~~on-site, daily implementation and supervision of the overall facility's operation commensurate with the authority conferred by the governing body.~~

~~a. Grandfathering Provision. For a facility with a current substance abuse license from LDH at the time of the promulgation of this final Rule, the current administrator may remain the administrator of the facility provided the following conditions are met.~~

~~1.a.i. - 2. ...~~

~~a. The clinical director shall be a physician holding an unrestricted license to practice medicine in Louisiana and who has the following:~~

~~i. ...~~

~~ii. if the license(s) is from another jurisdiction, the license(s) shall be documented in the employment record and shall also be unrestricted; and~~

~~iii. - iii.(b). ...~~

~~(c). an ABMS board-certified physician (non-psychiatrist) with ASAM certification and consultation with an ABPN board-certified psychiatrist. Proof of consultation shall be a current contract with a board-certified psychiatrist and written documentation of consults in the resident's medical record.~~

~~2.b. - 5.b. ...~~

~~6. Physician. The PRTF, except one that provides a social detoxification program only, shall have available a physician licensed in the state of Louisiana who shall assume 24-hour on-call medical responsibility for non-emergent physical needs of the facility's residents; the PRTF may have available, in place of the physician, a licensed advanced nurse practitioner who has a collaborