, for the purposes outlined in Section 19-4-104.
(2) The purpose of this rule is to specify standards for water treatment plants which utilize conventional complete treatment.

R309-108-3. General.
Treatment plants used for the purification of surface water supplies or ground water supplies under direct influence of surface water must conform to the requirements given herein. The plants must have, as a minimum, facilities for flash mixing of coagulant chemicals, flocculation, sedimentation, filtration and disinfection.
The overall design of a water treatment facility must be carefully examined to assure the compatibility of all devices and processes. The design of treatment processes and devices shall depend on an evaluation of the nature and quality of the particular water to be treated. The combined unit processes must produce water meeting all established drinking water standards as given in R309-103.
When any product is used to coat, seal, patch or otherwise attach itself to the surface of any treatment construction in a way as to come into contact with the drinking water, the product shall comply to National Sanitation Foundation (NSF) Standard 61.
Direct filtration may be acceptable and regulations governing this method are given in R309-109-6.
Refer to R309-109-14 for policy with regards to novel water treatment equipment or techniques which may depart from the requirements outlined herein.

R309-108-4. Plant Siting.
Plants must be sited with due regard for earthquake, flood, and fire hazard. Assistance in this matter is available from the Utah Geologic Survey. The Division of Drinking Water shall be consulted regarding site selection prior to the preparation of engineering plans and specifications.

R309-108-5. Plant Capacity and Reliability Assurance.
Plants designed for processing surface water or ground water under direct influence of surface water shall be designed to meet present and future water demands and assure reliable operation at all times. The degree of "back-up" required in a water treatment plant will vary with the number of connections to be served, the availability of other acceptable sources of water, and the ability to control water consumption. The Division of Drinking Water must be consulted in this regard prior to plant design.
Unless otherwise specifically approved by the Executive Secretary, water treatment plants must:
(1) Be operated by qualified personnel approved by the Executive Secretary. As a minimum the Treatment Plant manager is required to be certified in accordance with R309-301 at the grade of the waterworks system with an appropriate unrestricted Utah Operator's Certificate.
(2) Consist of sufficient treatment techniques and be properly operated so as to reliably achieve the following:
(a) at least 99.9 percent (3-log) removed and/or inactivation of Giardia lamblia cysts between a point where the raw water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer; and
(b) at least 99.99 percent (4-log) removal and/or inactivation of viruses between a point where the raw water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer.
A public water system using a surface water source or a ground water source under the direct influence of surface water is considered to be in compliance with the requirements above if the treatment technique utilized produces finished water which does not exceed the turbidity limits of R309-103-2.4a or the microbiological contaminant level of R309-103-2.5 and there are no violations of the disinfection requirements of R309-103-2.6 or the monitoring requirements of R309-104-4.6.
(c) Meet the anticipated peak daily demand of the system being served when the treatment plant is the system's sole source,
(d) Provide a minimum of two units each for rapid mix, flocculation, sedimentation and filtration,

(e) Be constructed to permit units to be taken out of service without disrupting operation, and with drains or pumps sized to allow dewatering in a reasonable period of time,

(f) Have standby power available to permit operation of essential functions during power outages,

(g) Be provided with backup equipment or necessary spare parts for all critical items.

R309-108-6. Color Coding and Pipe Marking.

The piping in water treatment plants should be color coded for identification. Handouts are available from the Division of Drinking Water for suggested color code for piping.

Identification of the direction of flow and the contained liquid should also be made on the pipe.

R309-108-7. Diversion Structures and Pretreatment.

Refer to R309-106-4(5) for diversion structure design.

Waters containing high turbidity, heavy grit, sand, gravel, leaves or other debris may require presedimentation and/or screening. Presedimentation should be particularly considered for waters with rapidly settling silt or solids.

Presedimentation basins should have hopper bottoms or be equipped with continuous mechanical sludge removal apparatus, and provide arrangements for dewatering. Incoming water shall be dispersed across the full width of the line of travel as efficiently as practical. Short-circuiting must be minimized.

R309-108-8. Chemical Addition.

(1) Objectives of Chemical Addition

Chemicals must be used in the treatment of surface water in order to:

(a) Permit the formation of a floc,

(b) Disinfect raw and/or treated water.

(c) In achieving these goals the chemical(s) shall be applied to the water at points and by means as to:

(i) Assure maximum efficiency of treatment,

(ii) Assure maximum safety to consumer,

(iii) Provide maximum safety to operators,

(iv) Assure satisfactory mixing flexibility of operation through various points of application, when appropriate, and

(v) Prevent backflow or back-siphonage of chemical solutions to finished water systems.

(2) Typical Chemical Doses

Chemical doses shall be estimated for each treatment plant to be designed. A "jar test" must be conducted on representative raw water samples in order to determine anticipated doses. Safety factors of two or three should be built into the design of chemical equipment.

(3) Information Required for Review

With respect to chemical applications, a submittal for Division of Drinking Water review must include:

(a) Descriptions of feed equipment, including maximum and minimum feed rates,

(b) Location of feeders, piping layout and points of application,

(c) Chemical storage and handling facilities,

(d) Specifications for chemicals to be used,

(e) Operating and control procedures including proposed application rates,

(f) Descriptions of testing equipment and procedures, and

(g) Results of chemical, physical, biological and other tests performed as necessary to define the optimum chemical treatment.

(4) Quality of Chemicals

(a) Specifications

All chemicals used must be suitable for potable water use. Chemicals added to water being treated for use in a public water system for human consumption must comply with National Sanitation Foundation's (NFS) Standard 60. Evidence must be provided to confirm this requirement has been met.

(b) Assay

The Executive Secretary may require the assay of chemicals delivered.

(c) Shipping Containers

Chemical shipping containers shall be fully labeled to include:

(i) Chemical name, purity and concentrations,

(ii) Supplier name and address, and

(iii) labeling from a ANSI certified laboratory indicating compliance with National Sanitation Foundation Standard 60.

(5) Application of Chlorine

Due to the nature of the chemical, special precautions must be taken in handling and application of chlorine. Refer to R309-107 for regulations in this regard.

(6) Storage, Handling and Ventilation of Chemicals

(a) Storage of Chemicals

(i) Space should be provided for:

(A) An adequate supply of chemicals,

(B) Convenient and efficient handling of chemicals,

(C) Dry storage conditions.

(ii) Storage tanks and pipelines for liquid chemicals shall be specific to the chemicals and not for alternates.

(iii) Chemicals shall be stored in covered or unopened shipping containers, unless the chemical is transferred into a covered storage unit.

(iv) Liquid chemical storage tanks must:

(A) Have a liquid level indicator, and

(B) Have an overflow and a receiving basin or drain capable of receiving accidental spills or overflows, and meeting all requirements of R309-108-18, and

(C) Be equipped with an inverted "J" air vent.

(v) Acids shall be kept in closed acid-resistant shipping containers or storage units.

(b) Handling

(i) Carts, elevators and other appropriate means shall be provided for lifting chemical containers to minimize excessive lifting by operators.

(ii) Provisions should be made for disposing of empty bags, drums or barrels by an acceptable procedure which will minimize operator exposure to dusts.

(iii) Provisions shall be made for measuring quantities of chemicals used to prepare feed solutions.

(iv) Acids shall not be handled in open vessels, but should be pumped in undiluted form from original containers through suitable hose, to the point of treatment or to a covered tank.

(c) Dust Control and Ventilation

Ducting for dust control if powders are used is recommended. If concentrated liquids are used ventilation should be adequate to prevent lingering fumes. If gas chlorinators are used, the requirements of R309-107 must be met.

Provision must be made for the proper transfer of dry chemicals from shipping containers to storage bins or hoppers, in a way to minimize the quantity of dust which may enter the room in which the equipment is installed. Control should be provided by use of:

(i) Vacuum pneumatic equipment or closed conveyor systems,

(ii) Facilities for emptying shipping containers in special enclosures, or

(iii) Exhaust fans and dust filters which put the hoppers or bins under negative pressure.

Vents from feeders, storage facilities and equipment exhaust shall discharge to the outside atmosphere above grade and remote from air intakes.

(7) Feeder Design and Control

(a) General Feeder Design

General equipment design shall be such that:

(i) Feeders will be able to supply, at all times, the necessary amounts of chemicals at an accurately controlled rate, throughout the anticipated range of feed,

(ii) Surfaces which contact chemicals are resistant to the aggressiveness of the chemicals,

(iii) Corrosive chemicals are introduced in a manner to minimize potential for corrosion,

(iv) Chemicals that are incompatible are not fed, stored or handled together, and

(v) Spare parts are available for all feeders to replace parts which are subject to wear and damage.

(b) Feeder Locations

Chemical feed equipment shall:

(i) Be located in a separate room to reduce hazards and dust problems. With the approval of the Executive Secretary, chemical feed equipment serving small "package" type plants need not be located in a separate room provided hazardous dusts are adequately controlled,

(ii) Be conveniently located near points of application to minimize length of feed lines, and

(iii) Be readily accessible for servicing, repair, and observation.

(c) Number of Feeders

(i) The capability of adequate chemical feed must be provided with any one chemical feed unit out of service.

(ii) A separate feeder shall be used for each chemical applied where a feed pump is

required.

(d) Dry Chemical Feeders

Dry chemical feeders shall:

(i) Measure feed rate of chemicals volumetrically or gravimetrically,

(ii) Provide adequate solution water and agitation of the chemical in the solution pot,

(iii) Provide discharge feed from the bottom of the solution pots or provide a surface baffle for withdrawal near the water line of the solution pots.

(iv) Completely enclose chemicals to prevent emission of dust.

(e) Feed Rate Control

(i) Feeders may be manually or automatically controlled, with automatic controls being designed to allow override by manual controls.

(ii) Chemical feed rates shall be proportional to flows.

(iii) A means to measure water flow rate must be provided.

(iv) Provisions shall be made for measuring the quantities of chemicals used.

(v) Weighing scales:

(A) Shall be provided at all plants using gasified chemicals,

(B) Shall be required for dry fluoride solution feed, where applicable,

(C) Should be provided for volumetric dry chemical feeders, and

(D) Should be accurate to measure increments of 0.5 percent of scale capacity.

(8) Feeder Appurtenances

(a) Liquid Chemical Solution Pumps

Positive displacement type solution feed pumps should be used to feed chemicals or slurries. Centrifugal pumps shall not be used for slurry feed. All liquid chemical feeders shall be provided with devices approved by the Utah Plumbing Code which will prevent the siphoning of liquid chemical through the pump.

(b) Solution Tanks

(i) A means which is consistent with the nature of the chemical solution shall be provided in a solution tank to maintain a uniform strength of solution. Continuous agitation shall be provided to maintain slurries in suspension.

(ii) Two solution tanks of adequate volume may be required for a chemical to assure continuity of supply in servicing a solution tank.

(iii) Means shall be provided to measure the solution level in the tank.

(iv) Chemical solutions shall be kept covered. Large tanks with access openings shall have the openings curbed and fitted with tight overhanging covers.

(v) Subsurface locations are discouraged, but when used for solution tanks shall:

(A) Be free from sources of possible contamination, and

(B) Assure positive drainage for groundwaters, accumulated water, chemical spills and overflows.

(vi) Overflow pipes, when provided, should:

(A) Have a freefall discharge, and

(B) Be located where noticeable.

(vii) Acid storage tanks must be vented to the outside atmosphere, but not through vents in common with day tanks.

(viii) Each tank shall be provided with a valved drain, protected against backflow in accordance with R309-108-8(9)(b) and R309-108-8(9)(c).

(ix) Solution tanks shall be located and protective curbings provided so that chemicals from equipment failure, spillage or accidental drainage shall not enter the water in conduits, treatment or storage basins.

(x) When polymers are used, storage tanks should be located away from heat sources and direct sunlight.

(c) Day Tanks

(i) Day tanks shall be provided where dilution of liquid chemical is required prior to feeding.

(ii) Day tanks shall meet all the requirements of R309-108-8(8)(b).

(iii) Day tanks should hold no more than a thirty hour supply.

(iv) Day tanks shall be scale-mounted, or have a calibrated gauge painted or mounted on the side if liquid levels cannot be observed in a gauge tube or through translucent sidewalls of the tank. In opaque tanks, a gauge rod extending above a referenced point at the top of the tank, attached to a float may be used. The ratio of the cross-sectional area of the tank to its height must be such that unit readings are meaningful in relation to the total amount of chemical fed during a day.

(v) Hand pumps may be provided for transfer from a carboy or drum. A top rack may be used to permit withdrawal into a bucket from a spigot. Where motor-driven transfer pumps are provided a liquid level limit switch and an overflow from the day tank, which will drain by gravity back into the bulk storage tank, must be provided.

(vi) Tanks shall be properly labeled to designate the chemical contained.

(vii) Polymer day tanks should be located away from heat sources and direct sunlight.

(d) Feed Lines
(i) Feed lines should be as short as possible in length of run, and be:
(A) Of durable, corrosion resistant material,
(B) Easily accessible throughout the entire length,
(C) Protected against freezing, and
(D) Readily cleanable.
(ii) Feed lines should slope upward from the chemical source to the feeder when conveying gases.
(iii) Lines shall be designed with due consideration of scale forming or solids depositing properties of the water, chemical, solution or mixture conveyed:
(iv) Lines should be color coded.
(9) Make up Water Supply and Protection
(a) In Plant Water Supply
In plant water supply shall be:
(i) Ample in supply, adequate in pressure, and of a quality at least as good as the water at the point of application,
(ii) Provided with means for measurement when preparing specific solution concentrations by dilution,
(iii) Properly treated for hardness, when necessary,
(iv) Properly protected against backflow.
(b) Cross-Connection Control
Cross-connection control must be provided to assure that:
(i) The make-up waterlines discharging to solution tanks shall be properly protected from backflow as required by the Utah Plumbing Code.
(ii) Liquid chemical solutions cannot be siphoned through solution feeders into the process units as required in R309-108-8(9)(c), and
(iii) No direct connection exists between any sewer and the drain or overflow from the feeder, solution chamber or tank by providing that all pipes terminate at least six inches or two pipe diameters, whichever is greater, above the overflow rim of a receiving sump, conduit or waste receptacle.
(c) Liquid Chemical Feeders - Siphon Control
Liquid chemical feeders shall be such that chemical solutions cannot be siphoned into the process units, by:
(i) Assuring positive pressure at the point of discharge,
(ii) Providing vacuum relief,
(iii) Providing a suitable air gap, or
(iv) Other suitable means or combinations as necessary.
(10) Operator Safety
Provisions must be made to assure operator safety in chemical feed areas, as follows:
(a) Floor surfaces should be smooth and impervious, slip-proof and well drained,
(b) At least one pair of rubber gloves, a dust respirator of a type certified by the National Institute of Occupational Safety and Health (NIOSH) for toxic dusts, an apron or other protective clothing and goggles or face mask shall be provided,
(c) A water holding tank that will allow water to come to room temperature will be installed in the water line feeding the deluge shower and eyewashing device,
(d) Adequate ventilation must be provided as required by R309-108-8(6)(c), and
(e) Design of the plant should be in accordance with the Utah Occupational Safety and Health Act (UOSHA).

R309-108-9. Mixing.
(1) Rapid Mix
Rapid mix shall mean the rapid dispersion of chemicals throughout the water to be treated, usually by violent agitation.
(a) Equipment - Mechanical, in-line or jet mixing devices shall be used.
(b) Mixing - All devices used in rapid mixing shall be capable of imparting a minimum velocity gradient (G) of at least 750 ft/sec per foot. Mixing time shall be less than thirty seconds.
(c) Location - The rapid mix and flocculation basins shall be as close together as possible.
(d) Introduction of chemicals - Primary coagulant chemicals shall be added at the point of maximum turbulence within the flash mix unit. Where in-line mixing devices are used chemical injection should be at the most appropriate upstream point.
(2) Flocculation
Flocculation shall mean the gentle agitation of water at low velocities for long periods of time.
(a) Basin design - Inlet and outlet design shall prevent short-circuiting and destruction of floc. A drain or pumps shall be provided to handle dewatering and sludge removal.
(b) Detention - The flow-through velocity shall not be less than 0.5 nor greater than

1.5 feet per minute with a detention time for floc formation of at least 30 minutes.

(c) Equipment - Agitators shall be driven by variable speed drives with the peripheral speed of paddles ranging from 0.5 to 2.0 feet per second. Equipment shall be capable of imparting a minimum velocity gradient (G) between 25 and 80 ft/sec per foot to the water treated. It is also permitted to use the compartmentalized tapered energy flocculation concept in which G tapers from 100 to 10 ft/sec per foot.

(d) Hydraulic flocculation may be permitted and shall be reviewed on a case by case basis. The unit must yield a GT value equivalent to that required by b and c above.

(e) Piping - Flocculation and sedimentation basins should be as close as possible. The velocity of flocculated water through pipes or conduits to settling basins shall not be less than 0.5 nor greater than 1.5 feet per second. Allowance must be made to minimize turbulence at bends and changes in direction.

(f) Superstructure - A superstructure over the flocculation basins may be required.

(g) Visible floc - The flocculation unit shall be capable of producing a visible, settleable floc.

R309-108-10. Sedimentation.

(1) General Design Requirements

Sedimentation shall follow flocculation. The detention time for effective clarification is dependent upon a number of factors related to basin design and the nature of the raw water. The following criteria apply to conventional sedimentation units:

(a) Inlet devices - Inlets shall be designed to distribute the water equally and at uniform velocities. Open ports, submerged ports, or similar entrance arrangements are required. A baffle should be constructed across the basin close to the inlet end and should project several feet below the water surface to dissipate inlet velocities and provide uniform flows across the basin.

(b) Outlet devices - Outlet devices shall be designed to maintain velocities suitable for settling in the basin and to minimize short-circuiting. The use of submerged orifices is recommended in order to provide a volume above the orifices for storage when there are fluctuations in the flow.

(c) Overflow - An overflow weir should be installed which will establish the maximum water level desired on top of the filters. It shall discharge with a free fall to a location where the discharge will be noted.

(d) Superstructure - A superstructure over the sedimentation basins may be required. If there is no mechanical equipment in the basins and if provisions are included for adequate monitoring under all expected weather conditions, a cover may be provided in lieu of a superstructure.

(e) Sludge collection - Means of sludge removal shall be provided.

(f) Drainage - Basins must be provided with a means for dewatering. Basin bottoms should slope toward the drain not less than one foot in 12 feet where mechanical sludge collection equipment is not required.

(g) Flushing lines - Flushing lines or hydrants shall be provided and should be equipped with backflow prevention devices acceptable to the Executive Secretary.

(h) Safety - Permanent ladders or handholds should be provided on the inside walls of basins above the water level. Appropriate safety devices must be included as required by the Occupational Safety and Health Act (OSHA).

(i) Removal of floating material - Provision must be made for the periodic removal of floating material.

(2) Sedimentation Without Tube Settlers

If tube settling equipment is not used within settling basins, the following requirements apply:

(a) Detention Time - A minimum of four hours of detention time shall be provided. This may be reduced to no less than two hours when sedimentation is followed by filtration through dual or multi-media filters. Refer to R309-108-12.

(b) Weir Loading - The rate of flow over the outlet weir shall not exceed 20,000 gallons per day per foot of weir length. Where submerged orifices are used as an alternate for overflow weirs they should not be lower than three feet below the water surface with flow rates equivalent to weir loadings.

(c) Velocity - The velocity through settling basins shall not exceed 0.5 feet per minute. The basins must be designed to minimize short-circuiting. Baffles must be provided as necessary.

(d) The depth of the sedimentation basin should be between eight and 12 feet.

(3) Sedimentation With Tube Settlers

(a) If tube settling equipment is used within settling basins it shall comply with the following:

(i) Extreme care should be taken on the design of inlet and outlet arrangements of the tube settling device to minimize short-circuiting.

(ii) Provisions for sludge removal must be provided. In package type water treatment plants, provisions for automatic wasting of sludge shall be activated by the automatic

filter backwash system.

(iii) Mechanical sludge removal equipment, when used, shall be separated a minimum of three feet, measured vertically from the tube bundle.

(iv) Hydraulic sludge removal outlet ports, when used, shall be so arranged and sized to insure complete removal of sludge.

(b) Horizontal Face Tube Settling Equipment

Horizontal face tube settling equipment shall be defined as a group of tubes for which the plane containing the open end of all tubes is horizontal or nearly so and shall comply with each of the following requirements:

(i) To insure that the velocity through the tubes will be less than the sweep velocity necessary to resuspend settled particles, the value of (GPM / Af) must be less than or equal to 2.5

(ii) To insure laminar flow conditions (Reynolds number less than 400), the hydraulic radius (r) must be less than or equal to (Af * 5.7 * Sin Theta) / GPM

(iii) To insure sufficient residence time in the tubes, the length of the tube (L) must be greater than or equal to (M * GPM) / (Af * R * Cos Theta * Sin Theta)

Where:

Theta = The angle the axis of a single tube makes with the horizontal.

r = The hydraulic radius (area divided by the wetted perimeter of a single tube; measured in inches).

GPM = The total flow applied to the tube module; measured in gallons per minute.

Af = The total face area (the area of the plane containing the open end of all the tubes as well as the tube material), measured in square feet.

L = The length of the tube along the tube axis, measured in feet.

R = The approved filter loading rate expressed as gpm/sq. ft. (the approved rate may be greater than the actual loading rate and shall be determined by the Division of Drinking Water - see R309-108-12(3).

M = The height of the cross-section of a single tube measured in inches and measured perpendicular to the axis of the tube.

(c) Vertical Face Tube Settling Equipment

Vertical face tube settling equipment shall be defined as a group of tubes for which the plane containing the open end of all tubes is vertical or nearly so (in this configuration water flows towards the inlet of the tubes in a horizontal direction) and shall comply with each of the following:

(i) To insure that the velocity through the tubes be less than the sweep velocity necessary to resuspend settled particles, the value of (GPM / Af) must be less than or equal to 2.5

(ii) To insure laminar flow conditions (Reynolds number less than 400), the hydraulic radius (r) must be less than or equal to (Af * 5.75 * cos Theta) / GPM

(iii) To insure sufficient residence time in the tubes, the length of the tube (L) must be greater than or equal to (GPM * M) / (Af * R * cos2 Theta)

Parameters in the above equations are as defined in R309-108-10(3)(b)(iii).

R309-108-11. Solids Contact Units.

Solids contact units may be acceptable for clarification where water characteristics are not variable and flow rates are uniform. Additionally, these units are acceptable for combined softening and clarification in conformance with the requirements of R309-109-8. Before such units are considered as clarifiers without softening, specific approval of the Executive Secretary shall be obtained. Clarifiers should be designed for the maximum uniform rate and should be adjustable to changes in flow which are less than the design rate and for changes in water characteristics.

(1) Installation of Equipment

Supervision by a representative of the manufacturer shall be provided at the time of the installation and initial operation of all mechanical equipment.

(2) Operating Equipment

The following shall be provided for plant operation:

(a) A complete set of tools and accessories,

(b) Adequate piping with suitable sampling taps so located as to permit the collection of samples of water from critical portions of the units,

(c) Manuals from the equipment manufacturer describing the equipment and its recommended maintenance schedules.

(3) Chemical Feed

Chemicals shall be applied at such points and by such means as to insure satisfactory mixing of the chemicals with the water. Primary coagulant chemicals shall be added at the point of maximum turbulence within the rapid mix basin.

(4) Mixing

A rapid mix device or chamber ahead of the solids contact units may be required by the Executive Secretary to assure proper mixing of the chemicals applied. Mixing devices employed shall be so constructed as to:

(a) Provide good mixing of the raw water with previously formed sludge particles,
(b) Prevent deposition of solids in the mixing zone, and
(c) Conform to R309-108-9(1).
(5) Flocculation
Flocculation equipment shall:
(a) be adjustable (speed and/or pitch),
(b) provide for coagulation in a separate chamber or baffled zone within the unit,
(c) provide a flocculation period of thirty minutes or more,
(d) conform to R309-108-9(2).
(6) Sludge Concentrators
The equipment should provide either internal or external concentrators in order to obtain a concentrated sludge with a minimum of waste water.
(7) Sludge Removal
(a) Sludge pipes shall not be less than three inches in diameter and so arranged as to facilitate cleaning.
(b) The entrance of sludge withdrawal piping shall be designed to prevent clogging.
(c) Valves shall be located outside the tank for accessibility.
(d) The design shall permit the operator to observe and sample sludge being withdrawn from the unit.
(8) Cross-Connection
(a) Blow-off outlets and drains must terminate and discharge at places satisfactory to the Executive Secretary.
(b) Cross-connection control must be included for all potable water lines.
(9) Detention Period
The detention time shall be established on the basis of the raw water characteristics and other local conditions that affect the operation of the unit. Based on design flow rates, the detention time should be:
(a) Four hours for suspended solids contact clarifiers and softeners treating surface water or ground water under the direct influence of surface water, and
(b) One hour for the suspended solids contact softeners treating only groundwater.
(10) Suspended Slurry Concentrate
Softening units should be designed so that continuous sludge concentrates of one percent or more, by weight, can be satisfactorily maintained.
(11) Water Losses
(a) Units shall be provided with suitable controls for sludge withdrawal.
(b) Total water losses (i.e., water lost with the sludge) should not exceed:
(i) Five percent for clarifiers,
(ii) Three percent for softening units.
(c) Solids concentration of sludge bled to waste should be:
(i) Three percent by weight for clarifiers,
(ii) Five percent by weight for softeners.
(12) Weirs or Orifices
The units should be equipped with either overflow weirs or orifices constructed so that water at the surface of the unit does not travel over ten feet horizontally to the collection trough.
(a) Weirs shall be adjustable, and at least equivalent in length to the perimeter of the tank.
(b) Weir loading shall not exceed
(i) Ten gallons per minute per foot of weir length for units used for clarifiers,
(ii) Twenty gallons per minute per foot of weir length for units used for softeners.
(c) Where orifices are used the loading per foot of launder should be equivalent to weir loading. Either shall produce uniform rising rates over the entire area of the tank.
(13) Upflow Rates
Unless supporting data is submitted to the Executive Secretary to justify rates exceeding the following, rates shall not exceed
(a) 1.0 gallon per minute per square foot of area at the sludge separation line for units used for clarifiers,
(b) 1.75 gallons per minute per square foot of area at the slurry separation line for units used for softeners.

R309-108-12. Filtration.
(1) General
Filters may be composed of one or more media layers. Single media filters are relatively uniform throughout their depth. Dual or multi-layer beds of filter material are so designed that water being filtered first encounters coarse material, and then progressively finer layers of material, as it travels through the bed.
Generally, higher filter rates can be assigned for the dual or multi-media filter than for a single media filter. This is due to the fact that the former is more resistant to

filter breakthrough. The use of dual or multi-media filters may also allow a reduction of sedimentation detention time (see R309-108-10(2)(a), R309-108-12(3)(b)(vii) and R309-108-12(3)(c)(viii)) due to their increased ability to store sludge.

The use of filter types other than conventional rapid sand gravity filters must receive written approval from the Executive Secretary prior to the preparation of final plans and specifications.

(2) Number of Filters Required

Where only two units are provided, each shall be capable of meeting the projected average daily demand of the plant at the approved filtration rate. Where more than two filter units are provided, filters shall be capable of meeting the plant design capacity (normally the projected peak daily demand) at the approved filtration rate with one filter removed from service. Refer also to R309-108-5 for situations where these requirements may be relaxed.

(3) Filtration Rates and Media Design

The allowable rate of filtration shall be determined through consideration of such factors as raw water quality, degree of pretreatment provided, filter media, water quality control parameters, competency of operating personnel, and other factors as required by the Executive Secretary. In any case, the filter rate must be proposed and justified by the designing engineer to the satisfaction of the Executive Secretary prior to the preparation of final plans and specifications. Allowable filter rates assigned by the Executive Secretary must never be exceeded, even during backwash periods.

R309-108-12(3)(a) through R309-108-12(3)(d), which follow, give requirements for filter media design. These requirements are considered minimum and may be made more stringent if warranted by the above mentioned factors.

(a) Single Media, Rapid Rate Gravity Filters

Single media filters shall be composed of clean silica sand having an effective size of 0.35 mm to 0.65 mm and having a uniformity coefficient less than 1.7. The total bed thickness must not be less than 24 inches nor more than 30 inches. The allowable maximum filtration rate for this media configuration is three GPM/sq. ft.

(b) Dual Media, Rapid Rate Gravity Filters

The following applies to all dual media filters:

(i) Total depth of filter bed shall not be less than 24 inches nor more than 30 inches.

(ii) All materials used to make up the filter bed shall be of such particle size and density that they will be effectively washed at backwash rates between 15 and 20 GPM/sq. ft. They must settle to reconstitute the bed essentially in the original layers upon completion of backwashing.

(iii) The bottom layer must be at least ten inches thick and consist of a material having an effective size no greater than 0.45 mm and a uniformity coefficient not greater than 1.5.

(iv) The top layer shall consist of clean crushed anthracite coal having an effective size of 0.45 mm to 1.2 mm, and a uniformity coefficient not greater than 1.5.

(v) Dual media filters will be assigned a filter rate from three GPM/sq. ft. to five GPM/sq. ft. Generally if the bottom fine layer consists of a material having an effective size of 0.35 mm or less, a filtration rate of five GPM/sq. ft. can be assigned.

(vi) Each dual media filter must be provided with equipment which shall continuously monitor turbidity in the finished water. The equipment shall be so designed to initiate automatic backwash if the effluent turbidity exceeds 0.5 NTU. If the filter turbidity exceeds five NTU, filter shutdown is required. In plants attended part-time, this shutdown must be accomplished automatically and should be accompanied by an alarm. In plants having full-time operators, a five NTU condition need only activate an alarm. Filter shutdown may then be accomplished by the operator.

(vii) Due to increased media storage capacity the use of dual media filters may allow a reduction of detention time within sedimentation basins. Refer to R309-108-10(2)(a). Allowable reduction of sedimentation time will be determined by the Executive Secretary .

(c) Tri-Media, Rapid Rate Gravity Filters

The following applies to all Tri-media filters:

(i) Total depth of filter bed shall not be less than 24 inches nor more than 30 inches.

(ii) All materials used to make up the filter bed shall be of such particle size and density that they will be effectively washed at backwash rates between 15 and 20 GPM/sq. ft. They must settle to reconstitute the bed to the normal gradation of coarse to fine in the direction of flow upon completion of backwashing.

(iii) The bottom layer must be at least four inches thick and consist of a material having an effective size no greater than 0.45 mm and uniformity coefficient not greater than 2.2. The bottom layer thickness may be reduced to three inches if it consists of a material having an effective size no greater than 0.25 mm and a uniformity coefficient not greater than 2.2.

(iv) The middle layer must consist of silica sand having an effective size of 0.35 mm

to 0.8 mm, and a uniformity coefficient not greater than 1.8.

(v) The top layer shall consist of clean crushed anthracite coal having an effective size of 0.45 mm to 1.2 mm, and a uniformity coefficient not greater than 1.85.

(vi) Tri-media filters will be assigned a filter rate from three GPM/sq. ft. to five GPM/sq. ft. Generally, if the bottom fine layer consists of a material having an effective size of 0.35 mm or less, a filtration rate of five GPM/sq. ft. can be assigned.

(vii) Each Tri-media filter must be provided with equipment which shall continuously monitor turbidity in the finished water. The equipment shall be so designed to initiate automatic backwash if the effluent turbidity exceeds 0.5 NTU. If the filter turbidity exceeds five NTU, filter shutdown is required. In plants attended part-time, this shutdown must be accomplished automatically and should be accompanied by an alarm. In plants having full-time operators, a five NTU condition need only activate an alarm. Filter shutdown may then be accomplished by the operator.

(viii) Due to increased media storage capacity, the use of Tri-media filters may allow a reduction of detention time within sedimentation basins. Refer to R309-108-10(2)(a). Allowable reduction of sedimentation time will be determined by the Executive Secretary.

(d) Other Media Compositions and Configurations

Filters consisting of materials or configurations not prescribed in this section will be considered on experimental data or available operation experience.

Use of granular activated carbon media must receive the prior approval of the Executive Secretary, and must meet the basic specifications for filter material as given above, and:

(i) There must be provision for adding a disinfectant to achieve a suitable residual in the water following the filters and prior to distribution,

(ii) There must be a means for periodic treatment of filter material for control of bacterial or other growths,

(iii) Facilities for carbon regeneration or replacement must be provided.

(4) Support Media, Filter Bottoms and Strainer Systems

Care must be taken to insure that filter media, support media, filter bottoms and strainer systems are compatible and will give satisfactory service at all times.

(a) Support Media

The design of support media will vary with the configuration of the filtering media and the filter bottom. Thus, support media must be reviewed on a case-by-case basis. Guidelines for two types of support media commonly used are as follows:

(i) Torpedo Sand - A three inch layer of torpedo sand should be used as a supporting media for the filter sand in single media filters and should have:

(A) Effective size of 0.3 mm to 2.0 mm, and

(B) Uniformity coefficient not greater than 1.7.

(ii) Gravel - Gravel, when used as the supporting media, should consist of hard, rounded particles and should not include flat or elongated particles. The coarsest gravel should be 2.5 inches in size when the gravel rests directly on the strainer system, and should extend above the top of the perforated laterals. Not less than four layers of gravel should be provided in accordance with the following size and depth distribution when used with perforated laterals:

TABLE

Size	Depth
2-1/2 to 1-1/2 inches	5 to 8 inches
1-1/2 to 3/4 inches	3 to 5 inches
3/4 to 1/2 inches	3 to 5 inches
1/2 to 3/16 inches	2 to 3 inches
3/16 to 3/32 inches	2 to 3 inches

When proprietary filter bottoms are specified a reduction of gravel depths may be considered if such a reduction can be justified to the satisfaction of the Executive Secretary.

(b) Filter Bottoms and Strainer Systems

The design of manifold type collection systems shall:

(i) Minimize loss of head in the manifold and laterals,

(ii) Assure even distribution of washwater and even rate of filtration over the entire area of the filter,

(iii) Provide a ratio of the area of the final openings of the strainer system to the area of the filter of about 0.003,

(iv) Provide the total cross-sectional area of the laterals at about twice the total area of the final openings,

(v) Provide the cross-sectional area of the manifold at 1.5 to 2 times the total area

of the laterals.

Departures from these standards may be acceptable for high rate filter and for proprietary bottoms.

Porous plate bottoms shall not be used where iron or manganese may clog them or with waters softened by lime.

(5) Structural Details and Hydraulics

The filter structure shall be so designed as to provide for:

(a) Vertical walls within the filter,

(b) No protrusion of the filter walls into the filter media,

(c) Cover by superstructure,

(d) Head room to permit normal inspection and operation,

(e) Minimum water depth over the surface of the filter media of three feet, unless specifically waived by the Executive Secretary,

(f) Maximum water depth above the filter media should not exceed 12 feet,

(g) Trapped effluent to prevent backflow of air to the bottom of the filters,

(h) Prevention of floor drainage to enter onto the filter by installation of a minimum four inch curb around the filters,

(i) Prevention of flooding by providing an overflow,

(j) Maximum velocity of treated water in pipe and conduits to filters of two feet per second,

(k) Cleanouts and straight alignment for influent pipes or conduits where solids loading is heavy or following lime-soda softening,

(l) Washwater drain capacity to carry maximum flow,

(m) Walkways around filters, to be not less than 24 inches wide,

(n) Safety handrails or walls around filter areas adjacent to normal walkways,

(o) No common wall between filtered and unfiltered water shall exist. This requirement may be waived by the Executive Secretary for small "package" type plants using metal tanks of sufficient thickness,

(p) Filtration to waste for each filter.

(6) Backwash

(a) Water Backwash

Water backwash systems; including tanks, pumps and pipelines, shall:

(i) Provide a minimum backwash rate of 15 gallons per minute per square foot, consistent with water temperatures and the specific gravity of the filter media. A rate of 20 gallons per minute per square foot or a rate necessary to provide for a 50 percent expansion of the filter bed is recommended. The design shall provide for adequate backwash with minimum media loss.

(ii) Permit the backwashing of any one filter for not less than ten minutes.

(iii) Be capable of backwashing at least two filters, consecutively.

(iv) Include a means of varying filter backwash rate and time.

(v) Include a washwater regulator or valve on the main washwater line to obtain the desired rate of filter wash with washwater valves or the individual filters open wide.

(vi) Include a rate of flow indicator, preferably with a totalizer on the main washwater line, located so that it can be easily read by the operator during the washing process.

(vii) Be designed to prevent rapid changes in backwash water flow.

(viii) Use only filtered water.

(ix) Have washwater pumps in duplicate unless an alternate means of obtaining washwater is available.

(x) Perform in conjunction with "filter to waste" system to allow filter to stabilize before reintroduction into process.

(b) Air Backwash

Where air backwash is used, the design shall provide adjustable air flow up to four cfm/sq. ft.

(7) Washwater Troughs

Washwater troughs shall be so designed to provide

(a) The bottom elevation above the maximum level of expanded media during washing,

(b) A two inch freeboard at the maximum rate of wash,

(c) The top edge to be level,

(d) Spacing so that each trough serves the same number of square feet of filter areas,

(e) Maximum horizontal travel of suspended particles to reach the trough not to exceed three feet.

(8) Surface Wash or Subsurface Wash

Surface, subsurface, or air backwash facilities are required except for filters used exclusively for iron or manganese removal. Washing may be accomplished by a system of fixed nozzles or a revolving-type apparatus, provided:

(a) Provisions for water pressures of at least 45 psi,

(b) A properly installed vacuum breaker or other approved device to prevent

back-siphonage,

(c) All wash water must be finished water,

(d) Rate of flow of two gallons per minute per square foot of filter area with fixed nozzles or 0.5 gallons per minute per square foot with revolving arms.

(9) Appurtenances

(a) The following shall be provided for every filter:

(i) Influent and effluent sampling taps,

(ii) A gauge indicating loss of head,

(iii) A meter indicating rate-of-flow. A modified rate controller which limits the rate of filtration to a maximum rate may be used. However, equipment that simply maintains a constant water level on the filters is not acceptable, unless the rate of flow onto the filter is properly controlled,

(iv) A continuous turbidity monitoring where the filter is to be loaded at a rate greater than three GPM/sq. ft.

(v) Provisions for draining the filter to waste with appropriate measures for backflow prevention (see R309-108-18).

(b) The following should be provided for every filter:

(i) Wall sleeves providing access to the filter interior at several locations for sampling or pressure sensing,

(ii) A 1.0 to 1.5 inch diameter pressure hose and storage rack at the operating floor for washing filter walls.

(10) Miscellaneous

Roof drains shall not discharge into filters or basins and conduits preceding the filters.

R309-108-13. In-Plant Finished Water Storage.

In addition to the following, the applicable design standards of R309-111 shall be followed for plant storage.

(1) Washwater Tanks

Washwater tanks shall be sized, in conjunction with available pump units and finished water storage, to provide the backwash water required by R309-108-12(6)(a). Consideration must be given to the backwashing of several filters in rapid succession.

(2) Clearwell

Clearwell storage should be sized, in conjunction with distribution system storage, to relieve the filters from having to follow fluctuations in water use.

(a) When finished water storage is used to provide the contact time for chlorine (see R309-107), special attention must be given to size and baffling.

(b) An overflow should be provided.

(3) Adjacent Compartments

Finished water must not be stored or conveyed in a compartment adjacent to unsafe water when the two compartments are separated by a single wall. The Executive Secretary may waive this requirement for small "package" treatment plants using metal tanks of sufficient thickness.

(4) Basins and Wet-Wells

Receiving basins and pump wet-wells for finished water shall be designed as finished water storage structures.

R309-108-14. Miscellaneous Plant Facilities.

(1) Laboratory

Sufficient laboratory equipment must be provided to assure proper operation and monitoring of the water plant. A list of suggested laboratory equipment is available from the Division of Drinking Water. The Division should be consulted with respect to what laboratory equipment will be required.

(2) Continuous Turbidity Monitoring and Recording Equipment

Continuous turbidity monitoring and recording facilities shall be located as specified in R309-104-4.4.1a.

(3) Sanitary and Other Conveniences

All treatment plants should be provided with potable water, lavatory and toilet facilities unless such facilities are otherwise conveniently available. Plumbing must conform to the Utah Plumbing Code and must be so installed to prevent contamination of a public water supply. All wastes shall be safely disposed of without danger of contaminating the water treated by the station. Wastewaters shall be discharged directly to an approved wastewater disposal system which conforms to local requirement and the Utah Water Quality Rules, Utah Administrative Code R317. At all large plants, showers, lockers and office facilities should be provided.

R309-108-15. Operation and Maintenance Manuals.

Operation and maintenance manuals must be prepared for the treatment plant and found to be acceptable by the Executive Secretary. The manuals must be usable and easily

understood. They must describe normal operating procedures, maintenance procedures and emergency procedures.

R309-108-16. Safety.

All facilities must be designed and constructed with due regard for safety, comfort and convenience. As a minimum, all applicable requirements of Utah Occupational Safety and Health Act (UOSHA) must be adhered to.

R309-108-17. Disinfection Prior To Use.

All wells, pipes, tanks, and equipment which can convey or store potable water shall be disinfected in accordance with AWWA procedures. Plans or specifications shall outline the procedure and include the disinfectant dosage, contact time, and method of testing the results of the procedure.

R309-108-18. Disposal of Treatment Plant Waste.

Provisions must be made for proper disposal of water treatment plant waste such as sanitary, laboratory, sludge, and filter backwash water. All waste discharges and treatment facilities shall meet the requirements of the Utah Department of Environmental Quality, the Utah Department of Health, and the United States Environmental Protection Agency, including but not limited to the following:

(1) Rules for Individual Wastewater Disposal Systems, Utah Administrative Code R309-201 through R309-215 and R309-250.

(2) Rules for Water Quality, Utah Administrative Code R317.

(3) Rules for Solid and Hazardous Waste, Utah Administrative Code R315.

In locating waste disposal facilities, due consideration shall be given to preventing potential contamination of a water supply as well as breach or damage due to environmental factors.

R309-108-19. Additional Definitions.

"Coagulation" means a process using coagulant chemicals and mixing by which colloidal and suspended materials are destabilized and agglomerated into flocs.

"Conventional complete treatment" means a series of processes including coagulation, flocculation, sedimentation, filtration and disinfection resulting in substantial particulate removal and inactivation of pathogens.

"Direct filtration" means a series of processes including coagulation and filtration but excluding sedimentation resulting in substantial particulate removal.

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

"Flocculation" means a process to enhance agglomeration or collection of smaller floc particles into larger, more easily settleable particles through gentle stirring by hydraulic or mechanical means.

"Sedimentation" means a process for removal of solids before filtration by gravity or separation.

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R309. Environmental Quality, Drinking Water.
R309-109. Miscellaneous Treatment Methods.
R309-109-1. Definitions.
"Board" means the Drinking Water Board.
"Executive Secretary" means the executive secretary of the board.

R309-109-2. Authority and Purpose.
(1) This rule is authorized by Section 19-4-104(1)(a), Utah Code Unannotated 1992, which allows the Board to make rules in accordance with Title 63, Chapter 46a, Utah Administrative Rulemaking Act, for the purposes outlined in Section 19-4-104.
(2) The purpose of this rule is to specify standards for water treatment plants which utilize treatment techniques other than conventional complete treatment.

R309-109-3. General.
Included in this section are treatment processes not usually encountered in most water systems. However, these methods are expected to increase in popularity to accommodate future water supplies and water quality standards. Because of the specialized design, operation and maintenance required for these processes, design of these systems must not commence until the proposal has been discussed with and approved in writing by the Executive Secretary.
For each process described in this section pertinent regulations are given. The designer must also, however, incorporate the relevant regulations given in other sections into the plans and specifications for any of these specialized treatment methods.
Where applicable, the following topics must be addressed:
(1) Plant siting (R309-108-4)
(2) Reliability assurance (R309-108-5)
(3) Color coding of pipe (R309-108-6)
(4) Chemical addition (R309-108-8)
(5) Laboratory facilities (R309-108-14(1))
(6) Operation and maintenance manuals (R309-108-15)
(7) Safety (R309-108-16)
(8) Waste disposal (R309-108-18)
(9) Disinfection (R309-107 and R309-108-17)
When any product is used to coat, seal patch or otherwise attach itself to the surface of any treatment construction in such a way as to come into contact with the drinking water, the product shall comply, effective July 1, 1990, with the National Sanitation Foundation (NSF) Standard 61.

R309-109-4. Deionization.
Current practical methods of deionization include Ion Exchange, Reverse Osmosis and Electrodialysis. All properly developed groundwater sources having water quality exceeding 2,000 mg/l Total Dissolved Solids and/or 500 mg/l Sulfate must be either properly diluted or treated by the methods outlined in this section. Additional methods of deionization may be approved subject to the presentation of evidence of satisfactory reliability.
In general, treatment costs using these methods increase with salinity, therefore, every effort should be made to stabilize the salinity of the source.
Deionization cannot be considered a substitute process for complete treatment (see R309-108).
(1) ION EXCHANGE
(a) GENERAL
Deionization using ion exchange has generally been high in chemical costs but low in maintenance and capital costs. Great care should be taken by the designer to avoid loading the media with water high in organics. Pretreatment may be necessary depending on the source of supply. Organic contamination may irreversibly foul the ion exchange resin if adequate precautions are not observed. This design is generally less sensitive to the presence of iron and manganese.
(b) DESIGN
(i) Upflow or down flow units are acceptable.
(ii) Pretreatment may be necessary to minimize fouling by iron, manganese or organics.
(iii) Exchangers shall have at least a three foot media depth.
(iv) Exchangers shall be designed to meet the recommendations of the media manufacturer with regard to flow rate or contact time. In any case, flow shall not exceed seven gallons per minute per square foot of bed area. The plant shall be provided with an influent or effluent meter as well as a meter on any bypass line.
(v) Chemical feeders used shall conform with R309-108-8. All solution tanks must be covered.

(vi) Regenerants added should be uniformly distributed over the entire media surface of upflow or downflow units. Safety precautions should be observed around concentrated acids and bases. Regeneration shall be according to the media manufacturer's recommendations.

(vii) Since ion exchange can produce water very low in Total Dissolved Solids, blending is sometimes appropriate.

(viii) The wash rate capability shall be at least six to eight gallons per minute per square foot of bed area. Care should be taken in the design to prevent the loss of media during washing.

(ix) Disinfection (see R309-107) will be required ahead of the exchange units where this does not interfere with the media selected. This often improves filtration by minimizing bacterial growths or slimes. Where disinfection interferes with the media, disinfection must follow the treatment process.

(c) WASTE DISPOSAL

Waste generated by ion exchange treatment must be disposed of in accordance with R309-108-18.

(2) REVERSE OSMOSIS

(a) GENERAL

Reverse Osmosis (R.O.) has generally been low in chemical and maintenance cost but high in energy and capital costs. The design must permit the easy exchange of modules for cleaning or replacement. In general, experience indicates that modules have a maximum service life of about three years under ideal conditions. Replacement of these modules should be scheduled with the water system management when the flux decreases to an unacceptable limit and/or when the operating pressure requirements become excessive. Generally twenty to sixty-seven percent of the feed water is required to carry off the concentrated waste. The designer is cautioned that Hollow Fiber modules are sensitive to damage by chlorine.

(b) DESIGN CRITERIA

(i) Pretreatment shall be sufficient to minimize turbidity of the feed water. PH adjustment of the feed water to pH 5.5 is recommended when cellulose acetate (spiral wound) modules are used. Softening or pH adjustment is satisfactory pretreatment for hollow fiber modules.

(ii) Required equipment includes the following items: A polishing membrane filter (less than or equal to eight microns for hollow fiber modules, or less than or equal to twenty-five microns for a spiral wound module) shall be provided before the R.O. unit. Pressure gauges are required on the upstream and downstream side of the filter. The filter should be located to facilitate changes of the filtering membrane.

All units shall have a feed water and permeate water pressure gauge and have the capability to measure flow rates of permeate and concentrate water. Taps for sampling permeate, concentrate and blended (if practiced) flows will be required. A conductivity meter must be present at each installation. A continuous conductivity meter, if installed, shall be constructed so that it may be disconnected from the pipe system for calibration with standard solutions.

(iii) Aeration, if practiced, must conform with provisions of R309-109-11.

(iv) The maximum flux rate accepted will be 2.5 gallons per day per square foot of membrane per 100 pounds per square inch applied pressure. Higher flux rates will be permitted upon the presentation of satisfactory evidence of reliability and performance.

(v) A maximum thirty-six month membrane life shall be assumed until satisfactory on-site data is generated.

(vi) An automatic high temperature alarm or cutoff switch shall be installed if feed water is heated. Maximum temperature setting is generally between 80 and degrees 90 degrees Fahrenheit depending on the membrane used.

(vii) Cleaning in place is usually accomplished at lower pressures but at two to three times the normal flow velocity on the concentrate side. Chelating agents as well as citric acid are acceptable provided the unit is adequately flushed following cleaning.

(viii) Where the feed water pH is altered, stabilization of water is mandatory (see R309-109-9). Stabilization is optional in other cases.

(c) WASTE DISPOSAL

See R309-108-18.

(3) ELECTRODIALYSIS

(a) GENERAL

Past electrodialysis units have experienced high maintenance cost relative to the two desalinization methods mentioned previously. Where maintenance is readily available, this method may be cost effective. Experience has shown stacks must be disassembled and cleaned every two-four weeks depending on the source quality and operating conditions. Generally ten to thirty percent of the feed water is required to carry off the concentrated waste products. The designer should be cautioned that electrodialysis membranes may be damaged by the presence of chlorine.

(b) DESIGN

(i) The pretreatment necessary for electrodialysis is generally the same as R.O. (see R309-109-4(2)). However, feed water may be heated to near 180 degrees Fahrenheit to improve performance. Water should be free of iron, manganese or organics.

(ii) The design shall include ability to: measure plant flow rates; measure feed temperature if the water is heated (a high temperature automatic cutoff is required to prevent membrane damage); measure D.C voltage at the first and second stages as well as on each of the stacks. Sampling taps shall be provided to measure the conductivity of the feed water, blowdown water, and product water. D.C. and A.C. kilowatt-hour meters to record the electricity used shall also be provided.

(iii) With proper care, membrane life can be assumed to average near ten years.

(c) WASTE DISPOSAL REQUIREMENTS

See R309-108-18.

R309-109-5. Fluoridation.

The proposed method of fluoridation must be approved by the Executive Secretary prior to preparation of final plans and specifications. Treated water levels for Utah water supplies should contain approximately 1.0 mg/l fluoride. However, in no case shall the maximum contaminant levels for fluoride (see R309-103) be exceeded.

(1) FLUORIDE COMPOUNDS

Commercial Sodium Fluoride, Sodium Silicofluoride, and Hydrofluosilicic Acid shall conform to the applicable AWWA standards for the fluoridation of public water supplies. Other fluoride compounds which may be made available for water fluoridation purposes must be approved by the Executive Secretary. Evidence must be presented that they are satisfactory for the purpose and that they can be applied with the necessary degree of precision with the proposed chemical feeder. The use of granular compounds is advocated to minimize dust when handling the material.

(2) FLOURIDE COMPOUND STORAGE

Compounds shall be stored in covered or unopened shipping containers and should be stored inside a building. Unsealed storage units for hydrofluosilicic acid should have proper ventilation and be remote from any air intakes.

(3) CHEMICAL FEED EQUIPMENT AND METHODS

In addition to the requirements in R309-108-8, fluoride feed equipment shall meet the following requirements:

(a) Scales or loss-of-weight recorders shall be provided for dry chemical feeders.

(b) A device to measure the flow of water to be treated is required.

(c) Feeders shall be accurate to within five percent of any desired feed rate over the full range of flow to be treated.

(d) To avoid precipitation of fluoride, the fluoride compound shall not be added before lime-soda softening. Also fluoride shall not be added before ion exchange softening. Often it will be necessary to soften the make-up water to saturation feeders to minimize scale within the saturation tank.

(e) The point of application of hydrofluosilicic acid, if into a horizontal pipe, shall be in the lower half of the pipe.

(f) Feeders, fittings, etc., shall be compatible with the material fed, especially if hydrofluosilicic acid is used.

(g) A fluoride solution shall be applied by a positive displacement pump having a stroke rate not less than 20 strokes per minute.

(h) Adequate anti-siphon devices shall be provided for all fluoride feed lines. The make-up water pipe shall terminate a minimum of six inches or two pipe diameters above the solution tank which ever is greatest.

(i) Sodium silicofluoride shall not be fed as a slurry.

(j) The fluoride solution shall not be injected into the suction side of any pump which may be under negative pressure.

(4) PROTECTIVE EQUIPMENT

At least one pair of rubber gloves, a respirator of a type certified by the National Institute for Occupational Safety & Health for toxic dusts or acid gas (as necessary), an apron or other protective clothing, and goggles or face masks shall be provided for each operator. Other protective equipment must be provided as necessary.

(5) DUST CONTROL

(a) Provision must be made for the transfer of dry fluoride compounds from shipping containers to storage bins or hoppers in such a way as to minimize the quantity of fluoride dust which may enter the room in which the equipment is installed. Air exhausted from fluoride handling equipment shall discharge through a dust filter to the outside atmosphere of the building and all applicable Air Quality regulations shall be complied with.

(b) Provision shall be made for disposing of empty bags and drum barrels in a manner which will minimize exposure to fluoride dusts. A floor drain should be provided to facilitate the hosing of floors.

(6) TESTING EQUIPMENT

Equipment shall be provided for measuring the concentration of fluoride in the water. Such equipment shall be subject to the approval of the Executive Secretary and shall have the capacity to measure fluoride to the nearest 0.1 mg/l below 1.0 ppm.

R309-109-6. Direct Filtration.

Direct Filtration means complete treatment without settling prior to filtration. Previously mentioned requirements for chemical feed, mixing and flocculation shall apply (see R309-108). However, direct filtration applies the destabilized colloids to the filter rather than removing the majority of the load through sedimentation. While this process represents considerable construction cost savings, the water must have low average turbidity in order to provide reliable service without excessive backwash requirements. Such low average turbidity is generally only obtained from large capacity reservoirs.

(1) SOURCE QUALITY

At least a one year record of raw water turbidity data shall be presented to the Executive Secretary. A direct filtration facility will only be permitted if the data shows that most measurements are below 2 NTU. The Executive Secretary shall judge whether direct filtration is suitable given the quality of the proposed source.

(2) PILOT PLANT STUDIES

Pilot plant studies acceptable to the Executive Secretary shall be conducted prior to the preparation of final engineering plans.

(3) TREATMENT REQUIREMENTS

(a) Requirements for flash mix and flocculation basin design are given in R309-108-9.

(b) Chemical feed equipment shall be designed to provide a visible (but not necessarily settleable) floc at all times.

(c) Filter media shall be of the dual or multi media type having a minimum depth of thirty inches, the finest layer of which shall contain at least ten inches of media no larger than 0.45 mm effective size having a uniformity coefficient of 1.7 or less.

(d) The plant shall be designed and operated so that the plant will automatically shut down when a raw water turbidity of 10 NTU lasts longer than three hours, or when the raw water turbidity exceeds 25 NTU at any time.

(4) SITING REQUIREMENTS

The design and land ownership surrounding the plant shall allow for the installation of conventional sedimentation basins. Sedimentation basins may be required if the Executive Secretary determines the plant is failing to meet minimum water quality or performance standards.

R309-109-7. Taste and Odor Control.

Provisions should be made for the addition of taste and odor control chemicals at all surface water treatment plants. These chemicals hall be added sufficiently ahead of other treatment process to assure adequate contact time for effective and economical use of the chemicals.

(1) FLEXIBILITY

Plants treating water known to have taste and odor problems should be provided with equipment that makes several of the control processes available independently so the operator will have flexibility in operation. Where severe taste and odor problems are encountered, pilot studies may be necessary to estimate the rates (and thus the required detention time) at which various treatment processes proceed.

(2) CHLORINATION

Chlorination can be used for the removal of some objectionable odors. Adequate contact time must be provided to complete the chemical reactions involved. Ample consideration should be given to the point of application of chlorine. Use of chloramines to minimize taste and/or odors will not be permitted without the written approval of the Executive Secretary.

(3) CHLORINE DIOXIDE

Chlorine dioxide can be used to eliminate tastes and odors treatable by an oxidizing compound. Provisions shall be made for proper storing and handling of the sodium chlorite so as to eliminate any danger of explosion. In the future EPA may limit the use of this compound to a 1.0 mg/l maximum applied dose.

(4) POWDERED ACTIVATED CARBON

The following regulations pertain to the use of Powdered Activated Carbon:

(a) Powdered activated carbon may be added prior to coagulation to provide maximum contact time. Facilities to allow the addition at several points is preferred. Activated carbon should not be applied near the point of chlorine application.

(b) The carbon can be added as a pre-mixed slurry or by means of a dry-feed machine as long as the carbon is properly wetted.

(c) Continuous agitation is necessary to keep the carbon from depositing in the slurry storage tank.

(d) Provision shall be made for adequate dust control.

(e) The required rate of feed of carbon in water treatment plants depends upon the tastes and/or odors involved. Dosages up to 30 milligrams per liter have been utilized.

(f) Powdered activated carbon should be handled as a potentially combustible material. It should be stored in a building or compartment as nearly fireproof as possible. Nothing else should be stored in the same compartment. Quicklime, chlorine, hypochlorites and potassium permanganate are especially dangerous in contact with carbon. Carbon feeder rooms should be equipped with explosion-proof electrical outlets, lights, motors and structures.

(5) COPPER SULFATE AND OTHER COPPER COMPOUNDS

Continuous or periodic treatment of water with copper compounds to kill algae or other growths shall be controlled to prevent copper in excess of 1.0 milligram per liter (as copper) in the plant effluent or distribution system. Care shall be taken to assure an even distribution. Approval for the dose proposed must be obtained from all state and federal agencies having jurisdiction over raw water supplies. In larger raw water reservoirs, the chemical can be added from a boat, by dragging bags of the chemical, by chemical sprayers, by dusters, or by using dry-feed or solution-feed machines. For continuous feeding within the plant, copper compounds should be added by dry-feed machine or solution-feed equipment.

(6) AERATION

See R309-109-11

(7) POTASSIUM PERMANGANATE

Application of potassium permanganate may be considered, provided that the treatment shall be designed so that the products of the reaction are not present in the finished water. This generally means that application of this chemical shall precede filtration.

(8) MICROSCREENING

A microscreen is a mechanical supplement capable of removing suspended matter from the water by straining, usually prior to other treatment. It may be used to reduce nuisance organisms and organic loadings. It shall not be used in place of filtration and/or coagulation in the preparation of water for filtration.

(a) DESIGN

(i) Shall give due consideration to

(A) Nature of the suspended matter to be removed,

(B) Corrosiveness of the water,

(C) Effect of chlorination, when required as pretreatment.

(ii) Shall provide

(A) A durable, corrosion-resistant screen,

(B) By-pass arrangements,

(C) protection against back-siphonage when potable water is used for washing,

(D) Proper disposal of wash water. See R309-108-18.

(9) OTHER METHODS

The decision to use any other methods of taste and odor control should be made only after careful laboratory and/or pilot plant tests and consultation with the Executive Secretary.

R309-109-8. Softening.

The softening process selected must be based upon the mineral qualities of the raw water and the desired finished water quality in conjunction with requirements for disposal of sludge or brine waste, cost of plant, cost of chemicals and plant location. Applicability of the process chosen shall be demonstrated.

(1) LIME OR LIME-SODA PROCESS

Rapid mix and sedimentation design must conform to the applicable requirements of R309-108. Flocculation detention times are generally longer than at conventional complete treatment plants (see R309-109-8(1)(c)).

(a) EQUIPMENT

Sludge removal capability shall be provided in the sedimentation basin.

(b) PRE-AERATION

The carbon dioxide content of the raw water should be determined. When its concentration exceeds 10 milligrams per liter, the economics of removal by aeration as opposed to neutralization with lime should be considered.

(c) DESIGN

The applicable design standards of R309-108 shall be conformed to, except that the minimum flocculation detention time shall be 40 minutes.

(d) SOLIDS CONTACT UNITS

See R309-108-11.

(e) STABILIZATION OR RECARBONATION

pH adjustment of water softened by the lime or lime-soda process is required.

(f) SLUDGE DISPOSAL

Provisions must be included for proper disposal of softening sludges. (see R309-108-18).

(g) DISINFECTION

The use of excess lime shall not be considered a substitute for the conventional disinfection techniques. (see R309-107).

(h) PLANT START-UP

The plant processes must be manually started following shut-down.

(2) CATION EXCHANGE PROCESS

Alternative methods of hardness reduction should be investigated when the sodium content as well as the dissolved solids concentration is of concern. Iron, manganese, or combination of the two should not exceed 0.3 milligrams per liter in the water as applied to the ion exchange resin. Pretreatment is required when the content of iron, manganese or a combination of the two, is one milligram per liter or more.

(a) DESIGN

The units may be of pressure or gravity type, of either an upflow or downflow design. Automatic regeneration based on volume of water softened should be used unless manual regeneration is justified and is approved by the Executive Secretary. A manual override shall be provided on all automatic controls. Final sodium concentration and its health impact on the water system's users must be a consideration if sodium chloride is used to regenerate the ion exchange beds. Very high raw water sodium levels may preclude this method of treatment.

(b) EXCHANGE CAPACITY

The design capacity for hardness removal shall not be assumed to exceed 20,000 grains per cubic foot when resin is regenerated with 0.3 pounds of salt per kilograin of hardness removed. Iron in the oxidized state should not exceed 0.3 mg/l in the applied water to avoid fouling the resin. Finished water should contain less than 0.2 mg/l total iron.

(c) DEPTH OF RESIN

The depth of the exchange resin should not be less than three feet.

(d) SURFACE LOADING AND BACKWASH RATE

The surface loading rate should not exceed seven gallons per minute per square foot of bed area and the backwash rate capability should be six to eight gallons per minute per square foot of bed area. The design shall prevent the loss of media during normal operation.

(e) UNDERDRAINS AND SUPPORTING GRAVEL

The bottoms, strainer systems and support for the exchange resin shall conform to criteria provided for rapid rate gravity filters. See R309-108-12(4).

(f) BRINE DISTRIBUTION

Facilities should be included for even distribution of the brine over the entire surface of either upflow or downflow units.

(g) CROSS CONNECTION CONTROL

Backwash, rinse and air relief discharge pipes should be installed in such a manner as to prevent any possibility of back-siphonage.

(h) BYPASS

A bypass may be provided around softening units to produce blended water of desirable hardness if the source of water supply is groundwater of acceptable quality. Split treatment of surface sources should insure that both portions have received complete treatment. Totalizing meters must be installed on the bypass line and on each softener unit. An automatic proportioning or regulating device and shutoff valve should be provided on the bypass line. In some installations it may be necessary to treat the bypassed water to obtain acceptable levels of iron and/or manganese in the finished water.

(i) ADDITIONAL LIMITATIONS

Waters having five units or more turbidity should not be applied directly to the cation exchange softener. Silicagel resins should not be used for waters having a pH above 8.4 or containing less than six milligrams per liter silica (both can cause erosion of the media) and should not be used when iron is present. When the applied water contains a chlorine residual the cation exchange resin shall be a type that is not damaged by residual chlorine. Phenolic resin should not be used.

Sampling taps must be provided for the collection of representative samples. The taps shall be located to provide for sampling of the softener influent, effluent and blended water. The sampling taps for the blending water shall be at least twenty feet downstream from the point of blending.

(j) BRINE AND SALT STORAGE TANKS

Brine measuring or salt dissolving tanks and wet salt storage facilities must be covered and must be constructed of corrosion resistant material. The make-up water inlet must have a free fall discharge of two pipe diameters or six inches or more whichever is greatest above the maximum liquid level of the unit or be otherwise protected from back-siphonage. Water for filling the tank should be distributed over the entire surface of pipes above the brine level in the tank. The salt shall be supported on graduated layers of gravel under which is a suitable means of collecting the brine. Wet salt storage basins must be equipped with manhole or hatchway openings having raised curbs,

watertight covers, and overhanging edges similar to those required for finished water reservoirs. Overflows, where provided, must be turned down, have a proper free fall discharge and be protected with a corrosion resistant screen.

(k) SALT STORAGE CAPACITY

Salt storage should have sufficient capacity to store in excess of one and one-half carloads or truckloads of salt or provide for at least thirty days of operation.

(l) STABILIZATION

Stabilization for corrosion control must be provided (see R309-109-9) if it is determined that the system is being damaged as a result of softening.

(m) WASTE DISPOSAL

Suitable disposal must be provided for brine waste (see R309-108-18).

(n) Construction Material

Pipes and contact materials must be resistant to the aggressiveness of salt.

(o) Housing

Salt storage shall be enclosed and separated from other operating areas in order to prevent damage to equipment.

R309-109-9. Stabilization.

Water that is unstable due either to natural causes or to treatment given the water should be stabilized. Water following lime-softening processes must be stabilized to prevent scale on filter media and damage to the water system. Stabilization is also required where the pH has been artificially reduced prior to R.O. treatment.

The processes of stabilization outlined here are recommended for any water which is excessively corrosive or depositing within a water system. Each water utility should deliver a water which is stable and will not damage the users plumbing over its normal useful life.

(1) CARBON DIOXIDE ADDITION

(a) Recarbonation Basin Design Should Provide

(i) A total detention time of 20 minutes.

(ii) Two compartments, each with a depth of at least eight feet, as follows:

(A) A mixing compartment having a detention time of at least three minutes,

(B) A reaction compartment.

(b) Adequate precautions must be taken to prevent the possibility of carbon monoxide entering the plant building from recarbonation compartments.

(c) Provisions shall be made for draining the recarbonation basin and removing sludge.

(2) CARBON DIOXIDE REMOVAL

Carbon dioxide, down to about five ppm can be removed by aeration. However, aeration introduces dissolved oxygen, and thereby increases the corrosiveness of soft waters with low alkalinity. Carbon dioxide may also be removed by an alkali, the required dose being materially reduced by preaeration.

(3) ACID AND BASE ADDITION

(a) Feed equipment shall conform to R309-108-8.

(b) Adequate precautions such as not adding water to concentrated acid shall be taken.

(4) DEPOSITION OF CALCIUM CARBONATE FILM

A protective coating, sufficient to minimize corrosion without undue deposition of scale, may be obtained through the use of the proper dosage of certain treatment chemicals. A desired calcium carbonate form may usually be obtained by adding either lime, soda ash or caustic soda depending on the chemistry of the water to be treated. Soft waters should be treated with lime to provide the required calcium as well as alkalinity.

Soft waters which also have a low carbonate content may need a mixture of lime and soda ash to provide the necessary calcium and carbonate for the calcium carbonate film. A Langelier index of at least +0.2 and a Calcium Carbonate precipitation potential of not more than ten ppm (as $CaCO_3$) is considered good practice for the formation of protective coatings. To provide proper buffering of most waters final pH adjustments between 8.0 and 8.5 should be avoided if possible.

(5) POLYPHOSPHATES

The feeding of polyphosphates may be applicable for sequestering calcium in lime-softened water, corrosion control, and in conjunction with alkali feed following ion exchange softening. The usual dosage is one to two ppm. Maintenance of a chlorine residual in the system is required.

(a) Feed equipment shall conform to R309-108-8.

(b) Phosphate must be food grade.

(c) Stock phosphate solution must be kept covered and disinfected by carrying approximately ten milligrams per liter free chlorine residual.

(d) Satisfactory chlorine residuals shall be maintained in the distribution system when phosphates are used.

(e) Phosphate compounds shall never exceed ten ppm (as orthophosphate) in finished water.

(6) "SPLIT TREATMENT"

Under some conditions, a lime-softening water treatment plant can be designed using "split treatment" in which raw water is blended with lime-softened water to partially stabilize the water. Treatment plants designed to utilize "split treatment" should also contain facilities for further stabilization by other methods. All surface water portions must undergo the equivalent of complete treatment. Bypassing part of the flow from surface sources without equivalent complete treatment cannot be allowed.

(7) CARBON DIOXIDE REDUCTION BY AERATION

The carbon dioxide content of an aggressive water may be reduced by aeration. Aeration devices shall conform to R309-109-11.

(8) OTHER TREATMENT

Other treatment for controlling corrosive waters by the use of sodium silicate and sodium bicarbonate may be used where necessary. Any proprietary compound must receive the specific approval of the Executive Secretary before use. Chemical feeders shall be as required in R309-108-8.

(9) WATER UNSTABLE DUE TO BIOCHEMICAL ACTION IN DISTRIBUTION SYSTEM

Unstable water resulting from the bacterial decomposition of organic matter in water (especially in dead end mains), the biochemical action within tubercles, or the reduction of sulfates to sulfides should be prevented by the maintenance of a free chlorine residual throughout the distribution system. Disinfection (see R309-107) of some dead end lines may be required if residuals cannot be maintained.

(10) CONTROL

Laboratory equipment shall be provided for determining the effectiveness of stabilization treatment.

R309-109-10. Iron and Manganese Control.

Iron and manganese control, as used herein, refers solely to treatment processes designed specifically for this purpose. The treatment process used will depend upon the character of the raw water. The selection of one or more treatment processes must meet specific local conditions as determined by engineering investigations, including chemical analyses of representative samples of water to be treated, and receive the approval of the Division of Drinking Water. It may be necessary to operate a pilot plant in order to gather all information pertinent to the design. Consideration should be given to adjust the pH of the raw water to increase the rate of the chemical reactions involved.

(1) REMOVAL BY OXIDATION, DETENTION AND FILTRATION

(a) OXIDATION

Oxidation may be by aeration, as indicated in R309-109-11, or by chemical oxidation with Chlorine or Potassium Permanganate.

(b) DETENTION

(i) Reaction - A minimum detention time of twenty minutes shall be provided following aeration in order to insure that the oxidation reactions are as complete as possible. This minimum detention shall be omitted only where a pilot plant shall be designed as a holding tank with sufficient baffling to prevent short-circuits.

(ii) Sedimentation - Sedimentation basins shall be provided when treating water with high iron and/or manganese content, or where chemical coagulation is used to reduce the load on the filters. Provisions for sludge collection in the unit is required.

(c) FILTRATION

(i) General - Minimum criteria relative to number, rate of filtration, structural details and hydraulics, filter media, etc., provided for rapid rate gravity filters shall apply to pressure filters where appropriate, and may be used in this application but cannot be used in the filtration of surface waters or following lime-soda softening.

(ii) Details of Design for Pressure Filter - The filters shall be designed to provide for:

(A) Loss of head gauges on the inlet and outlet pipes of each filter

(B) An easily readable meter or flow indicator on each battery of filters. A flow indicator is recommended for each filtering unit,

(C) Filtration and backwashing of each filter individually with an arrangement of piping as simple as possible to accomplish these purposes,

(D) The top of the washwater collectors to be at least twenty-four (24) inches above the surface of the media,

(E) The underdrain system to efficiently collect the filtered water and to uniformly distribute the backwash water at a rate capable of not less than 15 gallons per minute per square foot of filter area,

(F) Backwash flow indicators and controls that are easily readable while operating the control valves,

(G) An air release valve on the highest point of each filter,

(H) An accessible manhole to facilitate inspections and repairs,

(I) Means to observe the wastewater during backwashing,
(J) Construction to prevent cross-connection.
(2) REMOVAL BY THE LIME-SODA SOFTENING PROCESS
See R309-109-8.
(3) REMOVAL BY MANGANESE GREENSAND FILTRATION
This process, consisting of the continuous feed of potassium permanganate to the influent of a manganese greensand filter, is more applicable to the removal of manganese than the removal of iron.
(a) Provisions should be made to apply the permanganate as far ahead of the filter as practical and at a point immediately before the filter.
(b) Other oxidizing agents or processes such as chlorination or aeration may be used prior to the permanganate feed to reduce the cost.
(c) An anthracite media cap of at least six inches shall be provided over manganese greensand.
(d) The normal filtration rate is three gallons per minute per square foot.
(e) The normal wash rate is 8 to 10 gallons per minute per square foot.
(f) Air washing shall be provided.
(g) Sample taps shall be provided.
(i) Prior to application of permanganate,
(ii) Immediately ahead of filtration,
(iii) At a point between the anthracite media and the manganese greensand,
4. Halfway down the manganese greensand,
5. At the filter effluent.
(4) "RED WATER" WASTE DISPOSAL
See R309-108-18.
(5) REMOVAL BY ION EXCHANGE
This process of iron and manganese removal should not be used for water containing more than 0.3 milligrams per liter of iron, manganese or combination thereof. This process is not acceptable where either the raw water or wash water contains dissolved oxygen. Waste disposal should conform with R309-108-18.
(6) SEQUESTRATION BY POLYPHOSPHATES
This process shall not be used when iron, manganese or a combination thereof exceeds 1.0 milligram per liter. The total phosphate applied shall not exceed 10 milligrams per liter as PO4. Where phosphate treatment is used, satisfactory chlorine residuals shall be maintained in the distribution system.
(a) Feeding equipment shall conform to the requirements of R309-108-8.
(b) Stock phosphate solution must be kept covered and disinfected by carrying approximately 10 milligrams per liter free chlorine residual.
(c) Polyphosphates shall not be applied ahead of iron and manganese removal treatment. If no iron or manganese removal treatment is provided, the point of application shall be prior to any aeration, oxidation or disinfection steps.
(d) Phosphate chemicals must be food grade.
(7) SAMPLING PROVISIONS
Sampling taps shall be provided for control purposes. Taps shall be located on each raw water source, and on each treatment unit influent and effluent.

R309-109-11. Aeration.
Aeration may be used to help remove offensive tastes and odors due to dissolved gases from decomposing organic matter, or to reduce or remove objectionable amounts of carbon dioxide, hydrogen sulfide, and to introduce oxygen to assist in iron and/or manganese removal. The designer is cautioned that aeration may considerably increase the oxygen content of some waters, thereby accelerating the corrosion processes. Stabilization may be necessary if evidence indicates the system is being damaged. Care should be taken that the air surrounding the treatment facilities complies with Utah Air Conservation Regulations.
(1) NATURAL DRAFT AERATION
Design shall provide:
(a) Perforations in the distribution pan 3/16 to 1/2 inches in diameter, spaced one to three inches on center to maintain a six inch water depth,
(b) For distribution of water uniformly over the top tray,
(c) Discharge through a series of three or more trays with separation of trays not less than twelve inches,
(d) Loading at a rate of one to five gallons per minute for each square foot of total tray area,
(e) Trays with slotted, heavy wire (1/2 inch openings) mesh or perforated bottoms,
(f) Construction of durable material resistant to aggressiveness of the water and dissolved gases,
(g) Protection from loss of spray water by wind carriage by enclosure with louvers sloped to the inside at an angle of approximately 45,

(h) Protection from insects by 24-mesh screen.

(2) FORCED OR INDUCED DRAFT AERATION

Devices shall be designed to:

(a) Include a blower with a weatherproof motor in a tight housing and screened enclosure,

(b) Insure adequate counter current of air through the enclosed aerator column,

(c) Exhaust air directly to the outside atmosphere,

(d) Include a down-turned and 14-mesh screened air outlet and inlet,

(e) Be such that air introduced in the column shall be as free from obnoxious fumes, dust, and dirt as possible,

(f) Be such that sections of the aerator can be easily reached or removed for maintenance of the interior or installed in a separate aerator room,

(g) Provide loading at a rate of one to five gallons per minute for each square foot of total tray area,

(h) Insure that the water outlet is adequately sealed to prevent unwarranted loss of air,

(i) Discharge through a series of five or more trays with separation of trays not less than six inches,

(j) Provide distribution of water uniformly over the top tray,

(k) Be of durable material resistant to corrosion by water and dissolved gases.

(3) PRESSURE AERATION

Pressure aeration may be used for oxidation purposes. Filters following pressure aeration must have adequate exhaust devices for release of air. Pressure aeration devices shall be designed to:

(a) Dive thorough mixing of compressed air with water being treated,

(b) Provide screened and filtered air, free of obnoxious fumes, dust, dirt and other contaminants.

(4) OTHER METHODS OF AERATION

Other methods of aeration may be used if applicable to the treatment needs. Such methods include but are not restricted to spraying, diffused air, cascades and mechanical aeration. The treatment processes must be designed to meet the particular needs of the water to be treated and are subject to the approval of the Executive Secretary.

(5) PROTECTION OF AERATORS

All aerators except those discharging to lime softening or clarification plants shall be protected from contamination from birds and insects.

(6) DISINFECTION

Groundwater supplies exposed to the atmosphere by aeration must receive chlorination as the minimum additional treatment. However, this requirement can be waived if the aeration housing is constructed and screened so as to minimize the possibility of contamination and a satisfactory bacteriologic record is maintained.

(7) BY-PASS

A by-pass should be provided for all aeration units or the facilities should consist of dual parallel units to permit routine maintenance.

R309-109-12. Slow Sand Filtration.

(1) Slow sand filtration means a process involving passage of raw water through a bed of sand at low velocity resulting in substantial particle removal by physical and biological mechanisms. The acceptability of slow sand filters as a substitute for "complete treatment" facilities (detailed in R309-108) shall be determined by the Executive Secretary based on suitability of the source water and demand characteristics of the system. The Executive Secretary may impose design requirements in addition to those listed herein, in allowing this process. The following will be considered, among other factors, in determining whether slow sand filtration will be acceptable:

(a) Consistent low turbidity raw water,

(b) Nature of the turbidity particles, and

(c) Nature and extent of algae growths in the raw water.

The Executive Secretary shall allow the use of slow sand filters only when the supplier's engineering studies prove that the slow sand facility can consistently produce an effluent meeting the quality requirements of R309-103. The Executive Secretary should be consulted prior to the detailed design of the slow sand facility.

Effluent from a slow sand filter shall not be introduced into a public water supply until an active surface mat has been created on the filter.

(2) DESIGN PARAMETERS

The following shall apply to each slow sand filter plant:

(a) Disinfection of the effluent of such plants will be required.

(b) Filtration rates of 2 to 6 million gallons per acre per day (0.031 to 0.095 GPM/Sq. Ft.) shall be acceptable.

(c) A minimum of 24 inches of filter sand shall be present, even after scraping.

(d) The filter sand uniformity coefficient shall not exceed 2.5. The effective size

of the filter sand must not be less than 0.2 mm and not greater than 0.4 mm.

(e) At least two filter units shall be provided.

(f) All filters shall be covered to prevent freezing.

(g) The underdrains shall be so spaced that the maximum velocity of the water flow in the lateral underdrain will not exceed 0.75 feet per second. The maximum spacing of the laterals shall not exceed 10 feet.

(h) The following minimum depths of filter gravel will be acceptable: 6 inches of gravel passing a 3-inch diameter screen, but held on a 1-inch diameter screen; 2 inches of gravel passing a 1-inch diameter screen, but held on a 3/16-inch diameter screen. The gravel layer shall be held at least two feet away from the side walls of the filters to insure that the filter sand will rest on the concrete bottom in the area within two feet of the side walls.

(i) Slow sand filters shall be designed to provide a depth of at least 3 to 5 feet of water over the sand.

(j) Each filter shall be equipped with a suitable loss-of-head gauge.

(k) A filter-to-waste provision shall be included.

R309-109-13. Diatomaceous Earth Filtration.

(1) The acceptability of diatomaceous earth filters as a substitute for "complete treatment" facilities (detailed in R309-108) shall be determined by the Executive Secretary based on the level of support previously exhibited by the system management along with a finding by the Executive Secretary that other methods herein described are unacceptable.

Diatomaceous earth filtration consists of a process to remove particles from water wherein a precoat cake of diatomaceous earth filter media is deposited on a support membrane (septum), and while the water is filtered by passing through the cake on the septum, additional filter media known as body feed is continuously added to the feed water to maintain the permeability of the filter cake. Diatomite filters are characterized by rigorous operating requirements, high operating costs, and increased sludge production.

The Executive Secretary may impose design requirements in addition to those listed herein, in allowing this process. The following will be considered, among other factors, in determining whether diatomaceous earth filtration will be acceptable:

(a) Consistent low turbidity raw water,

(b) Nature of the turbidity particles, and

(c) Nature and extent of algae growths in the raw water.

The Executive Secretary shall allow the use of diatomaceous earth filters only when the supplier's engineering studies, including sufficient pilot plant runs to prove, to the Executive Secretary's satisfaction, that the proposed diatomaceous earth filtration facility can consistently produce an effluent meeting the quality requirements of R309-103. The Executive Secretary should be consulted prior to the detailed design of the diatomaceous earth filtration facility.

(2) DESIGN PARAMETERS

The following shall apply to each diatomaceous earth filter plant:

(a) Disinfection of the effluent of such plants will be required.

(b) For the particular filter media used, pilot plant studies must have established minimum grade or grades which will provide the desired clarity-permeability relationship for the source water. The system must have procedures and tests, acceptable to the Executive Secretary, whereby they can accept or reject individual shipments from suppliers based on these minimums.

(c) Continuous body feed must be supplied to each filter during filtration. Dry or slurry type feeders can be utilized, but each must have apparatus for adjusting the feed rate for the expected range of variation in the suspended solids in the raw water.

(d) Filtration rates, in conjunction with body feed rates for variation in suspended solids in the raw water, must be established during pilot studies. Each filter must have equipment to indicate and maintain a constant rate of flow through the filter. Filtration rates of 0.5 to 2.0 gpm per square foot of filter area are considered normal.

(e) At least two filter units must be provided.

(f) The septums to support the filter media must be rigid and structurally stable so that increasing pressure differentials resulting from filter cake buildup will not distort the septum and cause the filter cake to crack or be dislodged. The septum design should be such as to facilitate uniform precoating and rapid and effective cleaning. The septum assembly should be fixed so that a single septum can be quickly withdrawn, cleaned and/or repaired, and replaced.

(g) All filters must be housed to prevent freezing.

(h) In addition to individual pumps for each filter, at least one operable and interchangeable standby pump must kept in stock. Where the filter plant is the single source, or the primary source, for a community type system; standby power must be provided.

(i) Each filter shall be equipped with suitable gauges to indicate the loss-of-head

across the septum.

(j) A filter-to-waste provision shall be included.

R309-109-14. New Water Treatment Processes or Equipment.

The policy of the Board is to encourage, rather than to obstruct, the development of new methods and equipment for the treatment of water. Nevertheless, any new processes or equipment must have been thoroughly tested in full-scale, comparable installations, before approval of plans can be issued.

Any municipality, water district, or institution purchasing novel equipment should be amply protected by a performance bond or other acceptable arrangement, so that any expenditure of money will be refunded in case of failure of any process or equipment. The performance bond should include provisions to cover the cost of any alterations deemed necessary by the Executive Secretary.

No new water treatment process will be approved for use in Utah unless the designer or supplier can present evidence satisfactory to the Executive Secretary that the process will insure the delivery of water of safe, sanitary quality, without imposing undue problems of supervision, operation and/or control.

KEY: drinking water, water treatment
199226-12-5

R309. Environmental Quality, Drinking Water.
R309-110. Pumping Facilities.
R309-110-0. General.

Pumping facilities shall be designed to maintain the sanitary quality of pumped water. Subsurface pits or pump rooms and inaccessible installations should be avoided wherever possible.

There shall not be at any point in the pumping station a cross connection between a potable water supply and any supply which is not of equal quality. Steam engine exhaust shall not be returned, nor shall the cooling water from engine jackets or other heat-exchange devices be returned to a potable supply.

Requirements for well pump houses are also given in Section 106-2.7.

R309-110-1. Location.

The pumping station shall be so located that the proposed site will meet the requirements for sanitary protection of water quality, hydraulics of the system and protection against interruption of service by fire, flood or any other hazard.

1.1 SITE PROTECTION

The station shall be:

a. Elevated to a minimum of one foot above the elevation of a flood with a 25 year frequency, or protected to such elevation,

b. Readily accessible at all times unless permitted to be out of service for the period of inaccessibility,

c. Graded around the station so as to lead surface drainage away from the station,

d. Protected to prevent vandalism and entrance by unauthorized persons or animals preferably by an industrial type fence with a locked gate, unless located in an area where such an enclosure would be inappropriate.

R309-110-2. Pumping Stations.

Both raw and finished water pumping stations:

a. Shall have floor elevation of at least six inches above finished grade (where underground chambers are required, this requirement may be waived by the Executive Secretary),

b. Shall have underground structure externally waterproofed,

c. Shall have all floors drained in such a manner that the quality of the potable water will not be endangered (All floors shall be sloped to adequately drain the building. Drains to daylight are preferred),

d. Shall provide a suitable outlet for drainage from pump glands without discharging onto the floor,

e. Should have adequate space for the installation of additional units if needed, and for the safe servicing of all equipment,

f. Should be of durable construction, fire and weather resistant and with outward opening doors (the use of tamperproof hinges is recommended).

2.1 WET WELL INSTALLATIONS

Wet wells shall:

a. Be watertight,

b. Have a riser pipe or casing which extends at least six inches above the floor,

c. Have the pump foundation and pump base designed to prevent water from coming into contact with the joint,

d. Have floors sloped to permit removal of water and settled solids,

e. Be covered or otherwise protected against contamination,

f. Be placed above highest anticipated ground water elevation if handling potable water.

2.2 EQUIPMENT SERVICING

Pump Stations:

a. Shall be provided with adequate facilities (such as craneways, hoist beams, openings in roofs, etc.) for the servicing or removal of pumps, motors and heavy or bulky equipment,

b. Should have a convenient tool board, maintenance record charts or other facilities as needed for proper maintenance of the equipment.

2.3 STAIRWAYS AND LADDERS

Stairways or ladders should be provided between all floors, and in pits or compartments which must be entered. Stairways shall have handrails on both sides, and treads of non-slip material. Stairs are preferred in areas where there is frequent traffic or where supplies are transported by hand.

2.4 HEATING

Provisions shall be made for adequate heating for the safe and efficient operation of the equipment if the equipment will be utilized in the winter. In pump houses not occupied by personnel, only enough heat need be provided to prevent freezing of equipment

or treatment process.

If the installation will not be used in the winter, provisions should be made to isolate and drain the equipment to prevent damage by freezing.

2.5 VENTILATION

Ventilation shall conform to existing local and/or state codes. Adequate ventilation shall be provided for all pumping stations by means of windows and doors, roof ventilators, or other means. Unless otherwise approved by the Executive Secretary forced ventilation of at least six changes of air per hour shall be provided for:

a. all rooms, compartment, pits and other enclosures below ground floor,

b. Any area where unsafe atmosphere may develop or where excessive heat may be built up.

2.6 LIGHTING

Pump stations shall be adequately lighted throughout. All electrical work shall conform to the requirements of the American Insurance Association and related agencies and to the relevant state and/or local codes.

2.7 SANITARY AND OTHER CONVENIENCES

All pump stations, if attended during a significant portion of the day, should be provided with potable water, lavatory and toilet facilities unless such facilities are otherwise available. Plumbing must conform to the Utah State Plumbing Code and must be so installed as to prevent contamination of a public water supply. All wastes shall be safely disposed of without danger of contaminating the water pumped by the station.

They shall be discharged directly to an approved sewer system, or to a septic tank and subsurface tile absorption field which conforms to state and/or local requirements. At all large stations, showers, lockers and office facilities should be provided.

2.8 INTAKES

The intake shall be of a type appropriate to the pumping station, and shall be protected so as to prevent deterioration of the sanitary quality of the water to be pumped. Refer also to Section 106-1.4.

2.8.1 INTAKE LINE

Except in the case of small stations, or where the pump suction is taken directly from an adjacent supply, the water should be conducted from its source by a watertight conduit into a wet well which is in or adjacent to the pump house.

2.8.2 INTAKE ENTRANCE STRUCTURES

Intakes which draw water from surface streams or open reservoirs shall have adequate protection, by means of jetties, racks, or other appropriate devices, against clogging by sediment, trash, or ice. Where the depth of water permits selection of the level from which the water can be drawn, as in the case of raw water supplies, the intake structure should provide for such selection by suitable gates, controlled from the operating floor of the intake or some other readily accessible point, and should be constructed of such materials and of such design as will insure their free operation under all heads. Where practicable, an emergency intake is desirable.

2.8.3 SCREENS AND ICE CONTROL

The intake to the pumps drawing raw water should be protected to exclude all matter which will obstruct the suction line, injure the pumps, or interfere with subsequent treatment of the water. To accomplish this two sets of removable stationary screens, or a traveling screen, may be used. Suitable facilities for cleaning the screens also should be provided. Where ice formation can be anticipated, the intake should be designed to minimize this. Where necessary, provision shall be made to de-ice the screens and intake openings, and to control ice by means of steam lines or otherwise.

R309-110-3. Pumps.

Pumps shall be of suitable type and have adequate capacity for their intended purpose, and shall be installed in accordance with the manufacturer's directions.

When the pressure in a distribution system is dependent upon the pump station, at least two pumping units shall be provided unless adequate water, and pressure, can be supplied by other facilities within the system; or unless the water system can be easily shut down (e.g., some non-community systems).

With any pump out of service the remaining pump or pumps shall be capable of providing the maximum daily pumping demand of the system. The pumping units:

a. Shall have ample capacity to supply the peak demand without overloading,

b. Shall be driven by a prime mover able to operate at the maximum head and air temperature which may be encountered.

3.1 SUCTION LIFT

Suction lift shall:

a. Be avoided, if possible,

b. Be within allowable limits, preferably less than 15 feet.

If suction lift is necessary, provision shall be made for priming the pumps.

3.2 PRIMING

Prime water must not be of lesser sanitary quality than that of the water being

pumped. Means shall be provided to prevent backsiphonage. When an air-operated ejector is used, the screen intake shall draw clean air from a point at least ten feet above the ground or other source of possible contamination, unless the air is filtered by an apparatus approved by the Division of Environmental Health. Vacuum priming may be used.

R309-110-4. In-Line Booster Pumps.

Booster pumps positioned within a distribution system shall be located or controlled so that:

a. The intake pressure shall be at least 20 psi when the pump is in normal operation,

b. Power to the pumps shall be automatically cutoff when the pressure in the suction line becomes less than 20 psi,

c. Automatic or remote control devices shall have a range between the start and cutoff pressure which will prevent excessive cycling,

d. A bypass is available,

e. They are accessible for servicing and repairs.

4.1 INDIVIDUAL HOME BOOSTER PUMPS

Individual home booster pumps may be allowed provided that it can be demonstrated that they will not jeopardize the sanitary quality of the water system. The booster pump shall not reduce the water pressure in the main to less than 20 psi. The requirements of Section 110 and Section 112 must be met.

R309-110-5. Automatic and Remote Controlled Stations.

All automatic stations should be provided with automatic signaling apparatus which will report when the station is out of service.

R309-110-6. Appurtenances.

6.1 VALVES

Pumps shall be adequately valved to permit satisfactory operation, maintenance, and repair of the equipment. If foot valves are necessary, they shall have a net valve area of at least 2-1/2 times the area of the suction pipe and they shall be screened. Where downstream pressures exist each pump shall have a positive acting check valve on the discharge side between the pump and the shut-off valve. Where necessary, provisions shall be made for draining the discharge line. All external valves shall be adequately protected.

6.2 PIPING

In general piping shall:

a. Be designed so that the friction losses will be minimized.

b. Not be subject to contamination,

c. Have watertight joints,

d. Be protected against surge, water hammer or vacuums,

e. Have provision for the removal of entrapped air,

f. Be such that each pump has an individual suction line or that the lines shall be so manifolded that they will insure similar hydraulic and operating conditions.

g. Be protected against freezing.

6.3 GAUGES AND METERS

Each pump:

a. Shall have a standard pressure gauge on its discharge line,

b. Shall have a compound pressure gauge on its suction line,

c. Shall have recording gauges in the larger stations,

d. Should have a means for measuring the discharge.

The station should have indicating and totalizing capability for the total water pumped.

6.4 WATER SEALS

Water seals shall not be supplied with water of a lesser sanitary quality than that of the water being pumped. Where pumps are sealed with potable water and are pumping water of lesser sanitary quality the water line to the seal shall:

a. Be provided with a break tank open to atmospheric pressure,

b. Have an air gap of at least six inches or two pipe diameters, whichever is greater, between the feeder line and the spill line of the tank,

c. When automatic pre-lubrication of pump bearings is necessary and an auxiliary power supply is provided, the prelubrication line shall be provided with a valved bypass around the automatic control so that the bearings can, if necessary, be lubricated manually before the pump is started.

6.5 CONTROLS

Pumps, their prime movers and accessories, shall be controlled in such a manner that they will operate at rated capacity without dangerous overload. Where two or more pumps are installed, provision shall be made for alternate operation. Provision shall be made to prevent energizing the motor in the event of a backspin cycle. Electrical controls

shall be located above grade. Protection against low voltages, power surges, and phase failure should also be provided.

6.6 POWER

The power source is assumed to be electric. However, alternative power sources will be evaluated if desired. The installation of the alternative power sources shall be in accordance with acceptable applicable codes. When power failure would result in cessation of minimum essential service, power supply shall be provided from at least two independent sources or a standby or an auxiliary source shall be provided.

R309-110-7. Hydropneumatic Systems.

Hydropneumatic systems including tanks, pumps, compressors, piping and electrical switching equipment should generally be provided only for water systems serving less than 50 connections. Unpressurized ground or elevated storage designed in accordance with Section 111 shall be provided. Pressure tank storage is not considered for fire protection purposes or effective system storage.

7.1 LOCATION

The tank and appurtenances should be located above normal ground surface and be completely housed. If located below ground adequate provisions for drainage, ventilation, maintenance and flood protection shall be made. The tank and appurtenances may be separated.

7.2 OPERATING PRESSURES

The system shall be designed to provide a minimum of 20 psi pressure at all points in the distribution system during peak hourly flow conditions. The system should operate with a 15-30 psi difference between the high and low pressures. A pressure gauge shall be installed on the pressure tank inlet line.

7.3 PRESSURE TANKS

Pressure tanks shall meet ASME code requirements or an equivalent requirement of state and local laws and regulations for the construction and installation of unfired pressure vessels.

Interior coatings used in pressure tanks shall meet the provisions of Section 111-3.14.

7.4 PUMPS

At least two pumping units shall be provided. With any pump out of service the remaining pump(s) shall be capable of providing the peak instantaneous demand of the system as described in Section 105, while recharging the pressure tank at 115 percent of the upper pressure setting. Pump cycling shall not exceed 15 starts per hour, with a maximum of ten starts per hour preferred.

If the water system can be conveniently shut down (e.g. as in some non-community systems) one pump may be sufficient if approved by the Executive Secretary.

The provisions of Section 110-3, except as herein provided, must also be met.

7.5 AIR VOLUME

The method of adjusting the air volume shall be acceptable to the Executive Secretary.

Air delivered by compressors to the pressure tank shall be adequately filtered and oil free and be of adequate volume.

Air relief valves shall be designed and installed to eliminate the possibility of contamination from this source.

7.6 WATER SEAL IN NON-MEMBRANE PRESSURE TANKS

The volume of water remaining in a non-membrane tank at the lower pressure setting must be sufficient to provide an adequate seal at the outlet to prevent the leakage of air. The following depths of water are required:

a. Horizontal outlets - twice the velocity head in the outlet pipe plus one outlet diameter measured from the center line of the outlet.

b. Vertical outlets - if unbaffled the same as in (a) except measured from the bottom of the tank; if baffled one velocity head in the outlet pipe measured from the top of the baffle.

The outlet velocity must be limited to 4.0 fps or less with a 0.5 fps maximum velocity under a baffle.

7.7 BACKUP POWER SUPPLY

Where a hydropneumatic system is intended to serve a community water system a standby source of power must be provided.

R309-110-8. Disinfection.

All new or repaired pump station equipment and piping must be properly disinfected prior to use. Refer to the appropriate disinfection techniques as given in Section 106 or Section 112.

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R309. Environmental Quality, Drinking Water.
R309-111. Water Storage.
R309-111-0. General.

Storage for finished water, sized in accordance with Section 111-1 shall be provided as an integral part of each water supply system. Elevated storage with gravity flow is preferred. However, low level reservoirs may be used provided adequate pressure in the distribution system can be maintained by pressure pumps. In this instance, any hydropneumatic tanks which are used cannot be credited toward total storage.

The materials and designs used on finished water storage structures shall provide stability and durability as well as protect the quality of the stored water. Steel structures shall follow the current AWWA standards concerning steel tanks, standpipes, reservoirs, and elevated tanks wherever they are applicable. Other materials of construction are acceptable when properly designed to meet the requirements of this section, provided it can be shown that they will not impart toxic substances to the stored water.

When any product is used to coat, seal, patch or otherwise attach itself to the interior surface of any storage structure in such a way as to come into contact with the drinking water, the product shall comply, effective July 1, 1990, with National Sanitation Foundation (NSF) Standard 61.

R309-111-1. Sizing.

Storage facilities must have sufficient capacity to meet domestic demands and, where fire protection is provided, fire flow demands.

a. The storage volume requirements for various types of public water systems are given in Section 105.

b. The storage requirements made in Section 105 may be reduced or eliminated when the source and any treatment facility have sufficient capacity and reliability (e.g. dual pumps, standby power, etc.) to supplement peak instantaneous demands of the system.

c. Storage requirements for fire protection must be provided by the design engineer along with any assumptions or requirements from other agencies during design review.

d. Where fire protection is provided (as evidenced by the presence of fire hydrants) the required storage may simply be the sum of the domestic storage as required in Section 105 herein and the fire protection storage; or credit for fire fighting apparatus may be taken, in which case the total storage would be based on the "Supply Work Capacity (SWC) as outlined in the Fire Suppression Rating Schedule published by the Insurance Service Office, 160 Water Street, New York, NY 10038.

R309-111-2. Location of Reservoirs.

a. The location of the reservoir and the design of the water system shall be such that the minimum working pressure in the distribution system under peak instantaneous flow conditions is 20 psi. The normal working pressure should be approximately 60 psi. When static pressures exceed 80 psi, pressure reducing devices should be provided on mains in the distribution system.

b. System connections at elevations such that a minimum of 20 psi at peak instantaneous flow cannot be maintained at that point must not be allowed.

c. When the bottom of a storage tank must be below normal ground surface, it shall be placed above the ground water table. Sewers, drains, standing water, and similar sources of possible contamination must be kept at least 50 feet from the reservoir. Water main pipe, pressure tested in place to 50 psi without leakage, may be used for gravity sewers at distances greater than 20 feet and less than 50 feet.

d. The location and design of a reservoir should also be influenced by aesthetic considerations, seismic factors, and avoidance of flood areas.

R309-111-3. Design.

3.1 PROTECTION FROM CONTAMINATION

All finished water storage structures shall have suitable watertight roofs which exclude birds, animals, insects, and excessive dust.

3.2 PROTECTION FROM TRESPASSERS

Locks on access manholes, and other necessary precautions shall be provided to prevent vandalism, and sabotage. Fencing is advisable where the reservoir is highly accessible to the public or livestock.

3.3 DRAIN

A means should be provided for the draining of storage structures. The floor of the storage structure should be sloped to permit drainage to the drain outlet.

Storage structures which provide pressure directly to the distribution system shall be designed so that they can be isolated from the distribution system and drained for cleaning or maintenance without necessitating loss of pressure in the distribution system.

If a drainline is provided for a storage structure, it shall discharge 12 to 24 inches above the ground surface, be sloped for complete discharge and be screened with a No. 4 mesh non-corrodible screen.

No drain on the water storage structure may connect or discharge to a sewer. A water storage tank drain may discharge to a storm drain if an appropriate air gap is provided.

3.4 OVERFLOW

All water storage structures shall be provided with an overflow which is brought down to an elevation between 12 and 24 inches above the ground surface and discharges without causing significant erosion.

All overflow pipes shall:

a. Be located so that any discharge is visible,

b. Be sloped for complete drainage,

c. Be screened with No. 4 mesh non-corrodible screen installed at a location least susceptible to damage by vandalism.

d. Be of sufficient diameter to permit waste of water in excess of the filling rate.

e. Not be connected to, or discharge into, a sewer system. Overflow water may be routed to a storm drain through an appropriate air gap.

Any coating used on the external surface of overflow pipes within a reservoir must be approved for potable water use. Refer to Section 111-3.14.

3.5 ACCESS

Finished water storage structures shall be designed with reasonably convenient access to the interior for cleaning and maintenance. There shall be at least one manhole above the water line which:

a. Shall be framed at least four inches, and preferably six inches, above the surface of the roof at the opening. In areas subject to heavy snows, the manhole should extend 12 inches or more above the roof. On buried structures, manholes should be elevated at least 18 inches above the surface,

b. Shall be provided with a close fitting solid shoebox type cover which extends down around the frame at least two inches,

c. Should be hinged at one side,

d. Shall have a locking device.

3.6 VENTS

Finished water storage structures shall be vented. Overflows shall not be considered as vents. Open construction between the sidewall and the roof is not permissible.

Vents

a. Shall prevent the entrance of surface water and rainwater,

b. Shall exclude birds and animals,

c. Shall exclude insects and dust, as much as this function can be made compatible with effective venting,

d. Shall, on buried structures, be 24 to 36 inches above the covering,

e. Shall be fitted with No. 14 mesh or finer non-corrodible screen,

f. Shall be located and sized so as to avoid blockage during winter conditions.

3.7 ROOF AND SIDEWALL

The roof and sidewalls of all structures must be watertight. Openings in the roof and sidewalls must be kept to a minimum and comply with the following:

a. Any pipes running through the roof or sidewall of a finished water storage structure must be welded, or properly gasketed in metal tanks. In new concrete tanks, these pipes shall be connected to standard wall castings poured in place. These wall castings should have seepage rings imbedded in the concrete.

b. Openings in a storage structure roof or top, designated to accommodate control apparatus or pump columns, shall be curbed and sleeved with proper additional shielding to prevent the access of drainage water into the structure.

c. Valves and controls should be located outside the storage structure so that the valve stems and similar projections will not pass through the roof or top of the reservoir.

3.8 DRAINAGE OF ROOF

The roof of the storage structure shall be well drained. Downspout pipes shall not enter or pass through the reservoir. Parapets, or similar construction which would tend to hold water and snow on the roof, will not be approved unless adequate waterproofing and drainage are provided.

3.9 SAFETY

The safety of employees must be considered in the design of the storage structure. As a minimum, such matters shall conform to pertinent laws and regulations of Utah OSHA.

a. Ladders, ladder guards, balcony railings, and safely located entrance hatches shall be provided where applicable.

b. Generally, ladders having an unbroken length in excess of 20 feet must be provided with appropriate safety devices. This requirement applies both to interior and exterior reservoir ladders.

c. Elevated tanks with riser pipes over eight inches in diameter shall have

protective bars over the riser openings inside the tank.

d. Railings or handholds shall be provided on elevated tanks where persons must transfer from the access tube to the water compartment.

3.10 FREEZING

All finished water storage structures and their appurtenances, especially the riser pipes, overflows, and vents, shall be designed to prevent freezing which will interfere with proper functioning.

3.11 INTERNAL CATWALK

Every catwalk over finished water in a storage structure shall have a solid floor with raised edges so designed that shoe scrapings or dirt will not fall into the water.

3.12 SILT STOP

The discharge pipes from all reservoirs shall be located in a manner that will prevent the flow of sediment into the distribution system. Where separate drains are not provided removable silt stops should be provided on reservoir discharge pipes where feasible.

3.13 GRADING

The area surrounding a ground-level structure shall be graded in a manner that will prevent surface water from standing within 50 feet of it.

3.14 INTERNAL COATINGS

Effective July 1, 1990, all internal coatings must comply with National Sanitation Foundation (NSF) Standard 61 for potable water contact. Compliance of the coating material must be substantiated in writing to the satisfaction of the Executive Secretary prior to application. Water must not be introduced into the vessel until the required curing time has passed. After proper curing, the coating shall not transfer any substance to the water which will be toxic or cause tastes or odors.

Proper protection must be given to all metal surfaces by paints or other protective coatings.

3.15 CATHODIC PROTECTION

When used, cathodic protection should be designed, installed and maintained by competent technical personnel.

3.16 WATER LEVEL VARIATION

The maximum variation between high and low levels in storage structures providing pressure to a distribution system should not exceed 30 feet.

3.17 LEVEL CONTROLS

Adequate controls shall be provided to maintain water levels in storage structures. Level indicating devices should be provided at a central location.

a. Where appropriate, pumps should be controlled from tank levels with the signal transmitted by telemetering equipment.

b. Altitude valves or equivalent controls may be required for subsequent storage structures on the system.

c. Overflow and low-level warnings or alarms should be located at places in the community where they will be under responsible surveillance 24 hours a day.

R309-111-4. Disinfection.

Finished water storage structures shall be disinfected before being put into service for the first time, and after being entered for cleaning, repair, or painting. The reservoir must be cleaned of all refuse and should then be washed with clean water prior to adding the disinfectant.

AWWA Standard C652 must be followed for reservoir disinfection. However, the following procedures may also be employed:

a. To disinfect reservoirs, sufficient chlorine shall be added to a full reservoir to give a concentration to the water of at least 10 mg/l of free chlorine at the end of a 24 hour retention period. At the end of the retention period the reservoir must be thoroughly drained and flushed with clean water. The chlorinated water must be disposed of in an acceptable manner and in conformance with the Utah Wastewater Disposal Regulations. If there is any question as to the effectiveness of the chlorine treatment, the procedure should be repeated.

Table 11-1 gives the amount of hypochlorite to be used for disinfecting reservoirs to give a concentration of 50 mg/l of available chlorine. An initial concentration of this amount will likely result in a free chlorine residual of at least 10 mg/l at the end of a 24 hour retention period.

b. With large reservoirs where it is not economical to treat the entire contents with 50 mg/l of chlorine, disinfection may be accomplished by swabbing or spraying all interior surfaces with a chlorine solution containing 200 mg/l of available chlorine. The surface of the reservoir must be kept wet for a minimum of 30 minutes before the structure is filled. Care must be taken to assure that inlet and outlet piping are adequately disinfected. The spray operator shall be protected with suitable protective clothing and breathing apparatus. The safety equipment shall be appropriate for the environment within the tank and shall meet all OSHA requirements.

At least one satisfactory bacteriologic sample must be achieved from the reservoir

after the disinfection procedure has been accomplished and the tank has been filled with potable water. If the sample shows the presence of coliform bacteria, the disinfection procedure must be repeated.

TABLE 11-1
CHLORINE REQUIREMENTS FOR 50 PPM

Capacity (Gal)	Liquid Chlorine (Lbs.)	70% Hypo Chlorite (Lbs.)	50% Hypo Chlorite (Lbs.)	25% Hypo Chlorite (Lbs.)	12% Hypo Chlorite (Lbs.)	5.25% Hypo Chlorite (Lbs.)
1,000	0.416	0.6	0.83	1.7	0.5	1
2,000	0.833	1.2	1.7	3.4	1.0	2
5,000	2.08	3	4.2	8.4	2	5
10,000	4.16	6	8.3	17	4	9.6
20,000	8.33	12	17	33	8	19
30,000	12.5	18	25	50	12.5	29
40,000	16.7	24	33	67	17	38
50,000	20.80	30	42	83	21	48
75,000	31.2	45	63	125	31	72
100,000	41.6	60	83	167	41	96
200,000	83.3	119	167	333	83	190
300,000	125.0	179	250	500	125	286
500,000	208	298	417	833	208	476
700,000	292	417	583	1,170	292	670
1,000,000	416	595	833	1,668	416	955

KEY: drinking water, environmental health
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R309. Environmental Quality, Drinking Water.
R309-112. Distribution System.
R309-112-0. Water Main Design.

0.1 DISTRIBUTION SYSTEM PRESSURE

The distribution system shall be designed to maintain a minimum pressure of 20 psi (at ground level) at all points of connection to the distribution system during peak instantaneous flow conditions, including fire flow conditions.

However, non-community systems in remote areas can be exempted from this requirement, on a case-by-case basis, if flow from the system is always unregulated and free-flowing.

0.2 PEAK INSTANTANEOUS FLOW RATES

Peak instantaneous flow rates for domestic use to be assumed when designing distribution systems shall be as given in Section 105 of these regulations.

Peak instantaneous flow rates for fire flow conditions shall be determined by the engineer and reported to the Bureau of Public Water Supplies during the plan review process.

Peak instantaneous fire flows must be added to peak instantaneous domestic demands for distribution system design.

0.3 MINIMUM WATER MAIN SIZE

The distribution system shall be sized to deliver the peak instantaneous demand rate as determined in Section 105 while maintaining the pressures required by Section 112-0.1. Minimum size serving a fire hydrant on a community system shall be six inch diameter. For supply lines not connected to fire hydrants serving community systems, the minimum line size shall be two inch diameter. Sizes of lines serving non-community systems shall be reviewed on a case-by-case basis. Mains should be designed with sufficient excess capacity to provide for anticipated future connections.

0.4 FIRE PROTECTION

When fire protection is to be provided, system design must be such that fire flows and normal peak instantaneous demand can be met while maintaining a minimum pressure of 20 psi at all points in the distribution system. Note the minimum water main size required by Section 112-0.3 when fire hydrants are provided.

0.5 GEOLOGIC CONSIDERATIONS

If possible, pipelines should not be laid in areas of unusual geologic hazard (e.g. slide zones, fault zones, etc.). Where these areas are impossible to avoid, special design and burial techniques should be employed.

R309-112-1. Materials.

When any product is used to coat, seal, patch or otherwise attach itself to the interior surface of any piping material in such a way as to come into contact with the drinking water, the product shall comply, effective July 1, 1990 with National Sanitation Foundation (NSF) Standard 61.

1.1 STANDARDS

Pipe, fittings, valves and fire hydrants shall conform to applicable standards issued by the AWWA, American Standards Association, the American Society for Testing and Materials or the Federal Government, if such standards exist, and be acceptable to the Executive Secretary. All plastic pipe must further be approved for potable water use by the National Sanitation Foundation, and must bear the logo "NSF-pw" indicating such approval. The Executive Secretary may approve materials for which there are no accepted standards provided acceptable supporting information can be provided.

The design engineer shall consider the materials to be used when corrosive soils or waters will be encountered. Where severe corrosion is indicated, approved plastic pipe is recommended. The use of asbestos pipe is prohibited.

1.2 USED MATERIALS

Only materials which have been used previously for conveying potable water or other non-toxic liquids may be reused provided they meet the above standards and have been thoroughly cleaned and restored practically to their original condition.

1.3 JOINTS

Packing and jointing materials used in the joints of pipe shall meet the standards of the AWWA. Pipe having mechanical joints, or slip-on joints with rubber gaskets, is preferred.

R309-112-2. Separation of Water Mains and Transmission Lines from Sewers and Other Pollution Sources.

2.1 HORIZONTAL SEPARATION

A water main must be laid at least ten feet horizontally from any existing or proposed sewer or wastewater leach line. Separation distances shall be measured pipe edge to pipe edge.

Should local conditions prevent a lateral separation of ten feet, a water main may be laid closer than ten feet to sewer lines (but not leach lines) provided:

a. The main is laid in a separate trench, or

b. The main is laid on an undisturbed earth shelf on one side of the sewer line trench, or

c. The main is laid in a sewer or drain line trench which has been backfilled and compacted not less than 95% of maximum laboratory density. (The density shall be determined in accordance with the procedures given by ASTM Standard D-690).

In each of the above cases, the bottom of the waterline shall be at least 18 inches above the top of the sewer line. At the same time the waterline must be sufficiently buried to prevent freezing.

2.1.1 EXCEPTION TO HORIZONTAL SEPARATION

When it is impossible to obtain the proper horizontal and vertical separation as stipulated above, both the water main and sewer line shall be constructed of cast iron, ductile iron, galvanized steel or protected steel pipe having mechanical joints. Other types of joints of equal or greater integrity may be used at the discretion of the of the Executive Secretary. Thermoplastic pipe may be used provided mechanical or solvent weld pipe joints are used. These shall be pressure-tested to assure water tightness before backfilling.

2.2 CROSSING NON-CULINARY LINES

Whenever water mains must cross sanitary sewers, the water main shall be laid at such an elevation that the bottom of the water main is 18 inches above the top of the sewer. This vertical separation should be maintained for the portion of the water main located within ten feet horizontally of any sewer it crosses. The ten feet is to be measured as the perpendicular distance from the sewer line to the water line.

2.2.1 INABILITY TO PROVIDE VERTICAL SEPARATION

Where conditions prevent the minimum vertical separation as set forth above from being maintained, or when it is necessary for the water main to pass under a sewer, both the water main and the sewer line shall be constructed of cast iron, ductile iron, galvanized steel or protected steel pipe, having mechanical joints. Thermoplastic pipe may be used provided mechanical or solvent weld type joints are used. The mechanical joint pipe shall extend on each side of the crossing until the perpendicular distance from the sewer line to the water line is at least ten feet. In making such crossings, it is preferable to center a length of water main so that the joints will be equidistant from the sewer and as remote therefrom as possible.

Where a water main must cross under a sewer, a vertical separation of at least 18 inches between the bottom of the sewer and the top of the water main shall be maintained with adequate support for the larger sized sewer lines to prevent them from settling on and breaking the water main.

In the case where a new waterline must be routed under an existing sewer line, and it is desired not to disturb the sewer line, the Executive Secretary may grant an exception to the above requirements. The designer must then propose a method for protecting the culinary line. Such a proposal must be deemed acceptable by the Executive Secretary.

2.3 SEWER MANHOLES

No water pipe shall pass through, or come into contact with, any part of a sewer manhole. Special care should be taken to make sewer manholes as nearly watertight as possible.

2.4 WATER SERVICE LATERALS CROSSING SEWER MAINS AND LATERALS

Water service laterals must conform to all requirements given herein for the separation of water and sewer lines, however, copper tubing service laterals (not plastic) may pass under sewer mains or laterals. This copper tubing must pass at least eighteen inches under the sewer.

2.5 UNPRESSURIZED TRANSMISSION LINES

A water supplier shall not route an unpressurized transmission line any closer than fifty feet to any concentrated source of pollution (i.e. septic tanks and drainfields, garbage dumps, pit privies, sewer lines, feed lots, etc.). Furthermore, unpressurized transmission lines should not be placed in boggy areas or areas subject to the ponding of water.

Where the water supplier cannot obtain a fifty foot separation distance from concentrated sources of pollution, it is permitted to use a Class 50 ductile iron pipe with joints acceptable to the Executive Secretary to give reasonable assurance that contamination will not be able to enter the unpressurized pipeline.

To assure continued protection of the transmission line, the water supplier should obtain a fifty foot right-of-way on each side of the transmission line.

R309-112-3. Air Relief Valves; Valve, Meter and Blow-Off Chambers.

3.1 AIR RELIEF VALVES

At high points in water mains where air can accumulate, provisions should be made to remove air by means of hydrants or air relief valves. Automatic air relief valves shall not be used in situations where flooding may occur. The air relief valve should be placed so as to prevent problems due to freezing. A gate valve should be provided to permit

servicing of any air relief valve.

3.2 AIR RELIEF VALVE PIPING

The open end of an air relief pipe from automatic valves should, where possible, be extended to at least one foot above grade and provided with a screened (#14 mesh, non-corrodible) downward elbow. Alternately, the open end of the pipe may be extended to as little as one foot above the top of the pipe if the valve's chamber is provided with a drain-to-daylight (See Section 112-3.3).

Blow-offs on air relief valve piping shall not be connected directly to any sewer.

3.3 CHAMBER DRAINAGE

Chambers, pits or manholes containing valves, blow-offs, meters, other such appurtenances to a distribution system, shall not be connected directly to any storm drain or sanitary sewer. They shall be provided with a drain to daylight. Where this is not possible, underground gravel filled absorption pits may be used if conditions will assure adequate drainage.

Where a chamber contains an air relief valve, and it is not possible to provide a drain-to-daylight, the vent pipe from the valve must be extended to at least one foot above grade (See Section 112-3.2).

Only when it is both impossible to extend the vent pipe above grade, and impossible to provide a drain-to-daylight may a gravel filled sump be utilized to provide chamber drainage (assuming local ground conditions permit adequate drainage without ground water intrusion).

R309-112-4. Installation of Water Mains.

4.1 STANDARDS

The specifications shall incorporate the provisions of the AWWA standards, the manufacturer's recommended installation procedures or the following, whichever is most stringent.

4.2 BACKFILL

A continuous and uniform bedding shall be provided in the trench for all buried pipe. Backfill material should be tamped in layers around the pipe and to a sufficient height above the pipe to adequately support and protect the pipe. Two inch or larger stones shall not be allowed within two inches of the pipe.

4.3 COVER

All water mains shall be covered with sufficient earth or other insulation to prevent freezing.

4.4 THRUST BLOCKING

All tees, bends, plugs and hydrants shall be provided with reaction blocking, tie rods or joints designed to prevent movement.

4.5 PRESSURE AND LEAKAGE TESTING

The installed pipe shall be pressure and leakage tested to assure satisfactory performance under all operating conditions.

4.6 SURFACE WATER CROSSINGS

4.6.1 ABOVE WATER CROSSINGS

The pipe shall be adequately supported and anchored, protected from damage and freezing, and accessible for repair or replacement.

4.6.2 UNDERWATER CROSSINGS

A minimum cover of two feet or greater, as local conditions may dictate, shall be provided over the pipe. When crossing water courses which are greater than 25 feet in width, the following should be provided:

a. The pipe should be of special construction, having flexible watertight or mechanical joints. Alternately, the pipe may be appropriately encased.

b. Valves should be provided at both ends of water crossings so that the section can be isolated for testing or repair; the valves shall be easily accessible, and not subject to flooding; and the valve nearest to the supply source should be in a manhole.

c. Permanent taps should be made on each side of the valve within the manhole to allow insertion of testing equipment to determine leakage and for sampling purposes.

4.7 SEALING PIPE ENDS DURING CONSTRUCTION

The open ends of all pipeline under construction shall be covered and effectively sealed at the end of the day's work.

4.8 DISINFECTING WATER DISTRIBUTION SYSTEMS

All new, cleaned or repaired water mains or appurtenances shall be disinfected in accordance with AWWA Standard C651.

On all new and extensive distribution system construction, evidence of satisfactory disinfection must be provided to the Bureau of Public Water Supplies. Samples for bacteriologic analyses must be collected after disinfection is complete and the system is refilled with potable water. The use of water for culinary purposes must not commence until the bacteriologic tests indicate the water to be free from contamination.

R309-112-5. Cross Connections and Interconnections.

There shall be no physical cross connections between the distribution system and pipe, pumps, hydrants, or tanks which are supplied from, or which may be supplied or contaminated from, any source except as approved by the Executive Secretary.

The approval of the Executive Secretary shall be obtained for interconnections between different potable water supply systems.

R309-112-6. Water Hauling.

Water hauling is not an acceptable permanent method for culinary water distribution in community water systems. However, the Executive Secretary may allow its use for non-community public water supplies if:

1. Consumers could not otherwise be supplied with good quality drinking water, or

2. The nature of the development, or ground conditions, are such that the placement of a pipe distribution system is not justified. Hauling may also be necessary as a temporary means of providing culinary water in an emergency.

11 proposals for water hauling must be submitted to and approved by the Executive Secretary. The guidelines for water hauling are contained in the bulletin entitled "Recommended Procedures for Hauling Culinary Water" available from the Bureau of Public Water Supplies.

R309-112-7. Service Connections and Plumbing.

7.1 SERVICE TAPS

Service taps shall be made so as to not jeopardize the sanitary quality of the system's water.

7.2 SERVICE LINES

The portion of the service line under the control of the water supplier is considered to be part of the distribution system and shall comply with all requirements given herein. Attention is drawn to Section 112-2 with regards to service lines crossing sewer lines.

7.3 SERVICE METERS

Each service connection should be individually metered.

7.4 ALLOWABLE CONNECTIONS

All dwellings or other facilities connected to a public water supply must be in conformance with the Utah Plumbing Code.

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R309. Environmental Quality, Drinking Water.
R309-113. Drinking Water Source Protection.
R309-113-1. Authority.

Under authority of Section 19-4-104(1)(a)(iv), the Drinking Water Board adopts this rule which governs the protection of ground-water sources of drinking water.

R309-113-2. Purpose.

Public Water Systems (PWSs) are responsible for protecting their sources of drinking water from contamination. R309-113 sets forth minimum requirements to establish a uniform, statewide program for implementation by PWSs to protect their ground-water sources of drinking water. PWSs are encouraged to enact more stringent programs to protect their sources of drinking water if they decide they are necessary.

R309-113 applies to all ground-water sources of drinking water which are used by PWSs to supply their systems except sources which are under the influence of surface water and are treated in accordance with surface water treatment rules. Additionally, compliance with this rule is voluntary for existing ground-water sources of drinking water which are used by public non-community water systems.

R309-113-3. Implementation.

(1) New Ground Water Sources - Each PWS shall submit a Preliminary Evaluation Report or a Drinking Water Source Protection (DWSP) Plan in accordance with R309-113-13(2) or R309-113-7(1) for each of its new ground-water sources to the Division of Drinking Water (DDW).

(2) Existing Ground Water Sources - Each PWS shall submit a DWSP Plan in accordance with R309-113-7(1) for each of its existing ground-water sources to DDW according to the following schedule. Well fields or groups of springs may be considered to be a single source.

TABLE 1

Population Served By PWS:	Percent Of Sources:	DWSP Plans Due By:
Over 10,000	50% of wells	December 31, 1995
Over 10,000	100% of wells	December 31, 1996
3,300-10,000	100% of wells	December 31, 1997
Less than 3,300	100% of wells	December 31, 1998
Springs and other sources	100%	December 31, 1999

(3) PWSs shall maintain all land use agreements which were established under previous rules to protect their ground-water sources of drinking water from contamination. Additionally, PWSs shall maintain land ownership and land-use agreements established under previous rules with new owners which prohibit these new owners from locating pollution sources within protection zones.

R309-113-4. Exceptions.

(1) Exceptions to the requirements of R309-113 or parts thereof may be granted by the Executive Secretary to PWSs if: due to compelling factors (which may include economic factors), a PWS is unable to comply with these requirements, and the granting of an exception will not result in an unreasonable risk to health.

(2) Within one year of granting an exception, the Executive Secretary may prescribe a schedule by which the PWS must come into compliance with the requirements of R309-113.

R309-113-5. Designated Person.

(1) A designated person shall be appointed and reported in writing to the Executive Secretary by each PWS within 180 days of the effective date of R309-113. The designated person's address and telephone number shall be included in the written correspondence.

(2) Each PWS shall notify the Executive Secretary in writing within 30 days of any changes in the appointment of a designated person.

R309-113-6. Definitions.

(1) The following terms are defined for the purposes of this rule:

(a) "Collection area" means the area surrounding a ground-water source which is underlain by collection pipes, tile, tunnels, infiltration boxes, or other ground-water collection devices.

(b) "Controls" means the codes, ordinances, rules, and regulations currently in effect to regulate a potential contamination source.

(c) "Criteria" means the conceptual standards that form the basis for DWSP area delineation to include distance, ground-water time of travel, aquifer boundaries, and ground-water divides.

(d) "Criteria threshold" means a value or set of values selected to represent the limits above or below which a given criterion will cease to provide the desired degree of protection.

(e) "DDW" means Division of Drinking Water.

(f) "DWSP Program" means the program to protect drinking water source protection zones and management areas from contaminants that may have an adverse effect on the health of persons.

(g) "DWSP Zone" means the surface and subsurface area surrounding a ground-water source of drinking water supplying a PWS, through which contaminants are reasonably likely to move toward and reach such ground-water source.

(h) "Designated person" means the person appointed by a PWS to ensure that the requirements of R309-113 are met.

(i) "Executive Secretary" means the individual authorized by the Drinking Water Board to conduct business on its behalf.

(j) "Existing ground-water source of drinking water" means a public supply ground-water source for which plans and specifications were submitted to DDW on or before July 26, 1993.

(k) "Ground-water Source" means any well, spring, tunnel, adit, or other underground opening from or through which ground-water flows or is pumped from subsurface water-bearing formations.

(l) "Hydrogeologic methods" means the techniques used to translate selected criteria and criteria thresholds into mappable delineation boundaries. These methods include, but are not limited to, arbitrary fixed radii, analytical calculations and models, hydrogeologic mapping, and numerical flow models.

(m) "Land management strategies" means zoning and non-zoning controls which include, but are not limited to, the following: zoning and subdivision ordinances, site plan reviews, design and operating standards, source prohibitions, purchase of property and development rights, public education programs, ground-water monitoring, household hazardous waste collection programs, water conservation programs, memoranda of understanding, written contracts and agreements, and so forth.

(n) "Land use agreement" means a written agreement wherein the owner(s) agrees not to locate or allow the location of potential contamination sources within zone one of new wells in protected aquifers. The owner(s) must also agree not to locate or allow the location of pollution sources within zone two of new wells in unprotected aquifers and new springs unless the pollution source agrees to install design standards which prevent contaminated discharges to ground water. This restriction must be binding on all heirs, successors, and assigns. Land use agreements must be recorded with the property description in the local county recorder's office. Refer to R309-113-13(4).

Land use agreements for protection areas on publicly owned lands need not be recorded in the local county recorder office. However, a letter must be obtained from the Administrator of the land in question and meet the requirements described above.

(o) "Management area" means the area outside of zone one and within a two-mile radius where the Optional Two-mile Radius Delineation Procedure has been used to identify a protection area.

For wells, land may be excluded from the DWSP management area at locations where it is more than 100 feet lower in elevation than the total drilled depth of the well.

For springs and tunnels, the DWSP management area is all land at elevation equal to or higher than, and within a two-mile radius, of the spring or tunnel collection area. The DWSP management area also includes all land lower in elevation than, and within 100 horizontal feet, of the spring or tunnel collection area. The elevation datum to be used is the point of water collection. Land may also be excluded from the DWSP management area at locations where it is separated from the ground-water source by a surface drainage which is lower in elevation than the spring or tunnel collection area.

(p) "New ground-water source of drinking water" means a public supply ground-water source of drinking water for which plans and specifications are submitted to DDW after July 26, 1993.

(q) "Nonpoint source" means any conveyance not meeting the definition of point source.

(r) "PWS" means public water system.

(s) "Point source" means any discernible, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, animal feeding operation with more than ten animal units, landfill, or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture.

(t) "Pollution source" means point source discharges of contaminants to ground water or potential discharges of the liquid forms of "extremely hazardous substances" which are

stored in containers in excess of "applicable threshold planning quantities" as specified in SARA Title III. Examples of possible pollution sources include, but are not limited to, the following: storage facilities that store the liquid forms of extremely hazardous substances, septic tanks, drain fields, class V underground injection wells, landfills, open dumps, landfilling of sludge and septage, manure piles, salt piles, pit privies, drain lines, and animal feeding operations with more than ten animal units.

The following definitions are part of R309-113 and clarify the meaning of "pollution source:"

(i) "Animal feeding operation" means a lot or facility where the following conditions are met: animals have been or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12 month period, and crops, vegetation forage growth, or post-harvest residues are not sustained in the normal growing season over any portion of the lot or facility. Two or more animal feeding operations under common ownership are considered to be a single feeding operation if they adjoin each other, if they use a common area, or if they use a common system for the disposal of wastes.

(ii) "Animal unit" means a unit of measurement for any animal feeding operation calculated by adding the following numbers; the number of slaughter and feeder cattle multiplied by 1.0, plus the number of mature dairy cattle multiplied by 1.4, plus the number of swine weighing over 55 pounds multiplied by 0.4, plus the number of sheep multiplied by 0.1, plus the number of horses multiplied by 2.0.

(iii) "Extremely hazardous substances" means those substances which are identified in the Sec. 302(EHS) column of the "TITLE III LIST OF LISTS - Consolidated List of Chemicals Subject to Reporting Under SARA Title III," (EPA 560/4-91-011). A copy of this document may be obtained from: Section 313 Document Distribution Center, P.O. Box 12505, Cincinnati, OH 45212.

(u) "Potential contamination source" means any facility or site which employs an activity or procedure which may potentially contaminate ground water. A pollution source is also a potential contamination source.

(v) "Protected aquifer" means a producing aquifer in which the following conditions are met:

(i) A naturally protective layer of clay, at least 30 feet in thickness, is present above the aquifer;

(ii) the PWS provides data to indicate the lateral continuity of the clay layer to the extent of zone two; and

(iii) the public-supply well is grouted with a grout seal that extends from the ground surface down to at least 100 feet below the surface, and through the protective clay layer.

(w) "Time of travel" means the time required for a particle of water to move in the saturated zone from a specific point to a ground-water source of drinking water.

(x) "Unprotected aquifer" means any aquifer that does not meet the definition of a protected aquifer.

(y) "Wellhead" means the physical structure, facility, or device at the land surface from or through which ground water flows or is pumped from subsurface, water-bearing formations.

R309-113-7. DWSP Plans.

(1) Each PWS shall develop, submit, and implement a DWSP Plan for each of its ground-water sources of drinking water. These DWSP Plans may be used to support use and susceptibility waivers for pesticides and volatile organic chemicals (VOCs). For the purposes of a waiver, the plan must identify contaminants that may result from potential contamination sources found in zones one, two, and three and management areas. Refer to Chapter Seven of the "Source Protection User's Guide." This guide may be obtained from DDW.

Required Sections for DWSP Plans - DWSP Plans must include the following seven sections:

(a) DWSP Delineation Report - A DWSP Delineation Report in accordance with R309-113-9(5) is the first section of a DWSP Plan.

(b) Potential Contamination Source Inventory and Assessment of Controls - A Prioritized Inventory of Potential Contamination Sources and an assessment of their controls in accordance with R309-113-10 is the second section of a DWSP Plan.

(c) Management Program to Control Each Preexisting Potential Contamination Source - A Management Program to Control Each Preexisting Potential Contamination Source in accordance with R309-113-11 is the third section of a DWSP Plan.

(d) Management Program to Control or Prohibit Future Potential Contamination Sources for Existing Drinking Water Sources - A Plan for Controlling or Prohibiting Future Potential Contamination Sources is the fourth section of a DWSP Plan. This must be in accordance with R309-113-12, consistent with the general provisions of this rule, and implemented to an extent allowed under the PWS's authority and jurisdiction. A land ownership map in accordance with R309-113-13-(2)(e) is required for new ground-water

sources of drinking water.

(e) Implementation Schedule - Each PWS shall develop a step-by-step implementation schedule which lists each of its proposed land management strategies with an implementation date for each strategy.

(f) Resource Evaluation - Each PWS shall assess the financial and other resources which may be required for it to implement each of its DWSP Plans and determine how these resources may be acquired.

(g) Recordkeeping - Each PWS shall document changes in each of its DWSP Plans as they are continuously updated to show current conditions in the protection zones and management areas. As a DWSP Plan is executed, the PWS shall document any land management strategies that are implemented. These documents may include any of the following: ordinances, codes, permits, memoranda of understanding, public education programs, and so forth.

(2) DWSP Plan Administration - DWSP Plans shall be submitted, corrected, retained, implemented, updated, and revised according to the following:

(a) Submitting DWSP Plans - Each PWS shall submit a DWSP Plan to DDW in accordance with the schedule in R309-113-3(2) for each of its ground-water sources of drinking water.

(b) Correcting Deficiencies - Each PWS shall correct any deficiencies in a disapproved DWSP Plan and resubmit it to DDW within 90 days of the disapproval date.

(c) Retaining DWSP Plans - Each PWS shall retain on its premises a current copy of each of its DWSP Plans. DWSP Plans shall be made available to the public upon request.

(d) Implementing DWSP Plans - Each PWS shall begin implementing each of its DWSP Plans in accordance with its schedule in R309-113-7(1)(e), within 180 days after submittal if they are not disapproved by DDW.

(e) Updating DWSP Plans - Each PWS shall update its DWSP Plans as often as necessary to ensure they show current conditions in the DWSP zones and management areas, and resubmit them to DDW at least every six years.

(f) Revising DWSP Plans - Each PWS shall submit a revised DWSP Plan to DDW within 180 days after the reconstruction or redevelopment of any ground-water source of drinking water which addresses changes in source construction, source development, hydrogeology, delineation, potential contamination sources, and proposed land management strategies.

R309-113-8. DWSP Plan Review.

(1) DDW shall review each DWSP Plan submitted by PWSs and "concur", "concur with recommendations", or "disapprove" the plan.

(2) DDW may "disapprove" DWSP Plans for any of the following reasons:

(a) An inaccurate DWSP Delineation Report, a report that uses a non-applicable delineation method, or a DWSP Plan that is missing this report or any of the information and data required in it (refer to R309-113-9(5));

(b) an inaccurate Prioritized Inventory of Potential Contamination Sources or a DWSP Plan that is missing this report or any of the information required in it (refer to R309-113-10(1));

(c) an inaccurate assessment of current controls or a DWSP Plan that is missing this assessment or any of the information required in it (refer to R309-113-10(4));

(d) a missing Management Program to Control Each Preexisting Potential Contamination Source which has been assessed as "not adequately controlled" by the PWS (refer to R309-113-11(1));

(e) a missing Management Program to Control or Prohibit Future Potential Contamination Sources for Existing or New Drinking Water Sources (refer to R309-113-12 and R309-113-13(4));

(f) a missing Implementation Schedule, Resource Evaluation, Recordkeeping Section, or Contingency Report (refer to R309-113-7(1)(e)-(g) and R309-113-14).

(3) DDW may "concur with recommendations" when PWSs propose management programs to control preexisting potential contamination sources or management programs to control or prohibit future potential contamination sources for existing or new drinking water sources which appear inadequate or ineffective.

R309-113-9. Delineation of Protection Zones and Management Areas.

(1) PWSs shall delineate protection zones or a management area around each of their ground-water sources of drinking water using the Preferred Delineation Procedure or the Optional Two-mile Radius Delineation Procedure. The hydrogeologic method used by PWSs shall produce protection zones or a management area in accordance with the criteria thresholds below. PWSs may also choose to verify protected aquifer conditions to reduce the level of management controls applied in applicable protection areas.

(2) Criteria Thresholds for Ground-water Sources of Drinking Water:

(a) Preferred Delineation Procedure - Four zones are delineated for management purposes:

(i) Zone one is the area within a 100-foot radius from the wellhead or margin of the collection area.

(ii) Zone two is the area within a 250-day ground-water time of travel to the wellhead or margin of the collection area, the boundary of the aquifer(s) which supplies water to the ground-water source, or the ground-water divide, whichever is closer. If the available data indicate a zone of increased ground-water velocity within the producing aquifer(s), then time-of-travel calculations shall be based on this data.

(iii) Zone three (waiver criteria zone) is the area within a 3-year ground-water time of travel to the wellhead or margin of the collection area, the boundary of the aquifer(s) which supplies water to the ground-water source, or the ground-water divide, whichever is closer. If the available data indicate a zone of increased ground-water velocity within the producing aquifer(s), then time-of-travel calculations shall be based on this data.

(iv) Zone four is the area within a 15-year ground-water time of travel to the wellhead or margin of the collection area, the boundary of the aquifer(s) which supplies water to the ground-water source, or the ground-water divide, whichever is closer. If the available data indicate a zone of increased ground-water velocity within the producing aquifer(s), then time-of-travel calculation shall be based on this data.

(b) Optional Two-mile Radius Delineation Procedure - In place of the Preferred Delineation Procedure, PWSs may choose to use the Optional Two-mile Radius Delineation Procedure to delineate a management area. This procedure is best applied in rural areas where few if any potential contamination sources are located. Refer to R309-113-6(1)(o) for the definition of a management area.

(3) Protected Aquifer Classification - PWSs may choose to verify protected aquifer conditions to reduce the level of management controls for a public-supply well which produces water from a protected aquifer(s). Refer to R309-113-6(1)(v) for the definition of a "protected aquifer."

(4) Special Conditions - Special scientific or engineering studies may be conducted to support a request for an exception (refer to R309-113-4) due to special conditions. These studies must be approved by DDW before the PWS begins the study. Special studies may include confined aquifer conditions, ground water movement through protective layers, wastewater transport and fate, etc.

(5) DWSP Delineation Report - Each PWS shall submit a DWSP Delineation Report to DDW for each of its ground-water sources using the Preferred Delineation Procedure or the Optional Two-mile Radius Delineation Procedure.

(a) Preferred Delineation Procedure - Delineation reports for protection zones delineated using the Preferred Delineation Procedure shall include the following information and a list of all sources or references for this information:

(i) Geologic Data - A summary description of the geology in the well and nearby area of the ground-water source of drinking water. This should include the formal or informal formation name(s), general rock type, grain sizes, sorting, degree of natural cementation, and description of fractures and solution cavities (size, abundance, spacing, orientation) and faults (brief description of location in or near the well, and orientation). Description of grain sizes, sorting, etc., can be obtained from surface hand samples or well cuttings; core samples and laboratory analyses are not necessary. Fractures, solution cavities, and faults should be described from surface outcrops or drill logs.

(ii) Well Construction Data - If the source is a well, the report shall include the well drillers log, elevation of the wellhead, borehole radius, casing radius, total depth of the well, depth and length of the screened or perforated interval(s), well screen or perforation type, casing type, method of well construction, type of pump, location of pump in the well, and the maximum projected pumping rate of the well.

(iii) Spring Construction Data - If the source is a spring or tunnel the report shall include a description or diagram of the collection area and method of ground-water collection.

(iv) Aquifer Data for New Wells - A summary report including the calculated hydraulic conductivity of the aquifer, transmissivity, hydraulic gradient, direction of ground-water flow, estimated effective porosity, and saturated thickness of the producing aquifer(s). The PWS shall obtain the hydraulic conductivity of the aquifer from a constant-rate aquifer test and provide the data as described in R309-106-5(6)(a). This report shall include graphs, data, or printouts showing the interpretation of the aquifer test.

(v) Aquifer Data for Existing Wells - A summary report including the calculated hydraulic conductivity of the aquifer, transmissivity, hydraulic gradient, direction of ground-water flow, estimated effective porosity, and saturated thickness of the producing aquifer(s). The PWS shall obtain the hydraulic conductivity of the aquifer from a constant-rate aquifer test using the existing pumping equipment. Aquifer tests using observation well are encouraged, but are not required. If a previously performed aquifer test is available and includes the required data described below, data from that test may be used instead. This report shall include graphs, data, or printouts showing the interpretation of the aquifer test.

If a constant-rate aquifer test is not practical, then the PWS shall obtain hydraulic conductivity of the aquifer using another appropriate method, such as data from a nearby well in the same aquifer, specific capacity of the well, published hydrogeologic studies

of the same aquifer, or local or regional ground-water models. A constant-rate test may not be practical for such reasons as insufficient drawdown in the well, inaccessibility of the well for water-level measurements, or insufficient overflow capacity for the pumped water.

The constant-rate test shall:

(A) Provide for continuous pumping for at least 24 hours or until stabilized drawdown has continued for at least six hours. Stabilized drawdown is achieved when there is less than 0.5 foot of change of ground-water level in the well within a six-hour period.

(B) Provide data as described in R309-106-5(6)(a)(v) through (vii).

(vi) Additional Data for Observation Wells - If the aquifer test is conducted using observation wells, the report shall include the following information for each observation well: location and surface elevation; total depth; depth and length of the screened or perforated intervals; radius, casing type, screen or perforation type, and method of construction; prepumping ground-water level; the time-drawdown or distance-drawdown data and curve; and the total drawdown.

(vii) Hydrogeologic Methods, Procedures, and Calculations - These include the hydrogeologic method used to delineate the protection zones, all applicable equations, values, and the calculations which determine the delineated boundaries of zones two, three, and four.

(viii) Map Showing Boundaries of the DWSP Zones - A 1:24,000 scale map showing the location of the ground-water source of drinking water and the boundary for each DWSP zone. Although zone one (100-foot radius around the well or margin of the collection area) need not be on the map, the boundaries for zones two, three, and four must be drawn and labeled. More detailed maps are encouraged, but are optional.

The PWS shall also include a written description of the distances which define the delineated boundaries of zones two, three, and four. These written descriptions must include the maximum distances upgradient from the well, the maximum distances downgradient from the well, and the maximum widths of each protection zone.

(b) Optional Two-Mile Radius Delineation Procedure - Delineation Reports for protection areas delineated using the Optional Two-mile Radius Delineation Procedure shall include the following information:

(i) Map Showing Boundaries of the DWSP Management Area - A 1:24,000 scale map showing the location of the ground-water source of drinking water and the DWSP management area boundary. Although zone one (100-foot radius around the well or margin of the collection area) need not be on the map, the two-mile radius must be drawn and labeled. More detailed maps are encouraged but are optional.

(ii) Hydrogeologic Report for Potential Contamination Sources - Unless the PWS chooses the option in R309-113-9(5)(b)(iii) below, it shall submit a hydrogeologic report for each potential contamination source within zone one and the management area. This report must explain the potential for contamination to move from the contamination source to the ground-water source and its potential impact on the drinking water quality of the ground-water source.

(iii) Hydrogeologic Report Not Required - A hydrogeologic report for pollution sources within zone one and the management area is not required if these pollution sources implement design standards which prevent contaminated discharges to ground water. Additionally, a hydrogeologic report is not required for potential contamination sources if the PWS meets the requirements in R309-113-11 and 12.

(6) Protected Aquifer Conditions - If a PWS chooses to verify protected aquifer conditions, it shall submit the following additional data to DDW for each of its public-supply wells for which the protected aquifer conditions apply:

(a) thickness, depth, and lithology of the protective clay layer;

(b) data to indicate the lateral continuity of the protective clay layer over the extent of zone two. This may include such data as correlation of beds in multiple wells, published hydrogeologic studies, stratigraphic studies, potentiometric surface studies, and so forth; and

(c) evidence that the well has been grouted or otherwise sealed through the protective clay layer in accordance with R309-106-5(5)(g) and R309-113-6(1)(v).

R309-113-10. Potential Contamination Source Inventory and Identification and Assessment of Controls.

(1) Prioritized Inventory of Potential Contamination Sources - Each PWS shall list all potential contamination sources within each DWSP zone or management area in priority order and state the basis for this order. This priority ranking shall be according to relative risk to the drinking water source. Additionally, each PWS shall identify each potential contamination source as to its location in zone one, two, three, four or in a management area and plot it on the map required in R309-113-9(5)(a)(vii) or R309-113-9(5)(b)(i).

(2) List of Potential Contamination Sources - A List of Potential Contamination Sources is found in Chapter Three of the "Source Protection User's Guide." This document

may be obtained from DDW. This list may be used by PWSs as a guide to inventorying potential contamination sources within their DWSP zones and management areas.

(3) Refining, Expanding, Updating, and Verifying Potential Contamination Sources - Each PWS shall update its list of potential contamination sources to show current conditions within DWSP zones or management areas. This includes adding potential contamination sources which have moved into DWSP zones or management areas, deleting potential contamination sources which have moved out, improving available data about potential contamination sources, and all other appropriate refinements.

(4) Identification of Current Controls - The PWS shall list each of the current controls that are in effect for each potential contamination source. Refer to Appendix E of the "Source Protection User's Guide" for a list of government agencies and the programs they administer to control potential contamination sources. This guide may be obtained from DDW.

(5) Assessment of Current Controls - The PWS shall assess whether current controls are stringent enough to prevent pollution from a potential contamination source from reaching a ground-water source of drinking water.

For the purpose of meeting the requirements of R309-113, DDW will consider a PWS's assessment that a potential contamination source which is covered by a permit or approval under one of the regulatory programs listed below sufficient to demonstrate that the source is adequately controlled unless otherwise determined by the Executive Secretary. For all other state programs, the PWS's assessment is subject to review by DDW; as a result, a PWS's DWSP Plan may be disapproved if DDW does not concur with its assessment(s).

In determining if a potential contamination source is permitted or approved under these programs, the PWS should contact the state agency responsible for these programs. In the event that a potential contamination source is contacted directly, the PWS should understand that they are usually under no obligation to furnish requested information.

(a) The Utah Ground Water Quality Protection program established by Section 19-5-104 and R317-6;

(b) closure plans or Part B permits under authority of the Resource Conservation and Recovery Act (RCRA) of 1984 regarding the monitoring and treatment of ground water;

(c) the Utah Pollutant Discharge Elimination System (UPDES) established by Section 19-5-104 and R317-8;

(d) the Underground Storage Tank Program established by Section 19-6-403 and R311-200 through R311-208; and

(e) the Underground Injection Control (UIC) Program for classes I-IV established by Sections 19-5-104 and 40-6-5 and R317-7 and R649-5.

(6) Assessment Determines Source to be Adequately Controlled - If the assessment in R309-113-10(5) determines that a particular potential contamination source is adequately controlled, the PWS shall report this appraisal in the DWSP Plan and indicate that no further land management strategies will be proposed or implemented unless conditions change.

R309-113-11. Management Program to Control Each Preexisting Potential Contamination Source.

(1) PWSs shall plan land management strategies to control each preexisting potential contamination source in accordance with their authority and jurisdiction. Land management strategies must be consistent with the provisions of R309-113, designed to control potential contamination, and may be regulatory or non-regulatory. Each potential contamination source listed on the inventory required in R309-113-10(1) and assessed as "not adequately controlled" must be addressed. Land management strategies must be implemented according to the schedule required in R309-113-7(1)(e).

(2) PWSs with overlapping protection zones and management areas may cooperate in controlling a particular preexisting potential contamination source if one PWS will agree to take the lead in planning and implementing land management strategies and the remaining PWS(s) will assess the preexisting potential contamination source as "adequately controlled."

R309-113-12. Management Program to Control or Prohibit Future Potential Contamination Sources for Existing Drinking Water Sources.

PWSs shall plan land management strategies to control or prohibit future potential contamination sources within each of its DWSP zones or management areas consistent with the provisions of R309-113 and to an extent allowed under its authority and jurisdiction. Land management strategies must be designed to control potential contamination and may be regulatory or non-regulatory. Additionally land management strategies must be implemented according to the schedule required in R309-113-7(1)(e).

Protection areas may extend into neighboring cities, towns, and counties. Since it may not be possible for some PWSs to enact regulatory land management strategies outside of their jurisdiction, except as described below, it is recommended that these PWSs

contact their neighboring cities, towns, and counties to see if they are willing to implement protective ordinances to prevent ground-water contamination under joint management agreements.

Cities and towns have extraterritorial jurisdiction in accordance with Section 10-8-15 of the Utah Code Annotated to enact ordinances to protect a stream or "source" from which their water is taken... "for 15 miles above the point from which it is taken and for a distance of 300 feet on each side of such stream..." Section 10-8-15 includes ground-water sources.

Zoning ordinances are an effective means to control potential contamination sources that may want to move into protection areas. They allow PWSs to prohibit facilities that would discharge contaminants directly to ground water. They also allow PWSs to review plans from potential contamination sources to ensure there will be adequate spill protection and waste disposal procedures, etc. If zoning ordinances are not used, PWSs must establish a plan to contact potential contamination sources individually as they move into protection areas, identify and assess their controls, and plan land management strategies if they are not adequately controlled.

R309-113-13. New Ground-water Sources of Drinking Water.

(1) Prior to constructing a new ground-water source of drinking water, each PWS shall develop a Preliminary Evaluation Report or a DWSP Plan which demonstrates whether the source meets the requirements of this section and submit it to DDW. PWSs shall submit Preliminary Evaluation Reports or DWSP Plans and other required information in accordance with R309-106-5(2) or R309-106-6(2) to DDW concurrently; review of source protection reports and engineering specifications by DDW shall also be conducted concurrently. DDW will not grant plan approval to a PWS in accordance with R309-106-5(2) or R309-106-6(2) until the requirements set forth in this section are also met. Construction standards relating to protection zones and management areas (fencing, diversion channels, sewer lines, and grouting, etc.) are found in R309-106. After the source is constructed a DWSP Plan shall be developed, submitted, and implemented accordingly. Land use agreement requirements are also identified.

(2) Preliminary Evaluation Report for New Sources of Drinking Water - Preliminary Evaluation Reports shall cover all four zones or the entire management area. PWSs shall include the following five sections in each Preliminary Evaluation Report:

(a) Delineation Report for Estimated DWSP Zones - PWSs shall use the Preferred Delineation Procedure to delineate protection zones for new wells. The same requirements apply as in R309-113-9(5), except that the hydrogeologic data for the Preliminary Evaluation Report may be obtained from surrounding wells, published information, surface geologic mapping, or best available data.

(b) Inventory of Potential Contamination Sources and Identification and Assessment of Controls - The same requirements apply as in R309-113-10(1).

(c) Management Program to Control Each Preexisting Potential Contamination Source - The same requirements apply as in R309-113-11.

(d) Management Program to Control or Prohibit Future Potential Contamination Sources for New Drinking Water Sources in accordance with R309-113-13(4). Land use agreements obtained in conjunction with Preliminary Evaluation Reports may be notarized "letters of intent" from the owner. These letters must include the language required in a land use agreement and a statement that the owner will record a land use agreement with the county recorder's office if the source proves to be an acceptable source. A copy of the land use agreement which has been recorded with the county recorders office must be submitted to DDW and an approval letter must be issued before the PWS will be permitted to introduce the new source into its public system.

(e) Land Ownership Map - A land ownership map which includes all land within zones one and two or the entire management area.

(3) DWSP Plan for New Sources of Drinking Water - If a Preliminary Evaluation Report was developed, the PWS shall submit a DWSP Plan in accordance with R309-113-7(1) for any new ground-water source of drinking water within one year after the date of DDW's concurrence letter. In developing this DWSP Plan, PWSs shall refine the information in the Preliminary Evaluation Report by applying any new, as-constructed characteristics of the source (i.e., pumping rate, aquifer test, etc.).

(4) Management Program to Control and Prohibit Future Potential Contamination Sources for New Drinking Water Sources - PWSs shall plan land management strategies to control or prohibit future potential contamination sources within each of their DWSP zones and management areas consistent with the provisions of R309-113 and to an extent allowed under their authority and jurisdiction. Land management strategies must be designed to control potential contamination and may be regulatory or non-regulatory. Land management strategies must be implemented according to the schedule required in R309-113-7(1)(e).

Zoning ordinances are an effective means to control potential contamination sources that may want to move into protection areas. They allow PWSs to prohibit facilities that would discharge contaminants directly to ground water. They also allow PWSs to review

plans from potential contamination sources to ensure there will be adequate spill protection and waste disposal procedures, etc. If zoning ordinances are not used, PWSs must establish a plan to contact potential contamination sources individually as the move into protection areas, identify and assess their controls, and plan land management strategies if they are not adequately controlled. PWSs shall enact the following restrictions:

(a) Additional Requirements for Protection Areas Delineated using the Preferred Delineation Procedure in Protected Aquifers - A PWS shall not locate a new ground-water source of drinking water where a potential contamination source exists within zone one. Additionally, the PWS shall prohibit the future location of any potential contamination sources within zone one. These restrictions shall be accomplished through zoning controls or land use agreements with the land owner(s).

(b) Additional Requirements for Protection Areas Delineated using the Preferred Delineation Procedure in Unprotected Aquifers:

(i) Zone One - The same requirements apply as in R309-113-13(4)(a).

(ii) Zone Two - PWSs shall not locate a new ground-water source of drinking water where a pollution source exists within zone two in an unprotected aquifer unless the pollution source implements design standards which prevent contaminated discharges to ground water. Additionally, PWSs shall prohibit the future location of pollution sources within zone two unless the pollution source implements design standards which prevent contaminated discharges to ground water. These restrictions shall be accomplished through zoning controls or land use agreements with the land owner(s).

(c) Additional Requirements for Management Areas Delineated using the Optional Two-Mile Radius Delineation Procedure in Unprotected Aquifers:

(i) Zone One - The same requirements apply as in R309-113-13(4)(a).

(ii) DWSP Management Area - PWSs shall not locate a new spring where a pollution source exist within a management area unless: the hydrogeologic report in R309-113-9(5)(b)(ii) verifies that it does not impact the spring; or the pollution source implements design standards which prevent contaminated discharges to ground water.

Additionally, PWSs shall prohibit the future location of any pollution source unless: the hydrogeologic report in R309-113-9(5)(b)(ii) verifies that it will not impact the ground water source; or the pollution source implements design standards which prevent discharges to ground water. These restriction shall be accomplished through zoning controls or land use agreements with the land owner(s).

(5) Sewers Within DWSP Zones and Management Areas - The Executive Secretary may permit sewer lines within DWSP zones and management areas if precautions in accordance with R309-106-5(4)(b) are taken.

R309-113-14. Contingency Plans.

PWSs shall submit a Contingency Plan which includes all sources of drinking water for their entire water system to DDW concurrently with the submission of their first DWSP Plan. Guidance for developing Contingency Plans may be found in Chapter Five of the "Source Protection User's Guide." This document may be obtained from DDW.

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R309. Environmental Quality, Drinking Water.
R309-150. Water System Rating Criteria.
R309-150-1. Authority.
Under authority of Utah Code Annotated, Section 19-4-104, the Drinking Water Board adopts this rule in order to evaluate a public water system's standard of operation and service delivered in compliance with R309-101 through R309-113 and R309-301 through R309-302 hereinafter referred to as Rules.

R309-150-2. Extent of Coverage.
These rules shall apply to all public water systems as defined in R309-101.

R309-150-3. Definitions.
Approved - means that the public water system is operating in substantial compliance with all the Rules as measured by this rule.
Board - means the Drinking Water Board.
Community Water System - means a public water system which serves at least fifteen service connections used by year-round residents or regularly serves at least twenty-five year-round residents.
Contaminant - means any physical, chemical, biological, or radiological substance or matter in water.
Corrective Action - means a provisional rating for a public water system not in compliance with the Rules, but making all the necessary changes outlined by the Executive Secretary to bring them into compliance.
Executive Secretary - means the Executive Secretary of the Drinking Water Board.
Major Bacteriological Routine Monitoring Violation- means that no routine bacteriological sample was taken as required by R309-104-4.6.1.
Major Bacteriological Repeat Monitoring Violation - means that no repeat bacteriological sample was taken as required by R309-104-4.6.2.
Major Chemical Monitoring Violation - means that no initial background chemical sample was taken as required in R309-106-3(1)(b).
Maximum Contaminant Level (MCL) - The maximum permissible level of a contaminant in water which is delivered to any user of a public water system. Individual maximum contaminant levels (MCLs) are listed in R309-103.
Minor Bacteriological Routine Monitoring Violation- means that not all of the routine bacteriological samples were taken as required by R309-104-4.6.1.
Minor Bacteriological Repeat Monitoring Violation - means that not all of the repeat bacteriological samples were taken as required by R309-104-4.6.2.
Minor Chemical Monitoring Violation - means that the required chemical sample(s) was not taken in accordance with R309-104-4.
Non-Community Water System - means a public water system that is not a community water system or a non-transient non-community water system.
Non-Transient, Non-Community Water System - means a public water system that is not a community water system and that regularly serves at least 25 of the same persons for more than six months per year. Examples are separate systems serving workers and schools.
Not Approved - means the water system does not fully comply with the Rules as measured by this rule.
Public Water System - means a system, either publicly or privately owned, providing water for human consumption and other domestic uses which has at least fifteen service connections, or regularly serves an average of at least twenty-five individuals for at least sixty days out of the year. Such term includes collection, treatment, storage and distribution facilities under control of the operator and used primarily in connection with the system. Additionally, the term includes collection, pretreatment or storage facilities used primarily in connection with system but not under such control.
Routine Chemical Monitoring Violation - means no routine chemical sample(s) was taken as required in R309-104-4.
Sanitary Seal - A cap that prevents contaminants from entering a well through the top of the casing.
Shall - means that a particular action is obliged and has to be accomplished.
Unregulated Contaminant - A known or suspected disease causing contaminant for which no maximum contaminant level has been established.

R309-150-4. Water System Ratings.
(1) The Executive Secretary shall assign a rating to each public water system in order to provide a concise indication of its condition and performance. This rating shall be assigned based on the evaluation of the operation and performance of the water system in accordance with the requirements of the Rules. Points shall be assessed to Not Approved and Corrective Action rated water systems for each violation of these requirements (R309-101 through R309-113 and R309-301 through R309-302) as the requirements

apply to each individual water system. The number of points that shall be assessed are outlined in the following sections of this rule. The number of points represent the threat to the quality of the water and thereby public health.

(2) Points are assessed in the following categories: Quality, Monitoring & Public Notification; Physical Deficiencies; Operator Certification; Cross Connection Control; Drinking Water Source Protection; Administrative Issues; and Reporting and Record Maintenance.

(3) Based upon the accumulation of points, the public water system shall be assigned one of the following ratings.

(a) Approved - In order to qualify for an Approved rating, the public water system must maintain a point total less than the following:

(i) Community water system - 150 points;

(ii) Non-Transient Non-Community water system - 120 points; and

(iii) Non-Community water system - 100 points.

(b) Not Approved - In order for a public water system to receive a Not Approved rating the accumulation of points for the water system must exceed the totals listed above.

(c) Corrective Action - In order to qualify for a Corrective Action rating the public water system must submit the following:

(i) A written agreement to the Executive Secretary stating a willingness to comply with the requirements set forth in the Rules; and

(ii) A compliance schedule and time table agreed upon by the Executive Secretary outlining the necessary construction or changes to correct any physical deficiencies or monitoring failures; and

(iii) Proof of the financial ability of the water system or that the financial arrangements are in place to correct the water system deficiencies.

(iv) The Corrective Action rating shall continue until the total project is completed or until a suitable construction inspection or sanitary survey is conducted to determine the effectiveness of the improvements or the accumulation of points drops below the threshold for a not approved rating whichever is later.

(4) The water system point accumulation shall be adjusted on a quarterly basis or as current information is available to the Executive Secretary. The appropriate water system rating shall then be adjusted to reflect the current point total.

(5) The Executive Secretary may at any time rate a water system not approved if an immediate threat to public health exists. This rating shall remain in place until such time as the threat is alleviated and the cause is corrected.

(6) Any water system may appeal its assigned rating or assessed points to the Drinking Water Board by filing a request for a hearing with the Executive Secretary. The Executive Secretary shall place this matter on the agenda of the next regular meeting and so inform the appellant. The request for a hearing must be received by the Executive Secretary at least 14 calendar days prior to a scheduled Board meeting in order to be placed on the Board's agenda.

R309-150-5. Quality, Monitoring and Public Notification Violations.

(1) Bacteriologic: All points assessed to public water systems via this subsection are based on violations of the quality standards in R309-103.2.6; or the monitoring requirements in R309-104-4.6; and the associated public notification requirements in R309-104-7. The bacteriological assessments shall be updated on a monthly basis with the total number of points reflecting the most recent twelve month period or the most recent 4 quarters for those water systems that collect bacteriological samples quarterly.

(a) For each major bacteriological routine monitoring violation 35 points shall be assessed. For each failure to perform the associated public notification 5 points shall be assessed.

(b) For each minor bacteriological routine monitoring violation 10 points shall be assessed. For each failure to perform the associated public notification 2 points shall be assessed.

(c) For each major bacteriological repeat monitoring violation 40 points shall be assessed. For each failure to perform the associated public notification 5 points shall be assessed.

(d) For each minor bacteriological repeat monitoring violation 10 points shall be assessed. For each failure to perform the associated public notification 2 points shall be assessed.

(e) For each additional monitoring violation (R309-104-4.6.2.e.) 10 points shall be assessed. For each failure to perform the associated public notification 2 points shall be assessed.

(f) For each non-acute bacteriological MCL violation (R309-103-2.7.a) 40 points shall be assessed. For each failure to perform the associated public notification 10 points shall be assessed.

(g) For each acute bacteriological MCL violation (R309-103-2.7.b.) 50 points shall be

assessed. For each failure to perform the associated public notification 10 points shall be assessed.

(2) Chemical: All points assessed to public water systems via this subsection are based on violations of the quality standards in R309-103.2; or the monitoring requirements in R309-104-4; and the associated public notification requirements in R309-104-7. The chemical assessments shall be updated on a quarterly basis with the total number of points reflecting the most recent compliance period unless otherwise specified. Points for any chemical MCL violation shall remain on record until the quality issue is resolved. Points for any monitoring violation shall be deleted as the required chemical samples are taken and the analytical results are reported to the Executive Secretary.

(a) Inorganic and Metal Contaminants:

(i) For each major chemical monitoring violation for inorganic and metal contaminants 20 points shall be assessed. For each failure to perform the associated public notification 3 points shall be assessed.

(ii) For each minor chemical monitoring violation for inorganic and metal contaminants 10 points shall be assessed. For each failure to perform the associated public notification 1 point shall be assessed.

(iii) For each MCL exceedance for inorganic and metal contaminants 30 points shall be assessed. For each failure to perform the associated public notification 5 points shall be assessed.

(b) Sulfate (for non-community water systems only):

(i) For each major chemical monitoring violation for sulfate 20 points shall be assessed. For each failure to perform the associated public notification 3 points shall be assessed.

(ii) For each minor chemical monitoring violation for sulfate 10 points shall be assessed. For each failure to perform the associated public notification 1 point shall be assessed.

(iii) For each MCL exceedance for sulfate 30 points shall be assessed. For each failure to perform the associated public notification 5 points shall be assessed.

(c) Radiologic Contaminants:

(i) For each major chemical monitoring violation for radiological contaminants 20 points shall be assessed. For each failure to perform the associated public notification 3 points shall be assessed.

(ii) For each minor chemical monitoring violation for radiological contaminants 10 points shall be assessed. For each failure to perform the associated public notification 1 point shall be assessed.

(iii) For each MCL exceedance for radiological contaminants 30 points shall be assessed. For each failure to perform the associated public notification 5 points shall be assessed.

(d) Asbestos Contaminants:

(i) For each major chemical monitoring violation for source water or distribution system asbestos 20 points shall be assessed. For each failure to perform the associated public notification 3 points shall be assessed.

(ii) For each minor chemical monitoring violation for source water or distribution system asbestos 10 points shall be assessed. For each failure to perform the associated public notification 1 point shall be assessed.

(iii) For each MCL exceedance for source water or distribution system asbestos 30 points shall be assessed. For each failure to perform the associated public notification 5 points shall be assessed.

(e) Nitrate:

(i) For each routine chemical monitoring violation for nitrate 35 points shall be assessed. For each failure to perform the associated public notification 5 points shall be assessed.

(ii) For each MCL exceedance of nitrate 50 points shall be assessed. For each failure to perform the associated public notification 10 points shall be assessed.

(f) Nitrite:

(i) For each routine chemical monitoring violation for nitrite 35 points shall be assessed. For each failure to perform the associated public notification 5 points shall be assessed.

(ii) For each MCL exceedance of nitrite 50 points shall be assessed. For each failure to perform the associated public notification 10 points shall be assessed.

(g) Volatile Organic Chemicals:

(i) For each major chemical monitoring violation for volatile organic chemical contaminants 20 points shall be assessed. For each failure to perform the associated public notification 3 points shall be assessed.

(ii) For each minor chemical monitoring violation for volatile organic chemical contaminants 10 points shall be assessed. For each failure to perform the associated public notification 1 point shall be assessed.

(iii) For each MCL exceedance for volatile organic chemical contaminants 30 points

shall be assessed. For each failure to perform the associated public notification 5 points shall be assessed.

(h) Pesticides/PCBs/SOCs

(i) For each major chemical monitoring violation for pesticide/PCB/SOC contaminants 20 points shall be assessed. For each failure to perform the associated public notification 3 points shall be assessed.

(ii) For each minor chemical monitoring violation for pesticide/PCB/SOC contaminants 10 points shall be assessed. For each failure to perform the associated public notification 1 point shall be assessed.

(iii) For each MCL exceedance for pesticide/PCB/SOC contaminants 30 points shall be assessed. For each failure to perform the associated public notification 5 points shall be assessed.

(i) Unregulated Organics:

(i) For each routine chemical monitoring violation for unregulated contaminants 5 points shall be assessed. For each failure to perform the associated public notification 1 point shall be assessed.

(j) Total Trihalomethanes:

(i) For each routine chemical monitoring violation for total trihalomethanes 10 points shall be assessed. For each failure to perform the associated public notification 1 point shall be assessed.

(ii) For each MCL exceedance for total trihalomethanes 30 points shall be assessed. For each failure to perform the associated public notification 5 points shall be assessed.

(k) Lead and Copper:

(i) For each major chemical monitoring violation for lead and copper contaminants 20 points shall be assessed. For each failure to perform the associated public notification 3 points shall be assessed.

(ii) For each minor chemical monitoring violation for lead and copper contaminants 10 points shall be assessed. For each failure to perform the associated public notification 1 point shall be assessed.

(iii) A system which fails to install, by the designated deadline, optimal corrosion control if the lead or copper action level has been exceeded shall be assessed 35 points. For each failure to perform the associated public notification 10 point shall be assessed.

(iv) A system which fails to install source water treatment if the source waters exceed the lead or copper action level shall be assessed 35 points. For each failure to perform the associated public notification 10 points shall be assessed.

(v) A system which fails to complete public notification/education if the lead/copper action levels have been exceeded shall be assessed 10 points for each calendar quarter that the system fails to provide public notification/education.

(vi) A system which still exceeds the lead action level and is not on schedule for lead line replacement shall be assessed 5 points annually. For each failure to perform the associated public notification 2 point shall be assessed.

(l) Groundwater Turbidity:

(i) For each monitoring violation for turbidity 35 points shall be assessed. For each failure to perform the associated public notification 5 points shall be assessed.

(ii) For each confirmed MCL exceedance of turbidity 50 points shall be assessed. For each failure to perform the associated public notification 10 points shall be assessed.

(m) Surface Water Treatment:

(i) Plant Operation: Based upon the following criteria (a. through d.) 20 to 150 points shall be assessed as appropriate to indicate the threat to public health. For the associated failure to perform public notification 1 to 10 points shall be assessed. The surface water treatment assessments shall be updated on a monthly basis with the total number of points reflecting the most recent twelve month period.

(A) Number of events where disinfectant level in water entering the distribution system is less than 0.2 milligrams per liter for more than 4 hours; or

(B) Number of events where turbidity exceeds 5 NTU; or

(C) Each month where the percentage of turbidity interpretations meeting the treatment plant limit is less than 95 percent; or

(D) Each month where the percentage of distribution sampling violations for detectable levels of disinfectant is greater than 5 percent.

(ii) For water systems having sources which are classified as under direct influence from surface water and which fail to abandon, retrofit or provide conventional complete treatment or it's equivalent within 18 months of notification shall be assessed 20 to 50 points based upon the degree and seasonality of the surface water influence. For the associated failure to perform public notification 10 points shall be assessed. The points shall be assessed as the failure occurs and shall remain on record until adequate treatment is provided or the source is physically disconnected.

R309-150-6. Physical Facilities.

All points assessed to public water systems via this subsection are based upon violation of R309-105. through R309-113. These points shall be assessed and updated upon notification of the Executive Secretary and shall remain until the violation or deficiency no longer exists.

(1) Surface Water Diversion Structures and Impoundments:

(a) For each surface water intake structure that does not allow for withdrawal of water from more than one level if quality significantly varies with depth 2 points shall be assessed.

(b) Where no facilities exist for release (wasting) of less desirable water held in storage 2 points shall be assessed.

(c) Where the diversion facilities do not minimize frazil ice formation by holding intake velocities to less than 0.5 feet per second 2 points shall be assessed.

(d) Where diversion facilities are not adequately protected from damage by ice buildup 2 points shall be assessed.

(e) Where diversion facilities are not capable of keeping large quantities of fish or debris from entering the intake 2 points shall be assessed.

(f) Where reservoirs have not had brush and trees removed to the high water level 2 points shall be assessed.

(g) Where reservoir watershed management has not provided adequate precautions to limit nutrient loading 10 points shall be assessed.

(2) Well Sources

(a) For each well which is not equipped with a sanitary seal, or has any unsealed opening into the well casing 50 points shall be assessed.

(b) For each well which does not utilize food grade mineral oil for pump lubrication 25 points shall be assessed.

(c) For each well casing which does not terminate at least 12 inches above the pumphouse floor, 18 inches above ground, and/or five feet above the highest flood elevation, or is not fitted with an acceptable pitless adaptor 1 to 20 points shall be assessed based upon whether the adjacent land slopes toward or away from the wellhead; the integrity of the cement surrounding the wellhead and other factors that would jeopardize the integrity of the wellhead seal.

(d) For each well casing vent which is not properly covered with a No. 14 mesh screen 5 points shall be assessed.

(e) For each well which has discharge piping that is not properly equipped with 1) a smooth nosed sampling tap 2) check valve 3) pressure gauge 4) means of measuring flow and 5) shutoff valve 1 to 5 points shall be assessed depending upon the number of the above components that are present.

(f) For each well where there is no means to release trapped air from the discharge piping 5 points shall be assessed.

(g) For each well house which does not have a drain-to-daylight installed 5 points shall be assessed.

(3) Spring Sources:

(a) For each spring source which allows surface water to stand or pond upon the spring collection area (within 50 feet from collection devices) 1 to 20 points shall be assessed. The number of points shall be based upon the size and extent of the ponding; the possible source (rainfall or incomplete collection); or the presence of moss or other indicators of long term presence of standing water.

(b) For each spring area which does not have a minimum of ten feet of relative impervious soil or an acceptable liner 10 points shall be assessed.

(c) For each spring area that has deep rooted vegetation within the fenced collection area 10 points shall be assessed.

(d) For each spring area that has deep rooted vegetation interfering with the spring collection 10 points shall be assessed.

(e) For each spring which does not have a proper collection/junction box; and does not have the following: a proper shoebox lid, gasket, No. 14 mesh screen on the vent line and lock; 1 to 25 points shall be assessed. The number of points shall be determined by the number of the above items that are present.

(f) For each spring collection area without a proper fence (unless the spring is located in a remote area where no grazing or public access is possible as specified in R309-106(5)(e)) 10 points shall be assessed.

(g) For each spring collection area that does not have a diversion channel capable of diverting surface water away from the collection area 5 points shall be assessed.

(h) For each spring system which does not have a permanent flow measuring device 5 points shall be assessed.

(i) For each spring area with an overflow/drain that is not properly screened with a No. 4 mesh screen or does not have adequate freefall (12 to 24 inches) between the drain invert and the surrounding ground 5 to 10 points shall be assessed. The number of points shall be based upon the presence of a screen and the slope of the ground surrounding the

overflow/drain outlet.

(4) Disinfection by gaseous chlorine:

(a) A chlorinated water system that does not maintain a detectable chlorine residual throughout the distribution system shall be assessed 10 points.

(b) An improperly heated, lighted, and vented chlorinator building shall be assessed 2 points.

(c) A chlorinated water system that does not have a test kit to measure chlorine residual shall be assessed 2 points.

(d) A chlorinated water system that does not have a cylinder wrench located on the yoke valve shall be assessed 2 points.

(e) A chlorinated water system that utilizes one ton cylinders and does not have proper chlorine leak detection and repair kit equipment shall be assessed 15 points.

(f) A chlorinated water system that utilizes 150 pound cylinders and does not have proper chlorine leak detection and repair kit equipment shall be assessed 2 points.

(g) A chlorinated water system that does not have chlorine cylinders properly restrained or isolated from operating areas shall be assessed 2 points.

(h) A chlorinated water system that does not have a feeder vent properly vented to the outside and screened with a No. 14 mesh screen shall be assessed 2 points.

(i) A chlorinated water system without means to measure chlorine feed and cylinder usage shall be assessed 2 points.

(j) A chlorinated water system without access to a properly stored gas mask or stores a gas mask in the same room where chlorine gas is handled shall be assessed 5 points.

(k) A chlorination station without a means of measuring the volume of water treated shall be assessed 2 points.

(5) Disinfection by liquid hypochlorite:

(a) A chlorinated water system that does not maintain a detectable chlorine residual throughout the distribution system shall be assessed 10 points.

(b) An improperly housed and secured hypochlorinator station shall be assessed 2 points.

(c) A chlorinated water system that does not have a test kit to measure chlorine residual shall be assessed 2 points.

(d) A chlorinated water system that does not maintain a spare parts repair kit for the positive displacement pumps shall be assessed 2 points.

(e) A hypochlorination station without a means of measuring the volume of water treated shall be assessed 2 points.

(6) Storage:

(a) A water system with an uncovered finished water storage reservoir shall immediately be assessed a rating of not approved.

(b) For each storage reservoir access that is not an overlapping (shoe box) type lid, locked and is at least 4 inches above the top of the tank 10 points shall be assessed.

(c) For each improperly vented storage reservoir 5 points shall be assessed.

(d) For each storage reservoir overflow that: is not properly screened, is not sloped for drainage, or is connected to a sewer without an appropriate air gap; 5 to 15 points shall be assessed based on the number and severity of the above items that are present.

(e) For each storage reservoir with inadequate or improper means of drainage 2 points shall be assessed.

(f) For each storage reservoir where the roof and sidewalls are not water tight shall be assessed 10 to 50 points based upon the size and number of cracks, the loss of structural integrity and the access of contamination to the drinking water.

(g) For each storage reservoir without an access ladder, or railing where required (elevated tank) 2 points shall be assessed.

(h) For each storage reservoir with internal coatings not in compliance with ANSI/NSF standard 61 30 points shall be assessed.

(7) Distribution System:

(a) A water system which fails to provide at least 20 psi at all times and at all locations within the distribution system during peak instantaneous flow conditions shall be assessed 50 points.

(b) A water system using unapproved pipe and materials shall be assessed 30 points.

(c) A water system with pipelines installed improperly without adequate clearance or separation from sewer lines shall be assessed 30 points.

(d) For each air vacuum release valve which is not properly screened and turned down 2 points shall be assessed up to a maximum of 20 points per system.

(e) For each flooded air vacuum release valve chamber 20 points shall be assessed up to a maximum of 50 points per system.

(8) Quantity requirements

(a) A water system which does not have sufficient source capacity to meet peak daily and average yearly flow requirements shall be assessed from 5 to 50 points. The number of points shall be based upon the severity of the shortage including the number of times and

duration of water outages or low pressure.

(b) A water system which does not have sufficient storage capacity to meet average daily flow requirements shall be assessed from 5 to 50 points. The number of points shall be based upon the severity of the shortage including the number of times and duration of water outages.

R309-150-7. Operator Certification.

Operator certification:

(1) A water system that is required to have a certified operator and does not shall be assessed 30 points.

(2) A water system where the operator is not certified at the appropriate level shall be assessed 10 points.

(3) A grade 3 or 4 water system that does not have all direct responsible charge operators (as specified in R309-301-5) certified at no more than one grade level below the level of the system shall be assessed 5 to 15 points. The number of points shall be based on the percentage of time that the water system is operated by operators not certified at the required level.

(4) A water system may be credited up to a maximum of 20 points which shall remain on record for as long as the conditions apply. The following items are eligible for credit:

(a) A water system that is not required to have a certified operator and does shall be credited 10 points.

(b) A water system that has operators that are certified at a higher level than required shall be credited 10 points.

(c) A water system that has operators certified in other areas that are not required by that water system, such as treatment or backflow prevention certification, shall be credited 10 points.

R309-150-8. Cross Connection Control Program.

Cross Connection Control Program:

(1) A water system which does not have any of the below listed components of a cross connection control program in place shall be assessed 50 points.

(2) A water system which only has some of the components of a cross connection control program in place shall be assessed the following number of points:

(a) A water system which does not have local authority to enforce a cross connection control program (i.e., ordinance, bylaw or policy) shall be assessed 10 points.

(b) A water system that does not provided public education or awareness material or presentations on an annual basis shall be assessed 10 points.

(c) A water system that does not have an operator with training in the area of cross connection control or backflow prevention shall be assessed 10 points.

(d) A water system with no written records of cross connection control activities, such as, backflow assembly inventory and test history, shall be assessed 10 points.

(e) A water system that does not have on-going enforcement activities (hazard assessments and enforcement actions) shall be assessed 10 points.

R309-150-9. Drinking Water Source Protection.

Drinking water source protection (well, spring or tunnel): Points shall be assessed for each source after a system fails to complete source protection plans as specified in R309-113. The points shall remain until such time as the source protection plan is completed and concurred with.

(1) For each groundwater source for which a protection area has not been delineated shall be assessed 5 points.

(2) For each groundwater source for which there is no inventory of potential contamination sources 5 points shall be assessed.

(3) For each groundwater source for which potential contamination sources assessed are not adequately controlled 5 points shall be assessed.

(4) For each groundwater source where there is not a plan to address any new potential contamination sources that may be located in protection areas shall be assessed 5 points.

(5) For each water system that completes a source protection plan prior to the required deadline in R309-113, the system shall receive a credit of 20 points that shall remain on record until the deadline requiring a plan for the system's source(s) passes.

R309-150-10. Administrative Issues.

Points in this area shall be assessed at the time that the failure occurs or upon notification of the Executive Secretary and shall remain until the issue is resolved unless otherwise specified.

(1) Administrative Data -

(a) A water system which has not designated a person or organizational official responsible for the system including a current address and phone number shall be assessed

10 points.

(b) A water system project constructed without proper plan approval shall be assessed 1 to 50 points based on an evaluation of the project which shall include the structural or engineering integrity of the project; whether the plans and specifications were prepared and stamped by a licensed professional engineer; the adequacy of the materials used and the impact on the operation of the water system (good or bad). The points assessed shall remain on record for a period of one year.

(2) A water system with a current written Emergency Response Program shall be credited 10 points that shall remain on record as long as the Program remains current.

(3) A water system with a written Financial Management Plan including an appropriate rate structure, infra-structure replacement fund, and master plan shall be credited 10 points that shall remain on record as long as the Plan is current.

(4) Sampling Site Plans:

(a) A water system which does not have an adequate bacteriological sampling site plan shall be assessed 5 points.

(b) A water system which does not have a lead/copper sampling site plan shall be assessed 10 points.

(5) Customer Complaint:

(a) 1 to 100 points may be assessed for valid and documented customer complaints. The customer complaints include but are not limited to the following:

(i) Turbidity;

(ii) Pressure;

(iii) Taste and Odor;

(iv) Sickness (water suspected); and

(v) Waterborne Disease Outbreak (R309-104-9).

(vi) Periods of Water Outage

(b) The number of points shall be based upon the extent and documentation of the problem and the potential impact to public health. The documentation shall consist of an investigation by Department of Environmental Quality, Department of Health or Local Health Department personnel and may include an epidemiological study linking the drinking water to reported outbreaks of illness where appropriate.

(c) In the case of a documented waterborne disease outbreak the water system shall automatically be rated Not Approved for at least the duration of the threat to the quality of the drinking water and as long as it takes the water system to correct any deficiency that caused the outbreak.

(d) Points shall only be assessed once per issue and shall not be additive based on the number of calls per issue. These points shall be assessed and updated upon verification of the complaint by the Executive Secretary and shall remain on record until the issue or deficiency no longer exists. Points may have already been assessed in other areas as appropriate.

(6) Agency Directives - When a directive consistent with the authority of the Drinking Water Board is not complied with 1 to 100 points may be assessed to a water system. Agency directives include but are not limited to the following:

(a) Administrative Orders;

(b) Rule defined action;

(c) Rule defined compliance schedule;

(d) Variance/Exemption requirements; and

(e) Bilateral Compliance Agreement.

Points shall be assessed based upon the severity of the non-compliance, the threat to public health and the underlying basis for the original directive.

(7) Data Falsification - The Executive Secretary may assess a water system points for data falsification. The water system may be assessed 1 to 50 points for each occurrence based upon:

(a) the severity of the falsification;

(b) the threat to public health;

(c) the intent of the water system personnel; and

(d) the type of falsification.

(i) Reports only good data

(ii) Doctored results from the laboratory

(iii) Non-valid sample

Data reported to the Executive Secretary includes but is not limited to Water Treatment Plant Reports, Chlorination Reports, bacteriological and chemical analyses, and Annual Reports.

R309-150-11. Reporting and Record Maintenance Issues.

Points may be assessed for failure to provide required reports to the Executive Secretary by the reporting deadline. The points shall be assigned as the failure occurs and shall remain on record for a period of one year.

(1) Monthly Reports:

(a) For each failure to report the monthly water treatment plant report 10 points shall be assessed.

(b) For each failure to report the monthly chlorination report 10 points shall be assessed.

(2) Annual Reports - For failure to provide the annual report 2 points shall be assessed.

KEY: drinking water, environmental protection, water system rating, administrative procedure

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R309. Environmental Quality, Drinking Water.

R309-301. Required Certification Rules for Water Supply Operators in the State of Utah.

R309-301-1. Objectives.

These certification rules are established to promote use of trained, experienced, and efficient personnel in charge of public waterworks and to establish standards whereby operating personnel can demonstrate competency to protect the public health through proficient operation of waterworks facilities.

R309-301-2. Authority.

Utah's Operator Certification Program is authorized by Section 19-4-104.

R309-301-3. Extent of Coverage - To Whom Rules Apply - Effective Date.

These rules shall apply to all public drinking water supply systems serving more than 800 individuals and all public drinking water systems that utilize treatment of the drinking water. This shall include both water treatment and distribution systems. These requirements shall be met by all such systems by January of 1994. For further information on this program, contact the Division of Drinking Water, telephone 536-4200.

R309-301-4. Definitions.

"Board" see the definition of: Drinking Water Board below.

"Commission" see the definition of: Operator Certification Commission.

"Continuing Education Unit (CEU)" means ten contact hours of participation in, and successful completion of, an organized and approved continuing education experience under responsible sponsorship, capable direction, and qualified instruction. College credit in approved courses may be substituted for CEUs on an equivalency basis.

"Direct Employment" means that the operator is directly compensated by the drinking water system to operate that drinking water system.

"Direct Responsible Charge" means active on-site charge and performance of operation duties. A person in direct responsible charge is generally an operator of a water treatment plant or distribution system who independently makes decisions during normal operation which can affect the sanitary quality, safety, and adequacy of water delivered to customers. In cases where only one operator is employed by the system, this operator shall be considered to be in direct responsible charge.

"Discipline" means type of certification (Distribution or Treatment).

"Distribution System" means the use of any spring or well source, distribution pipelines, appurtenances, and facilities which carry water for potable use to consumers through a public water supply. Systems which chlorinate groundwater are in this discipline.

"Distribution System Manager" means the individual responsible for all operations of a distribution system.

"Division of Drinking Water" means the Division within the Utah Department of Environmental Quality which regulates public water supplies.

"Drinking Water Board" means the board appointed by the Governor responsible for promulgation, interpretation and enforcement of Drinking Water Rules in Utah.

"Executive Secretary" means the individual authorized by the Drinking Water Board to conduct business on its behalf. The Executive Secretary has been delegated the responsibility of conducting the necessary daily duties of the Board.

"Grade" means any one of four possible steps within a certification discipline of either water distribution or water treatment. Grade I indicates knowledge and experience requirements for the smallest type of public water supply. Grade IV indicates knowledge and experience levels appropriate for the largest, most complex type of public water supply.

"Grandfather Certificate" means the operator has not been issued an Operator Certificate through the examination process and that a restricted certificate has been issued to the operator which is limited to his current position and system. These certificates cannot be used with any other system should the operator transfer. Grandfather certificates will be issued January 1, 1993 through March 31, 1993. No further grandfather certificates will be issued thereafter.

"Training Coordinating Committee" means the voluntary association of individuals responsible for environmental training in the state of Utah.

"Operator" means a person who operates, repairs, maintains, and is directly employed by a public drinking water system.

"Operator Certification Commission" means the Commission appointed by the Drinking Water Board as an advisory Commission on certification.

"Public Drinking Water System" means any drinking water system, either publicly or privately owned, that has at least 15 connections or serves at least 25 people for at

least 60 days a year.

"Regional Operator" means a certified operator who is in direct responsible charge of more than one public drinking water system.

"Restricted Certificate" means that the operator has qualified by passing an examination but is in a restricted certification status due to lack of experience as an operator.

"Secretary" means the Secretary to the Operator Certification Commission. This is an individual appointed by the Executive Secretary to conduct the business of the Commission.

"Specialist" means a person who has successfully passed the written certification exam and meets the required experience, but who is not in direct employment with a Utah public drinking water system.

"Treatment Plant Manager" means the individual responsible for all operations of a treatment plant.

"Treatment Plant" means those facilities capable of delivering complete treatment to any water (the equivalent of coagulation and/or filtration) serving a public drinking water supply.

"Unrestricted Certificate" means that a certificate of competency has been issued by the Board on the recommendation of the Commission. This certificate implies that the operator has passed the appropriate level written examination and has met all certification requirements at the discipline and grade stated on his certificate.

R309-301-5. General Policies.

1. Any properly qualified operator (see Minimum Required Qualifications for Utah Waterworks Operators Table 5) may apply for unrestricted certification.

2. Any properly qualified person (see Minimum Required Qualifications for Water System Specialists Table 6) may apply for Specialist certification. A Specialist, regardless of discipline or grade, shall not act as a direct responsible charge operator, or be in direct operation or supervise the direct operation of, any public drinking water system.

3. An individual who holds a current Specialist Certificate may apply for an Operator Certificate of the same discipline and grade upon verification of direct employment with a public drinking water system. An individual who holds a current Operator Certificate (Restricted and Unrestricted) may apply for a Specialist Certificate of the same discipline and grade if that operator leaves the direct employment of a drinking water system.

4. The Distribution System or Treatment Plant manager is required to be certified at the grade of the waterworks system with an appropriate unrestricted certificate. All other direct responsible charge operators shall be certified at an equivalent or not more than one grade lower. Where 24-hour shift operation is used or required, one operator per shift must be certified at not less than one grade below the classification of the system operated.

5. The Board, upon recommendation from the Commission, may waive examination of applicants holding a valid certificate or license issued in compliance with other state certification plans having equivalent standards, and grant reciprocity.

6. A grandfather certificate will require normal renewal as with other certificates and will be restricted to the existing position, person, and system for which it was issued. No further examination will be required unless the operator seeks to change the certificate discipline or grade. At that time, all normal certification requirements must be met.

7. Every public drinking water distribution system that serves a population of 800 or more, and all public systems that employ treatment of the drinking water shall have at least one operator certified at the classified grade of the water system by January 1, 1994. Certification must be appropriate for the type of system operated (treatment and/or distribution).

8. An individual who is issued an Operator Certificate shall be employed by a public drinking water supply located in Utah.

9. If the Distribution or Treatment Plant Manager is changed or leaves a particular water system, the water system management must notify the Secretary to the Operator Certification Commission within ten days by contacting the Division of Drinking Water in writing. Within one year, or two examination cycles, whichever is longer, the operator in the position of plant or system manager that requires certification must have passed an examination of the appropriate grade and discipline. Direct responsible charge experience may be gained later, together with unrestricted certification as experience is gained.

10. The Secretary to the Commission may suspend or revoke a certificate after due notice and opportunity for a hearing. See Section R309-301-9 for further details.

11. An operator may have the opportunity to take any grade of examination higher than the rating of the system which he operates. If passed, the operator shall be issued a restricted certificate at that higher grade. This certificate can be used to demonstrate

that the operator has successfully passed all knowledge requirements for that discipline and grade, but that experience is lacking. This restricted certificate will become unrestricted when the experience requirements are met with written verification for the appropriate discipline and grade, provided it is renewed at the required intervals.

12. The Commission will review on a periodic basis each system's compliance with these rules and will refer those systems in violation to the Board for appropriate action. Any requirement can be appealed to the Board where unusual conditions warrant an exemption. Formal action in these areas will be taken on each case. The Commission will work closely with water system managements to ensure that efforts are underway to meet the requirements of these rules.

13. An operator who is acting as the direct responsible charge operator for more than one drinking water system (regional operator) shall not be a Grandfather certified operator.

14. The regional operator must have an unrestricted certificate equal to or higher than the grade and discipline of the rating applied to each system he is operating.

15. If the regional operator is operating any system(s) that have both disciplines involved in their rating, the operator must have unrestricted certificates in both disciplines and at the highest grade of the most complex system he is working with.

16. If the drinking water system has only one certified operator, with the exception of a drinking water system employing a regional operator, the operator must have a back up operator certified in the required discipline(s) and not more than one grade lower than the drinking water system's grade. The back up certified operator must be within one hour travel time of the drinking water system.

17. At no time will an uncertified operator be allowed to operate a drinking water system covered by these rules.

R309-301-6. Application for Examination.

1. Prior to taking an examination, the operator or specialist must file a written application with the Division of Drinking Water, accompanied by evidence of his qualifications for certification in accordance with provisions of this plan (see tables on minimum qualifications). Such applications shall be made on forms supplied by the Division.

2. An operator may elect to challenge any written examination which he believes can be successfully passed. Persons passing such a challenged examination shall be issued restricted certificates for the appropriate discipline and grade.

R309-301-7. Examinations.

1. The time and place of the examination to qualify for a certificate shall be determined by the Commission. All examinations for certification shall be given not less than twice a year, generally at each of 12 district health department offices. All examinations will be conducted on the same day, graded, and the applicant notified of the results within 30 days. If an operator taking the examination fails to pass, he may file an application for reexamination at the next available date.

2. The minimum passing grade for all certification exams shall be 70 percent correct on all questions asked.

3. An individual who has failed to pass at least two consecutive written exams, at the same grade level and discipline, may appeal the results by making an application for an oral exam. The oral exam will be administered by at least two Commission members. If the individual fails this exam, he will be given written notice of those areas deficient and asked to reapply for a written examination.

4. Examinations will be given in four grades in water treatment and water distribution. The examinations will cover, but not be limited to, the following areas:

(a) general water supply knowledge;
(b) control processes in water treatment or distribution;
(c) operation, maintenance, and emergency procedures in treatment or distribution;
(d) proper record keeping;
(e) laws and requirements, and water quality standards.

5. The written examination for specialist certification will be the same examination that is given for operator certification.

R309-301-8. Certificates.

1. All certificates shall indicate the discipline for which they were issued as follows:

(a) Water Treatment Plant Operator, Unrestricted;
(b) Water Treatment Plant Operator, Restricted;
(c) Water Distribution Operator, Unrestricted;
(d) Water Distribution Operator, Restricted;
(e) Water Treatment Specialist;
(f) Water Distribution Specialist.

2. A restricted certificate will be issued to those operators who have passed a higher grade examination than the grade for which they have qualified in the experience category. Upon accumulating the necessary experience, these restricted certificates will become unrestricted with the same renewal date. Certificates issued in the restricted status will be stamped with the word RESTRICTED on the bottom left corner of the certificate.

3. Grandfather certificates will be restricted to the person, position, and water system for which they were issued. These certificates will exempt the holder from further examination but will not be transferable to other persons, drinking water systems or positions.

4. A Specialist Certificate will be issued to those persons who have met the experience requirements and have successfully passed the written examination, but who are not in direct employment with a Utah Public Drinking Water System or in the case of requested conversion (see R309-301-8(5)).

5. An individual who currently holds a valid Utah Operator Certificate and who is no longer directly employed by a Utah drinking water system may request his Operator Certificate be converted to a Specialist Certificate with the same expiration date.

6. All certificates shall continue in effect for a period of three years unless suspended or revoked prior to that time. The certificate must be renewed every three years by payment of a renewal fee and evidence of required training (see R309-301-13). Certificates will expire on December 31, three years from the year of issuance.

7. Failure to remain active in the waterworks field during the three-year life of the Operator Certificate can be cause for denial of the application renewal.

8. Requests for renewal shall be made on the forms supplied by the Division of Drinking Water.

9. A lapsed certificate may be renewed by payment of the reinstatement fee and either passing an examination or, at the discretion of the Secretary to the Commission after considering the training, experience, education and progress made since the certificate lapsed, reinstatement may be granted without examination.

R309-301-9. Certificate Suspension and Revocation Procedures.

1. When the Secretary is considering the suspension or revocation of an Operator's or Specialist's certificate, the individual shall be so informed in writing. The communication shall state the reasons for considering such action and allow the individual an opportunity for a hearing.

2. Grounds for suspending or revoking an Operator's or a Specialist's certificate shall be any of the following:

(a) demonstrated disregard for the public health and safety;

(b) misrepresentation or falsification of figures and reports, or both, submitted to the State;

(c) cheating on a certification exam;

(d) mental or physical incapacity of the operator to perform operating duties.

3. Suspension or revocation will be possible when it can be shown that the circumstances and events were under an Operator's or a Specialist's jurisdiction and control. Disasters or "acts of God" which could not be reasonably anticipated will not be grounds for a suspension or a revocation action.

4. Following an appropriate hearing on these matters, the Commission will take formal action. This action shall include a description of the findings of fact to be placed in the Operator's or the Specialist's certification file and mailed to the Operator or the Specialist involved. This communication shall also state the lengths of suspension or revocation, and the procedures to reapply for certification at the end of the specified disciplinary period.

5. Any suspension or revocation may be appealed to the Drinking Water Board by filing a request for a hearing with the Executive Secretary. The Executive Secretary shall place this matter on the agenda of the next regular meeting and so inform the appellant. The request for a hearing must be received by the Executive Secretary at least 14 calendar days prior to a scheduled Board meeting in order to be placed on the Board's agenda.

R309-301-10. Fees.

1. Fees for operator and specialist certification shall be submitted in accordance with Section 63-38-3.

2. Examination fees from applicants who are rejected before examination will be returned to the applicant.

3. Application fees will not be returned.

R309-301-11. Facilities Classification System.

1. All treatment plants and distribution systems shall be classified in accordance with the appropriate tables in these rules.

2. Classification will be made by either the point system or on a population-served

basis, whichever results in a higher classification.

3. When the classification of a system is upgraded or added to existing system ratings, the Secretary to the Commission will make a decision on the timing to be allowed for operators to gain certification at the higher or different level.

R309-301-12. Qualifications of Operators.

1. Minimum qualifications are outlined in Minimum Required Qualifications for Utah Waterworks Operators, Table 5, and Minimum Certification Qualifications for Water System Specialists, Table 6, included with these rules (see Section R309-301-18).

2. Approved high school equivalencies can be substituted for the high school graduation requirement.

3. Education of an operator can be substituted for experience, but no more than 50 percent of the experience may be satisfied by education. Note: The exception to this is in grades I and II, where the "one year of experience" requirement cannot be reduced by any amount of education.

4. Education of a specialist cannot be substituted for the required experience (see Minimum Certification Qualifications for Water System Specialists Table 6).

R309-301-13. CEUs and Approved Training.

1. CEUs will be required for renewal of certificates according to the following schedule:

TABLE 1

CLASSIFICATION	CEUs REQUIRED IN A 3-YEAR PERIOD
Grade 1	2
Grade 2	2
Grade 3	3
Grade 4	3

2. Groups that currently sponsor approved education activities in Utah are:
The Rural Water Association of Utah;
Salt Lake Community College
Utah Valley State College;
Utah State University at Logan;
Utah Department of Environmental Quality;
Manufacturer's Representatives;
American Water Works Association;
American Backflow Prevention Association.

3. A continuing education unit is defined as 10 contact hours of participation in, and successful completion of, an organized and approved training education experience under qualified instruction.

4. College level education is accepted in drinking water related disciplines upon approval of the Secretary to the Commission as to CEU credits (1 quarter credit hour will equal 1.0 CEU or 1 semester credit hour will equal 1.5 CEUs).

5. All CEUs for certificate renewal shall be subject to review for approval to insure that the training is applicable to waterworks operation and meets CEU criteria. Identification of approved training, appropriate CEU or credit assignment and verification of successful completion is the responsibility of the Secretary to the Commission. Training records will be maintained by the Division of Drinking Water.

6. All in-house or in-plant training which is intended to meet any part of the CEU requirements must be approved by the Secretary to the Commission in writing prior to the training.

7. In-house or in-plant training submitted to the Secretary of the Commission must meet the following general criteria to be approved:

(a) Instruction must be under the supervision of an approved instructor.

(b) An outline must be submitted of the subjects to be covered and the time to be allotted to each area.

(c) A list of the teacher's objectives shall be submitted which will document the essential points of the instruction ("need-to-know" information) and the methods used to illustrate these principles.

8. One CEU credit will be given for registration and attendance at the annual technical program meeting of the American Water Works Association (AWWA), the Intermountain Section of AWWA, the Rural Water Association of Utah, or the National Rural Water Association.

R309-301-14. Validation of Previously Issued Certificates.

1. All current certificates issued by the Executive Secretary will remain in effect

until their stated date of expiration and may be renewed at any time before this date in accordance with the rules established herein. Certificates will be issued for a three-year period.

2. Those individuals who were issued Grandfather Certificates and subsequently passed an examination within the same discipline, at the same grade, or a higher grade will be issued a new unrestricted certificate which will nullify the existing "Grandfather" certificate.

R309-301-15. Operator Certification Commission.

1. An Operator Certification Commission shall be appointed by the Drinking Water Board from recommendations made by the cooperating agencies. Cooperating agencies are the Utah Department of Environmental Quality, the Utah League of Cities and Towns, the Training Coordinating Committee of Utah, the Intermountain Section of the American Water Works Association, the Civil or Environmental Engineering Departments of Utah's Universities, and the Rural Water Association of Utah.

2. The Commission is charged with the responsibility of conducting all work necessary to promote the program, recommend certification of operators, and oversee the maintenance of records.

3. The Commission shall consist of seven members as follows:

(a) One member shall be a certified operator from a town having a population under 10,000 and will be nominated by the Rural Water Association of Utah.

(b) One member shall be at least a grade III unrestricted certified distribution operator and will be nominated by the American Water Works Association.

(c) One member shall be at least a grade III unrestricted certified water treatment plant operator and will be nominated by the American Water Works Association.

(d) One member shall represent municipal water supply management and will be nominated by the Utah League of Cities and Towns.

(e) One member shall represent the civil or environmental engineering department of a Utah university cooperating with the certification program.

(f) One member shall represent water supply trainers and will be nominated by the Training Coordinating Committee (TCC).

(g) One member shall be a representative for the Drinking Water Board.

4. Each group represented shall designate its nominee to the Drinking Water Board for a three-year term. Nominations may be accepted or rejected by the Drinking Water Board. Persons may be renominated for successive three-year terms by their sponsor groups. The Executive Secretary for the Drinking Water Board shall notify the sponsoring groups one year in advance of the termination of the Commission member that a nominee will be needed. The initial Commission at its first meeting will draw lots corresponding to one, two, and three-year terms. Thereafter, all Commission member terms will be for three years on a staggered replacement basis. An appointment to succeed a Commission member who is unable to serve his full term shall be only for the remainder of the unexpired term and shall be submitted by the sponsor groups and approved by the Drinking Water Board as mentioned above.

5. Each year the Commission shall elect from its membership a chairperson and vice-chairperson and such other officers as may be needed to conduct its business.

6. It shall be the duty of the Commission to advise in the preparation of examinations for various grades of operators and advise on the certification criteria used by the Secretary. In addition to these duties, the Commission shall also advertise and promote the program, distribute applications and notices, maintain a register of certified Operators and Specialists, set examination dates and locations, and make recommendations regarding each drinking water system's compliance with these rules.

R309-301-16. Secretary to the Commission.

The Executive Secretary of the Drinking Water Board shall designate a non-voting member of the Commission to serve as its Secretary, who shall be a senior public health representative from the Division of Drinking Water. This Secretary shall serve to coordinate the paperwork for the Commission and to bring issues before the Commission. His duties consist of the following:

1. acting as liaison between the Commission and the water suppliers, and generally promote the program;

2. maintaining records necessary to implement these rules;

3. classifying all water treatment plants and distribution systems;

4. notifying sponsor groups of Commission nominations needed;

5. coordinating with Utah's Training Coordinating Committee (TCC) to ensure adequate operator training opportunities throughout the state;

6. serving as a source of public information for operator training opportunities and certified operators available for employment;

7. receiving applications for certification and screen, investigate, verify and evaluate all applications received consistent with policies set by the Board and

Commission;

8. bringing issues to the Commission for their review;
9. developing and administering operator certification examinations.

R309-301-17. Non-compliance with Certification Program.

1. After appropriate consideration by the Commission, cases of non-compliance will be referred to the Drinking Water Board for appropriate enforcement action.
2. Non-compliance with the certification rules is a violation of R309-102-8. Whenever such a violation occurs, the water system management will be notified in writing by the Division of Drinking Water and will be required to correct the situation.

R309-301-18. Water Treatment Classification System.

This system applies only to those public water supplies operating coagulation and/or filtration treatment plants. This classification system does not apply to those systems operating only chlorination facilities on distribution systems.

TABLE 2

Size	Item	Points
	Maximum population served, peak day	1 pt. per 5,000 or part thereof
	Design flow (avg. day) or peak month's	1 pt. per MGD or part thereof
Water Supply Source		
	Groundwater	3
	Surface water	5
	Average raw water quality (0 to 10)	
	Little or no variation	0
	Raw water quality (other than turbidity) varies enough to require treatment changes less than 10% of the time	2
	Raw water quality including turbidity varies often enough to require frequent changes in the treatment process	5
	Raw water quality is subject to major changes and may be subject to periodic serious pollution	10
	Aeration for with CO2	2
	pH adjustment	4
	Packed tower aeration	6
	Stability or corrosion control	4
	Taste and odor control	8
	Color control	4
Treatment		
	Iron or Iron/Mn, removal	10
	Ion exchange softening	10
	Chemical precipitation softening	20
	Coagulant addition	4
	Flocculation	6
	Sedimentation	5
	Upflow clarification	14
	Filtration	10
	Disinfection (0-10)	
	No disinfection	0
	Chlorination or comparable	5
	On-site generation of disinfectant	5
	Special processes (including reverse osmosis, electro-dialysis, etc.	15

Sludge/backwash water disposal (0-5)	
No disposal to raw water source	0
Any disposal to raw water source	2
Any disposal to plant raw water	5
Laboratory control (0-10)	
Biological (0-10)	
All lab work done outside of plant	0
Colilert process	2
Membrane filter	3
Multiple tube of fecal determination	5
Biological identification	7
Viral studies or similarly complex work done on-site	10
Chemical/physical	
All lab work done outside of plant	0
Push button or colorimetric methods such as chlorine residual or pH	3
Additional procedures such as titrations or jar tests	5
More advanced determinations such as numerous organics	7
Highly sophisticated instrumentation such as atomic absorption or gas chromatography	10

TABLE 3
SUMMARY OF UTAH
WATER UTILITY CLASSIFICATION SYSTEM
WATER TREATMENT PLANT CLASSIFICATION

Grade	1	2	3	4
Population served	1500 or less	1501 5000	5001 15,000	over 15,000
Water plant points	0-40	41-65	66-90	91-UP

TABLE 4
SUMMARY OF UTAH
WATER UTILITY CLASSIFICATION SYSTEM
DISTRIBUTION CLASSIFICATION

Grade	1	2	3	4
Population served	1500 or less	1501 5000	5001 15,000	over 15,000
Water plant points	0-10	10-25	26-50	51-UP

Distribution systems are those which use groundwater sources (springs and wells) and which may or may not use chlorination. Classification will generally be made in accordance with the following four classes. The Commission may change the classification of a particular distribution system when there are unusual factors affecting the complexity of transmission, mixing of sources, or potential health hazards.

TABLE 5

MINIMUM REQUIRED QUALIFICATIONS FOR
UTAH WATERWORKS OPERATORS

EDUCATION					EXPERIENCE Direct	
Certification Grade (Both Dist. & Treatment)	Degree	Assoc. Degree	High School	Non High School	Respon. Charge Years	Total Years
	X				2	4
		X			2	6
4			X		4	8
				X	5	10
	X				1	2
		X			1	2
3			X		2	4
				X	3	6
	X				0	2
		X			0	2
2			X		0	2
				X	0	3
	X				0	1
		X			0	1
1			X		0	1
				X	0	1

Note:

(1) Experience requirements apply to all operators except those who have been issued "grandfather" certificates.

(2) At least one half of all experience must be gained at the grade of certification desired.

TABLE 6
Minimum Certification Qualifications
For Water System Specialists

CERTIFICATION GRADE (both Distribution and Treatment)	EXPERIENCE "Hands On" Experience (Years)	Design or Associated Experience (Years)
4	8	10
3	4	8
2	2	4
1	0	0

Note:
1. All experience must be verifiable.

2. All "hands on" experience must be in the area of operation, repair, and maintenance of a public drinking water system.

3. Associated experience may be in the design, construction, and inspection of public drinking water systems and/or direct consultation for public drinking water systems.

4. The required experience, as outlined above, must be either in the "Hands On" category or in the Design or Associated category, not in combination.

5. Persons applying for and passing the specialist exam who do not meet the minimum

qualifications will be issued a restricted certificate similar to the water system operator restricted certificate.

6. Restricted Specialist Certificate shall be changed to unrestricted status upon written request of certificate holder after minimum experience qualifications have been met.

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R309. Environmental Quality, Drinking Water.

R309-302. Required Certification Rules for Backflow Technicians in the State of Utah.

R309-302-1. Objectives.

These certification rules are established in order to promote the use of trained, experienced professional personnel in protecting the public's health.

To establish standards for training, examining, and certification of those personnel involved with cross connection control program administration, testing, maintenance, and repair of backflow prevention assemblies, and the instruction of Backflow Technicians.

R309-302-2. Authority.

The Backflow Technician certification program is authorized by Utah Code Annotated, Section 26-12-5(4)(a).

R309-302-3. Extent of Coverage.

These rules shall apply to all personnel who will be:

a. directly involved with the administration or enforcement of any cross connection control program being administered by a drinking water system;

b. testing, maintaining and/or repairing any backflow prevention assembly;

c. instructors within the certification program, regardless of institution or program.

R309-302-4. Definitions.

Cross Connection Control Subcommittee - means the duly constituted advisory subcommittee appointed by the Safe Drinking Water Committee to advise the Safe Drinking Water Committee on Backflow Technician Certification and the Cross Connection Control Program of Utah. The Subcommittee will review the qualifications of applicants and make recommendations to the Safe Drinking Water Committee for certification of those individuals.

Bureau of Drinking Water/Sanitation - means that Bureau within the Department of Health which regulates public drinking water systems.

Cross Connection Control Program - means the program administered by the public water system in which cross connections are either eliminated or controlled.

Executive Secretary - means the Executive Secretary to the Utah Safe Drinking Water Committee.

Class - means the level of certification of Backflow Prevention Technician (Class I, II and III).

Public Drinking Water Supply - means a system, either publicly or privately owned, providing water for human consumption and other domestic uses which has at least 15 service connections, or regularly serves an average of at least 25 individuals daily for at least 60 days out of the year.

Renewal Course - means a course of instruction, approved by the Subcommittee, which is a prerequisite to the renewal of a Backflow Technician's Certificate.

Secretary to the Subcommittee - means that individual appointed by the Executive Secretary to conduct the business of the Subcommittee.

Utah Safe Drinking Water Committee - means the duly constituted Committee appointed by the Governor, and responsible for the promulgation, interpretation and enforcement of public drinking water regulations within Utah.

R309-302-5. General Policies.

5.1 Certification Application: Any individual may apply for certification.

5.2 Certification Classes: The classes of certificates will be: Class I, Class II, and Class III.

5.2.1 Class I - Backflow Technician: This certificate will be issued to those individuals who are directly involved in administering a cross connection control program, who have demonstrated their knowledge and ability by passing the certification examination.

These individuals may NOT test, maintain or repair any backflow prevention assembly for record (except to insure proper testing techniques are being utilized within their jurisdiction).

These individuals may conduct plan/design reviews, hazard assessment investigations, compliance inspections, and enforce local laws, codes, (including the Utah Plumbing Code as it applies to cross connection control and backflow prevention), rules and regulations and policies within their jurisdictions, and offer technical assistance as needed.

5.2.2 Class II - Backflow Technician: This certificate will be issued to those individuals who meet the criteria for Class I and in addition having proven qualified and competent to test, maintain, and/or repair (see Section 5.3.3) backflow prevention

assemblies (commercially as well as within their jurisdiction) by passing the practical examination.

5.2.3 Class III - Backflow Technician: This certificate will be issued to those individuals who meet the criteria for Class II and in addition have proven qualified and competent to instruct approved Backflow Technician Certification classes by participating in and passing an approved "Train The Trainers" course.

5.3 Certification Requirements: Those individuals seeking certification as a Backflow Technician must participate in an approved Technician's course of instruction and pass the examination required per class of certification.

5.3.1 All individuals who hold a valid Backflow Technician's license issued prior to the initiation of these rules will be issued a Class II - Backflow Technician certificate.

5.3.2 All individuals who instruct Backflow Technician training courses must hold a current Class III - Backflow Technician certificate.

5.3.3 The issuance of a Backflow Technician certificate (Class I, II or III) does NOT authorize that individual to install or replace any backflow prevention assembly. The installation replacement or repair of assemblies must be made by a licensed Journeyman Plumber (Title 58, Chapter 54, Utah Code Annotated), except when the Backflow Technician is an agent of the assembly owner.

R309-302-6. Examinations.

6.1 Exam Issuance: The examination recognized by the Subcommittee for certification will be issued through the Bureau of Drinking Water/Sanitation for both initial certification and renewals to those certified instructors teaching a course approved by the Cross Connection Control Subcommittee.

If an individual fails an examination, he may file another application for reexamination on the next available test date.

6.1.1 Examinations (both written and practical) that are used to determine competency and ability will be approved by the Cross Connection Control Subcommittee prior to being issued.

6.1.2 Oral examinations may be administered, with approval from the Cross Connection Control Subcommittee, on a case-by-case basis.

6.2 Exam Scoring: Class I, Class II and Class III Technician's must successfully complete a written exam with a score of 70% or higher. Class II Technician's must also successfully demonstrate competence and ability in the practical examination, for the testing of the Pressure Atmospheric Vacuum Breaker, Double Check Valve Assembly, and Reduced Pressure Zone Principal Backflow Prevention Assemblies.

6.2.1 The practical examination will be conducted by a minimum of two Class III Technicians.

6.2.2 Each candidate must demonstrate competence and will be evaluated by all proctors and assessed a pass or fail grade in each of the following areas.

1) Properly identify backflow assembly
2) Properly identify test equipment needed
3) Properly connect test equipment
4) Test assembly
5) Identify inaccuracies
6) Properly diagnose assembly problems
7) Properly record test results

The candidate must receive a pass grade from each proctor in all areas listed above for each assembly tested in order to pass the practical examination.

6.2.3 An individual may apply for reexamination of either portion of the examination a maximum of two times. After a third failing grade, the individual must register for and complete another technician's course prior to the reexamination.

6.3 Class III Exam: Class III Technicians must participate in, and pass, a "train the trainers" course, approved by the Cross Connection Control Subcommittee, in addition to the successful completion of the Class II Technician's certification course.

R309-302-7. Certificates.

7.1 Certificate Issuance: For a certificate to be issued, the individual must complete a Technician's training course and pass with a minimum score of 70% the written examination. For Class II and III certificates, passing marks on the practical portion of the examination will also be required.

7.2 Certificate Renewal: The Backflow Technician's certificate will expire December 31, three years from the year of issuance.

Backflow Technician certificates will be issued by the Subcommittee's Secretary, by delegated authority from the Safe Drinking Water Committee.

7.2.1 The Backflow Technician's certificate may be renewed up to six months in advance of the expiration date.

7.2.2 To renew a Technician's certificate, the Technician must register and

participate in a backflow prevention renewal course, and pass the renewal examination (minimum score of 70%) which will include a practical portion for Class II and III Certification.

7.2.3 To renew a Technician certificate that was issued prior to December 31, 1989, the Technician must register and attend a one day renewal course and pass a renewal written exam (minimum 70%) only. (There will not be a practical portion included in the renewal courses until 1992.)

7.2.4 Should the applicant fail the renewal written examination (minimum score of 70%), renewal of that existing license will not be allowed until a passing score is obtained. If the applicant fails to pass the test after three attempts, the applicant will be required to participate in an approved Backflow Technician's course before retaking the written and practical examinations. (Class I Technicians would only need to pass the written examination.)

7.3 Certification Revocation: The Subcommittee's Secretary is authorized to suspend or revoke a Backflow Technician's certification upon recommendation of the Subcommittee if, following a hearing of the Subcommittee, it is found that:

a. There is evidence that a disregard of public health and safety has occurred.

b. There is evidence that a violation of the Plumber's Law (Title 58 Chapter 54), that prohibits installation or replacement of assemblies, has occurred.

c. There is evidence that a misrepresentation or falsification of figures or reports concerning backflow prevention assembly or test results has occurred.

d. There is evidence that a failure to notify the proper authorities of a failing backflow prevention assembly within five days has occurred.

e. There is evidence that a failure to notify the proper authorities of a backflow incident for which the technician had personal knowledge has occurred.

f. There is evidence that a change of the design, material or operational characteristics of a backflow prevention assembly has occurred.

7.3.1 Suspension or revocation of a Technician's certificate will be in writing and will state the reasons for such actions and available appeal procedures. Disasters or "Acts of God", which could not be reasonably anticipated or prevented, will not be grounds for suspension or revocation actions.

7.4 Appeal Procedures: Any individual who receives a notice of suspension or revocation may, within 30 days of receipt, make a written request for an appeal to the Executive Secretary of the Safe Drinking Water Committee for a hearing before that Committee. The Committee shall follow the procedures for such a hearing as set forth in the Utah State Code.

R309-302-8. Fees.

8.1 Fees: The fees for certification will be submitted in accordance with Section 63-38-3.

All fees will be deposited in a special account to defray the costs of administering the Cross Connection Control and Certification programs.

8.2 Renewal Fees: The renewal fee for all classes of Technicians will be in accordance with Section 63-38-3.

8.3 All fees will be deposited in a special account to defray the cost of the program.

8.4 All fees are non-refundable.

R309-302-9. Training.

9.1 Training: Minimum training course curriculum, written tests and performance tests will be established by the Subcommittee and implemented by the Secretary of the Subcommittee for both the Technicians course and the renewal short course.

9.1.1 The length of the renewal course shall not exceed two days including the renewal examination (both written and "hands on").

R309-302-10. Cross Connection Control Subcommittee.

10.1 Appointment of Members: A Cross Connection Control Subcommittee will be appointed by the Safe Drinking Water Committee from nominations made by cooperating agencies.

10.2 Responsibility: The Subcommittee is charged with the responsibility of conducting all work necessary to promote the cross connection program as well as recommending qualified individuals for certification, and overseeing the maintenance of necessary records.

10.3 Representative Agencies: The Subcommittee shall consist of five members:

1. One member (nominated by the League of Cities and Towns) shall represent a community drinking water supply.

2. One member (nominated by the Utah Pipes Trades Education Program) shall represent the plumbing trade and must be a licensed Journeyman Plumber and Class II or III Backflow Technician.

3. One member (nominated by the Utah Mechanical Contractors Association) shall represent the mechanical trade contractors.

4. One member (nominated by the Safe Drinking Water Committee) shall represent the Safe Drinking Water Committee.

5. One member (nominated by the Rural Water Association of Utah) shall represent small water systems.

10.4 Term: Each member shall serve a two year term. At the initial meeting of the Subcommittee, lots will be drawn corresponding to two one and three two year terms. Thereafter, all Subcommittee members' terms will be on a staggered basis.

10.5 Nominations of Members: All nominations of Subcommittee members will be presented to the Safe Drinking Water Committee, which reserves the right to refuse any nomination.

10.6 Unexpired Term: An appointment to succeed a Subcommittee member who is unable to complete his full term shall be for the unexpired term only, and shall be nominated to, and appointed by, the Safe Drinking Water Committee in accordance with R309-302-10.1.

10.7 Quorum: At least three Subcommittee members shall be required to constitute a quorum to conduct the Subcommittee's business.

10.8 Officers: Each year the Subcommittee will elect officers as needed to conduct its business.

10.8.1 The Subcommittee shall meet at least once a year.

10.8.2 All actions taken by the Subcommittee will require a minimum of three affirmative votes.

R309-302-11. Secretary of the Subcommittee.

11.1 Appointment: The Executive Secretary of the Safe Drinking Water Committee will appoint, with the consent of the Subcommittee, a staff member to function as the Secretary to the Subcommittee. This Secretary will serve to coordinate the business of the Subcommittee and to bring issues before the Subcommittee.

11.2 Duties: The Secretary's duties will be to:

a. act as a liaison between the Subcommittee, certified Technicians, public water suppliers, and the public at large;

b. maintain records necessary to implement and enforce these rules;

c. notify sponsor agencies of Subcommittee nominations as needed;

d. coordinate and review all cross connection control programs, certification training and the certification of Backflow Technicians;

e. serve as a source of public information for Certified Technicians, water purveyors, and the public at large;

f. receive and process applications for certification;

g. investigate and verify all complaints against or concerning certified Backflow Prevention Technicians, and advise the Executive Secretary of the Safe Drinking Water Committee regarding any enforcement actions that are being recommended by the Subcommittee as outlined in Section R309-302-7.4;

h. develop and administer examinations;

i. review and correct examinations.

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R309. Environmental Quality, Drinking Water.

R309-350. Utah Drinking Water Project Loan, Credit Enhancement, Interest Buy-Down, and Hardship Grant Program: Policies and Guidelines.

R309-350-1. Statutory Authority.

The authority for the Department of Environmental Quality acting through the Drinking Water Board to issue loans to political subdivisions to finance all or part of drinking water project costs and to enter into "credit enhancement agreements", "interest buy-down agreements", and "Hardship Grants" is provided in Chapter 10b and 10c, Title 73, Utah Code Annotated 1953.

R309-350-2. Definitions and Eligibility.

A. Board means the Drinking Water Board.

B. Political Subdivision means any county, city, town, improvement district, metropolitan water district, water conservancy district, special service district, drainage district, irrigation district, separate legal or administrative entity created under the Interlocal Co-operation Act or any other entity constituting a political subdivision under the laws of Utah.

C. Drinking Water Project means any work or facility necessary or desirable to provide water for human consumption and other domestic uses which has at least fifteen service connections or serves an average of twenty-five individuals daily for at least sixty days of the year and includes collection, treatment, storage, and distribution facilities under the control of the operator and used primarily with the system and collection, pretreatment or storage facilities used primarily in connection with the system but not under such control.

D. Project Costs include the cost of acquiring and constructing any project including, without limitation: the cost of acquisition and construction of any facility or any modification, improvement, or extension of such facility; any cost incident to the acquisition of any necessary property, easement or right of way; engineering or architectural fees, legal fees, fiscal agent's and financial advisors' fees; any cost incurred for any preliminary planning to determine the economic and engineering feasibility of a proposed project; costs of economic investigations and studies, surveys, preparation of designs, plans, working drawings, specifications and the inspection and supervision of the construction of any facility; interest accruing on loans made under this program during acquisition and construction of the project; and any other cost incurred by the political subdivision, the Board or the Department of Environmental Quality, in connection with the issuance of obligation of the political subdivision to evidence any loan made to it under the law.

E. Drinking Water Project Obligation means, as appropriate, any bond, note or other obligation of a political subdivision issued to finance all or part of the cost of acquiring, constructing, expanding, upgrading or improving a drinking water project.

F. Credit Enhancement Agreement means any agreement entered into between the Board, on behalf of the State, and a political subdivision for the purpose of providing methods and assistance to political subdivisions to improve the security for and marketability of drinking water project obligations.

G. Interest Buy-Down Agreement means any agreement entered into between the Board, on behalf of the State, and a political subdivision, for the purpose of reducing the cost of financing incurred by a political subdivision on bonds issued by the subdivision for project costs.

H. Financial Assistance means a project loan, credit enhancement agreement, interest buy-down agreement or hardship grant.

I. Hardship Grant means a grant of monies to a political subdivision that meets the drinking water project loan considerations whose project is determined by the Board to not be economically feasible unless grant assistance is provided. A hardship grant may be authorized in the following forms:

1. A Planning Advance which will be required to be repaid at a later date, to help meet project costs incident to planning to determine the economic, engineering and financial feasibility of a proposed project.

2. A Design Advance which will be required to be repaid at a later date, to help meet project costs incident to design including, but not limited to, surveys, preparation of plans, working drawings, specifications, investigations and studies.

3. A Project Grant which will not be required to be repaid.

R309-350-3. Application and Project Initiation Procedures.

The following procedures must normally be followed to obtain financial assistance from the Board:

A. It is the responsibility of the applicant to obtain the necessary financial, legal

and engineering counsel to prepare an effective and appropriate financial assistance agreement, including cost effectiveness evaluations of financing methods and alternatives, for consideration by the Board.

B. A completed application form, project engineering report as appropriate, and financial capability assessment are submitted to the Board. Comments from the local health department and/or district engineer shall accompany the application. Comments from other interested parties such as an association of governments will also be accepted.

C. The staff prepares an engineering and financial feasibility report on the project for presentation to the Board.

D. The Board "Authorizes" financial assistance for the project on the basis of the feasibility report prepared by the staff, designates whether a loan, credit enhancement agreement, interest buy-down agreement, hardship grant or any combination thereof, is to be entered into, and approves the project schedule (see Section VIII). The Board shall authorize a hardship grant only if it determines that other financing alternatives are unavailable or unreasonably expensive to the applicant. If the applicant seeks financial assistance in the form of a loan of amounts in the security account established pursuant to Chapter 10c, Title 73 "Utah Code Annotated" (1953), which loan is intended to provide direct financing of projects costs, then the Board shall authorize such loan only if it determines that credit enhancement agreements, interest buy-down agreements and other financing alternatives are unavailable or unreasonably expensive to the applicant or that a loan represents the financing alternative most economically advantageous to the state and the applicant; provided, that for purposes of this paragraph and for purposes of Section 73-10c-4(2), Utah Code Annotated (1953), the term "loan" shall not include loans issued in connection with interest buy-down agreements as described in Section VI.2 hereof or in connection with any other interest buy-down arrangement.

E. Planning Advance - The applicant requesting a Planning Advance must attend a preapplication meeting, complete an application for a Planning Advance, prepare a plan of study, satisfactorily demonstrate procurement of planning services, and prepare a draft contract for planning services.

F. Design Advance - The applicant requesting a Design Advance must have completed an engineering plan which meets program requirements.

G. The project applicant must demonstrate public support for the project.

H. For financial assistance mechanisms when the applicant's bond is purchased by the Board, the project applicant's bond documentation, including an opinion from legal counsel experienced in bond matters that the drinking water project obligation is a valid and binding obligation of the applicant (see R309-350-11-C), must be submitted to the Assistant Attorney General for preliminary approval and the applicant shall publish a Notice of Intent to issue bonds in a newspaper of general circulation pursuant to the Utah Code Annotated 1953, Section 11-14-21. For financial assistance mechanisms when the applicant's bond is not purchased by the Board, the applicant shall submit a true and correct copy of an opinion from legal counsel experienced in bond matters that the drinking water project obligation is a valid and binding obligation of the applicant.

I. Hardship Grant - The Board executes a grant agreement setting forth the terms and conditions of the grant.

J. The Board issues a Plan Approval for plans and specifications and concurs in bid advertisement.

K. If a project is designated to be financed by a loan or an interest buy-down agreement as described in Section VI-2, from the Board, to cover any part of project costs an account supervised by the applicant and the Board will be established by the applicant to assure that loan funds are used only for qualified project costs. If financial assistance for the project is provided by the Board in the form of a credit enhancement or interest buy-down agreement as described in Section VI-1 all project funds will be maintained in a separate account and a quarterly report of project expenditures will be provided to the Board.

L. For a revenue bond a User Charge Ordinance must be submitted to the Board for review and approval to insure adequate provisions for debt retirement and/or operation and maintenance. For a general obligation bond, a User Charge Ordinance must be submitted to the Board for review and approval to insure the system will have adequate resources to provide acceptable service.

M. A plan of operation, for the project after construction is complete, including adequate staffing with an operator, certified at the appropriate level in accordance with R309-301 in responsible charge, training, and start up procedures to assure efficient operation and maintenance of the facilities, must be submitted by the applicant and approved by the Board.

N. The applicant's contract with its engineer must be submitted to the Board for review to determine that there will be adequate engineering involvement, including project supervision and inspection, to successfully complete the project.

O. The applicant's attorney must provide an opinion to the Board regarding legal incorporation of the applicant, valid legal title to rights-of-way and the project site,

and adequacy of bidding and contract documents.

P. A position fidelity bond must be provided for the treasurer or other local staff handling the repayment funds and revenues produced by the applicant's system.

Q. CREDIT ENHANCEMENT AGREEMENT AND INTEREST BUY-DOWN AGREEMENT ONLY - The Board issues the credit enhancement agreement or interest buy-down agreement setting forth the terms and conditions of the security or other forms of assistance provided by the agreement and notifies the applicant to sell the bonds (See Section V and Section VI).

R. CREDIT ENHANCEMENT AGREEMENT AND INTEREST BUY-DOWN AGREEMENT ONLY - The applicant sells the bonds on the open market and notifies the Board of the terms of sale. If a credit enhancement agreement is being utilized, the bonds sold on the open market shall contain the legend required by Section 73-10c-6(3)(d), Utah Code Annotated (1953). If an interest buy-down agreement is being utilized, the bonds sold on the open market shall bear a legend which makes reference to the interest buy-down agreement and states that such agreement does not constitute a pledge of or charge against the general revenues, credit or taxing powers of the state and that the holder of any such bond may look only to the applicant and the funds and revenues pledged by the applicant for the payment of interest and principal on the bonds.

S. The applicant opens bids for the project.

T. LOAN ONLY - The Board gives final approval to purchase the bonds and execute the loan contract (see Section W).

U. LOAN ONLY - The final closing of the loan is conducted.

V. A preconstruction conference shall be held.

W. The applicant issues a written notice to proceed to the contractor.

R309-350-4. Loan, Credit Enhancement, Interest Buy-Down, and Hardship Grant Consideration Policy.

A. Board Priority Determination. In determining the priority for financial assistance the Board shall consider:

1. The ability of the applicant to obtain funds for the drinking water project from other sources or to finance such project from its own resources;

2. The ability of the applicant to repay the loan or other project obligations;

3. Whether a good faith effort to secure all or part of the services needed from the private sector through privatization has been made; and

4. Whether the drinking water project:

a. meets a critical local or state need;

b. is cost effective;

c. will protect against present or potential hazards;

d. is needed to comply with the minimum standards of the Federal Safe Drinking Water Act, 42 USC, 300f, et. seq. or similar or successor statute;

e. is needed to comply with the minimum standards of the Utah Safe Drinking Water Act, Title 19, Chapter 4 or similar or successor statute.

5. The overall financial impact of the proposed project on the citizens of the community, including direct and overlapping indebtedness, tax levies, user charges, impact or connection fees, special assessments, etc., resulting from the proposed project, and anticipated operation and maintenance costs versus the median income of the community;

6. Consistency with other funding source commitments which may have been obtained for the project;

7. The point total from an evaluation of the criteria listed in Table 1;

TABLE 1

NEED FOR PROJECT

	POINTS
1. PUBLIC HEALTH AND WELFARE (SELECT ONE)	
A. There is evidence that waterborne illnesses have occurred	15
B. There are reports of illnesses which may be waterborne	10
C. No reports of waterborne illness, but high potential for such exists	5
D. No reports of possible waterborne illness and low potential for such exists	0
2. WATER QUALITY RECORD (SELECT ONE)	
A. Primary Maximum Contaminant Level (MCL) violation more than 6 times in preceding 12 months	15

B. In the past 12 months violated a primary MCL 4 to 6 times	12
C. In the past 12 months violated a primary MCL 2 to 3 times or exceeded the Secondary Drinking Water Standards by double	9
D. In the past 12 months violated MCL 1 time	6
E. Violation of the Secondary Drinking Water Standards	5
F. Does not meet all applicable MCL goals	3
G. Meets all MCLs and MCL goals	0

3. VERIFICATION OF POTENTIAL SHORTCOMINGS (SELECT ONE)

A. Has had sanitary survey within the last year	5
B. Has had sanitary survey within the last five years	3
C. Has not had sanitary survey within last five years	0

4. GENERAL CONDITIONS OF EXISTING FACILITIES (SELECT ALL THOSE WHICH ARE TRUE AND PROJECT WILL REMEDY)

A. The necessary water treatment facilities do not exist, not functioning, functioning but do not meet the requirements of the Utah Public Drinking Water Rules (UPDWR)	10
B. Sources are not developed or protected according to UPDWR	10
C. Source capacity is not adequate to meet current demands and system occasionally goes dry or suffers from low pressures	10
D. Significant areas within distribution system have inadequate fire protection	8
E. Existing storage tanks leak excessively or are structurally flawed	5
F. Pipe leak repair rate is greater than 4 leaks per 100 connections per year	2
G. Existing facilities are generally sound and meeting existing needs	0

5. ABILITY TO MEET FUTURE DEMANDS (Select One)

A. Facilities have inadequate capacity and cannot reliably meet current demands	10
B. Facilities will become inadequate within the next three years	5
C. Facilities will become inadequate within the next five to ten years	3

6. OVERALL URGENCY (Select One)

A. System is generally out of water. There is no fire protection or water for flushing toilets	10
B. System delivers water which cannot be rendered safe by boiling	10
C. System delivers water which can be rendered safe by boiling	8
D. System is occasionally out of water	5
E. Situation should be corrected, but is not urgent	0

TOTAL POSSIBLE POINTS FOR NEED FOR PROJECT	100

8. Other criteria that the Board may deem appropriate.

B. Drinking Water Board Financial Assistance Determination. The amount and type of financial assistance offered will be based on the following considerations:

1. An evaluation based upon the criteria in Tables 2 and 3 of the applicant's financial condition, the project's impact on the community, and the applicant's commitment

to operating a responsible water system.

The interest rate to be charged by the Board for its financial assistance will be computed using the number of points assigned to the project from Table 2 to reduce, in a manner determined by Board resolution from time to time, the most recent market yields for "A" rated, tax exempt, 20 year municipal revenue bonds. The interest rate so calculated will be assigned to the financial assistance. This interest rate may be further reduced, in a manner determined by Board resolution from time to time, by the ratio of the number of points assigned to the applicant's water system from Table 3 to the total points available.

For hardship grant consideration, exclusive of advances for planning and design, the estimated annual cost of drinking water service for the average residential user should exceed 1.75% of the median adjusted gross household income from the most recent available State Tax Commission records. The Board will also consider the applicant's level of contribution to the project.

TABLE 2

FINANCIAL CONSIDERATIONS

	POINTS
1. COST EFFECTIVENESS RATIO (SELECT ONE)	
A. Project cost $0 to $500 per benefitting connection	15
B. $501 to $1,500	12
C. $1,501 to $2,000	9
D. $2,001 to $3,000	6
E. $3,001 to $5,000	3
F. $5,001 to $10,000	1
G. Over $10,000	0
2. PRIVATE SECTOR OR OTHER FUNDING, BUT NOT OWN CONTRIBUTION (SELECT ONE)	
A. A reasonable search for it has been made without success	10
B. Will provide greater than 50% of project cost	10
C. Will provide 25 to 49% of project cost	8
D. Will provide 10 to 24% of project cost	5
E. Will provide 1 to 9% of project cost	3
F. Has not been investigated	0
3. CURRENT LOCAL MEDIAN ADJUSTED GROSS INCOME (AGI) (SELECT ONE)	
A. Less than 70% of State Median AGI	15
B. 71 to 90% of State Median AGI	12
C. 91 to 115% of State Median AGI	9
D. 116 to 135% of State Median AGI	6
E. 136 to 160% of State Median AGI	3
F. Greater than 161% of State Median AGI	0
4. APPLICANT'S COMMITMENT TO PROJECT	
4A. PROJECT FUNDING CONTRIBUTED BY APPLICANT (SELECT ONE)	
a. Greater than 25% of project funds	15
b. 10 to 25% of project funds	12
c. 5 to 9% of project funds	9
d. 2 to 4% of project funds	6
e. Less than 2% of project funds	0
4B. RESIDENTS ARE WILLING TO (AND IT IS CONFIRMED BY RESIDENTS) INCREASE WATER BILL BY (SELECT ONE)	
a. Greater than $10.00 per month per connection	15
b. $5.01 to $10.00 per month per connection	11
c. $2.51 to $5.00 per month per connection	7
d. $1.00 to $2.50 per month per connection	3
e. Less than $1.00 per month per connection	0
5. ABILITY TO REPAY LOAN	
5A. WATER BILL (INCLUDING TAXES) AFTER PROJECT IS BUILT RELATIVE TO LOCAL MEDIAN ADJUSTED GROSS	

INCOME (SELECT ONE)

a. Greater than 2.50% of local median AGI	15
b. 2.01 to 2.50% of local median AGI	11
c. 1.51 to 2.00% of local median AGI	7
d. 1.01 to 1.50% of local median AGI	3
e. 0 to 1.00% of local median AGI	0

5B. TOTAL DEBT LOAD (PRINCIPAL ONLY) OF APPLICANT AFTER PROJECT IS CONSTRUCTED (INCLUDING WATER AND SEWER DEBT, LIGHTING DEBT, SCHOOL DEBT, ETC.) (SELECT ONE)

a. Greater than 12% of fair market value	15
b. 8.1 to 12% of fair market value	12
c. 4.1 to 8.0% of fair market value	9
d. 2.1 to 4.0% of fair market value	6
e. 1.0 to 2.0% of fair market value	3
f. Less than 1% of fair market value	0

TOTAL POSSIBLE POINTS FOR FINANCIAL NEED 100

TABLE 3

SPECIAL INCENTIVES

	POINTS
1. Applicant has secured adequate protection zones for all existing drinking water sources	5
2. Applicant has developed a master plan to guide water system growth in the next 20 years	5
3. Applicant has an established replacement fund	5
4. Project will create a new regionalization plan or maintain integrity of existing regionalization plan	5
5. Applicant has established a backflow prevention program	5
6. Applicant has established a rate structure to encourage water conservation	5
7. Project is necessary because of unforeseen circumstances	5
8. Applicant has a written emergency response plan	5

TOTAL POSSIBLE POINTS FOR SPECIAL INCENTIVES 40

2. Optimizing return on the security account while still allowing the project to proceed.
3. Local political and economic conditions.
4. Cost effectiveness evaluation of financing alternatives.
5. Availability of funds in the security account.
6. Environmental need.
7. Other criteria the Board may deem appropriate.

R309-350-5. Planning Advance.

A. A Planning advance can only be made to a political subdivision which demonstrates a financial hardship which prevents the completion of project planning.

B. A Planning Advance is made to a political subdivision with the intent to provide interim financial assistance for project planning until the long-term project financing can be secured. Once the long-term project financing has been secured, the Planning Advance must be expeditiously repaid to the Board.

C. The applicant must demonstrate that all funds necessary to complete project planning will be available prior to commencing the planning effort. The Planning Advance will be deposited with these other funds into a supervised escrow account at the time the grant agreement between the applicant and the Board is executed.

D. Failure on the part of the recipient of a Planning Advance to implement the

construction project may authorize the Board to seek repayment of the Advance on such terms and conditions as it may determine.

E. The recipient of a Planning Advance must first receive written approval for any cost increases or changes to the scope of work.

R309-350-6. Design Advance.

A. A Design Advance can only be made to a political subdivision which demonstrates a financial hardship which prevents the completion of project design.

B. A Design Advance is made to a political subdivision with the intent to provide interim financial assistance for the completion of the project design until the long-term project financing can be secured. Once the long-term project financing has been secured, the Project Design Advance must be expeditiously repaid to the Board.

C. The applicant must demonstrate that all funds necessary to complete the project design will be available prior to commencing the design effort. The Design Advance will be deposited with these other funds into a supervised escrow account at the time the grant agreement between the applicant and the Board is executed.

D. Failure on the part of the recipient of a Design Advance to implement the construction project may authorize the Board to seek repayment of the Advance on such terms and conditions as it may determine.

E. The recipient of a Design Advance must first receive written approval for any cost increases or changes to the scope of work.

R309-350-7. Credit Enhancement Agreements.

The Board will determine whether a project may receive all or part of a loan, credit enhancement agreement or interest buy-down agreement subject to the criteria in Section IV. To provide security for project obligations the Board may agree to purchase project obligations of applicants or make loans to the applicants to prevent defaults in payments on project obligations. The Board may also consider making loans to the applicants to pay the cost of obtaining letters of credit from various financial institutions, municipal bond insurance, or other forms of insurance or security for project obligations. In addition, the Board may consider other methods and assistance to applicants to properly enhance the marketability of or security for project obligations.

R309-350-8. Interest Buy-Down Agreements.

Interest buy-down agreements may consist of:

1. A financing agreement between the Board and applicant whereby a specified sum is loaned or granted to the applicant to be placed in a trust account. The trust account shall be used exclusively to reduce the cost of financing for the project.

2. A financing agreement between the Board and the applicant whereby the proceeds of bonds purchased by the Board is combined with proceeds from publicly issued bonds to finance the project. The rate of interest on bonds purchased by the Board may carry an interest rate lower than the interest rate on the publicly issued bonds, which when blended together will provide a reduced annual debt service for the project.

3. Any other legal method of financing which reduces the annual payment amount on locally issued bonds. After credit enhancement agreements have been evaluated by the Board and it is determined that this method is not feasible or additional assistance is required, interest buy-down agreements and loans may be considered. Once the level of financial assistance required to make the project financially feasible is determined, a cost effective evaluation of interest buy-down options and loans must be completed. The financing alternative chosen should be the one most economically advantageous for the state and the applicant.

R309-350-9. Loans.

The Board may make loans to finance all or part of a drinking water project only after credit enhancement agreements and interest buy-down agreements have been evaluated and found either unavailable or unreasonably expensive. The financing alternative chosen should be the one most economically advantageous for the state and its political subdivisions.

R309-350-10. Project Authorization (Reference Section III.D).

A project may be "Authorized" for a loan, credit enhancement agreement, interest buy-down agreement, or hardship grant in writing by the Board following submission and favorable review of an application form, engineering report (if required), financial capability assessment and Staff feasibility report. The engineering report must include the preparation of a cost effective analysis of feasible project alternatives capable of meeting State and Federal drinking water requirements. It shall include consideration of monetary costs including the present worth or equivalent annual value of all capital costs, operation, maintenance, and replacement costs. The alternative selected must be the most economical means of meeting applicable State and Federal drinking water

requirements over the useful life of the facility while recognizing environmental and other nonmonetary considerations. If it is anticipated that a project will be a candidate for financial assistance from the Board, the Staff should be contacted, and the plan of study for the engineering report (if required) should be approved before the planning is initiated.

Once the application form, plan of study, engineering report, and financial capability assessment are reviewed, the staff will prepare a project feasibility report for the Board's consideration in Authorizing a project. The project feasibility report will include a detailed evaluation of the project with regard to the Board's funding priority criteria, and will contain recommendations for the type of financial assistance which may be extended (i.e., for a loan, credit enhancement agreement, interest buy-down agreement, or hardship grant).

Project Authorization is not a contractual commitment and is conditioned upon the availability of funds at the time of loan closing or signing of the credit enhancement, interest buy-down, or grant agreement and upon adherence to the project schedule approved at that time. If the project is not proceeding according to the project schedule the Board may withdraw the project Authorization so that projects which are ready to proceed can obtain necessary funding. Extensions to the project schedule may be considered by the Board, but any extension requested must be fully justified.

R309-350-11. Financial Evaluations.

A. The Board considers it a proper function to assist and give direction to project applicants in obtaining funding from such State, Federal or private financing sources as may be available to achieve the most effective utilization of resources in meeting the needs of the State. This may also include joint financing arrangements with several funding agencies to complete a total project.

B. Hardship Grants will be evidenced by a grant agreement.

C. In providing any form of financial assistance in the form of a loan, the Board may purchase bonds of the applicant only if the bonds are accompanied by a legal opinion of recognized municipal bond counsel to the effect that the bonds are legal and binding under applicable Utah law (including, if applicable, the Utah Municipal Bond Act). For bonds of $150,000 or less the Board will not require this opinion.

1. In providing any form of financial assistance in the form of a loan, the Board may purchase either a taxable or non-taxable bonds; provided that it shall be the general preference of the Board to purchase bonds issued by the applicant only if the bonds are tax exempt and are accompanied by a legal opinion of recognized municipal bond counsel to the effect that interest on the bonds is exempt from federal income taxation. Such an opinion must be obtained by the applicant in the following situations:

a. Bonds which are issued to finance a project which will also be financed in part at any time by the proceeds of other bonds which are exempt from federal income taxation.

b. Bonds which are not subject to the arbitrage rebate provisions of Section 148 of the Internal Revenue Code of 1986 (or successor provision of similar intent), including, without limitation, bonds covered by the "small governmental units" exemption contained in Section 148(f)(4)(c) of the Internal Revenue Code of 1986 (or any successor provision of similar intent) and bonds which are not subject to arbitrage rebate because the gross proceeds from the loan will be completely expended within six months after the issuance of such bonds.

2. In any other situations, the Board may purchase taxable bonds if it determines, after evaluating all relevant circumstances including the applicant's ability to pay, that the purchase of the taxable bonds is in the best interests of the State and applicant.

3. If more than 25 percent of the project is to serve industry, bond counsel must evaluate the loan to ensure the tax exempt status of the loan fund.

4. Revenue bonds purchased by the Board shall be secured by a pledge of water system revenues, and it is the general policy of the Board that the pledge of water revenues for the payment of debt service (principal and/or interest) on a particular revenue bond be on a parity with the pledge of those water revenues as security for the debt service payments on all other bonds or other forms of indebtedness which are secured by the water revenues.

D. The Board will consider the financial feasibility and cost effectiveness evaluation of the project in detail. The financial capability assessment must be completed as a basis for the review. The Board will generally use these reports to determine whether a project will be Authorized to receive a loan, credit enhancement agreement, interest buy-down agreement, or hardship grant (Reference Sections V, VI and VII). If a project is Authorized to receive a loan, the Board will establish the portion of the construction cost to be included in the loan and will set the terms for the loan. The Board will require the applicants to repay the loan as rapidly as is reasonably consistent with the financial capability of the applicant. It is the Board's intent to avoid repayment schedules which would exceed the design life of the project facilities.

E. Normal engineering and investigation costs incurred by the Department of

Environmental Quality or Board during preliminary project investigation and prior to Board Authorization will not become a charge to the applicant if the project is found infeasible, denied by the Board, or if the applicant withdraws the Application prior to the Board's Authorization. If the credit enhancement agreement or interest buy-down agreement does not involve a loan of funds from the Board, then administrative costs will not be charged to the project. However, if the project is Authorized to receive a loan or grant of funds from the Board, all costs from the beginning of the project will be charged to the project and paid by the applicant as a part of the total project cost. If the applicant decides not to build the project after the Board has Authorized the project, all costs accruing after the Authorization will be reimbursed by the applicant to the Board.

F. The Board shall determine the date on which the scheduled payments of principal and interest will be made. In fixing this date, all possible contingencies shall be considered, and the Board may allow the system user one year of actual use of the project facilities before the first repayment is required.

G. The applicant shall furnish the Board with acceptable evidence that the applicant is capable of paying its share of the construction costs during the construction period.

H. LOANS AND INTEREST BUY-DOWN AGREEMENTS ONLY - The Board may require, as part of the loan or interest buy-down agreement, that any local funds which are to be used in financing the project be committed to construction prior to or concurrent with the committal of State funds.

I. The Board will not forgive the applicant of any payment after the payment is due.

J. The Board will require a debt service reserve account be established by the applicant at or before the loan is closed. Deposits to that account shall be made at least annually in the amount of one-tenth of the annual payment on the bond(s) purchased by the Board and shall continue until the total amount in the debt service reserve fund is equal to the annual payment. The debt service reserve account shall be continued until the bond is retired. Annual reports/statements will be required. Failure to maintain the reserve account will constitute a technical default on the bond(s) and may result in penalties being assessed. Annual reports/statements will be required.

K. The Board will require a capital facilities replacement reserve account be established at or before the loan is closed. Deposits to that account shall be made at least annually in the amount of five percent (5%) of the applicant's annual drinking water system budget, including depreciation, unless otherwise specified by the Board at the time of loan authorization, until the loan is repaid. This fund shall not serve as security for the payment of principal or interest on the loan. The applicant shall adopt such resolutions as necessary to limit the use of the fund to construct capital facilities for its water system and to notify the Board prior to making any disbursements from the fund so the Board can confirm that any expenditure is for an acceptable purpose. The applicant will not need the consent of the Board prior to making any expenditure from the fund. Failure to maintain the reserve account will constitute a technical default on the bond(s) and may result in penalties being assessed. Annual reports/statements will be required.

L. If the Board is to purchase a revenue bond, the Board will require that the applicant's water rates be established such that sufficient net revenue will be raised to provide at least 125% (or such other amount as the Board may determine) of the total annual debt service.

R309-350-12. Committal of Funds and Approval of Agreements.

After the Board has approved the plans and specifications by the issuance of a Plan Approval and has received the appropriate legal documents and other items listed on the financial assistance checklist, the loan will be considered by the Board for final approval. The Board will determine whether the project loan, interest buy-down agreement or grant agreement is in proper order on the basis of the previous authorization. The Executive Secretary may then close the loan or credit enhancement agreement if obligations to the Board or other aspects of the project have not changed significantly since the Board's authorization of the loan or credit enhancement, provided all conditions imposed by the Board have been met. If significant changes have occurred the Board will then review the project and, if satisfied, the Board will then commit funds, approve the signing of the contract, credit enhancement agreement, interest buy-down agreement, or grant agreement, and instruct the Executive Secretary to submit a copy of the signed contract or agreement to the Division of Finance.

R309-350-13. Construction.

The Division of Drinking Water staff may conduct inspections and will report to the applicant. Contract change orders must be properly negotiated with the contractor and approved in writing. Change orders in excess of $10,000 must receive prior written approval by the Executive Secretary before execution. Upon successful completion of the project and recommendation of the applicant's engineer, the applicant will request the Executive Secretary to conduct a final inspection. When the project is complete to the satisfaction of the applicant's engineer, the Executive Secretary and the applicant,

written approval will be issued by the Executive Secretary to commence using the project facilities.

KEY: loans, interest buy-down, credit enhancement, hardship grant
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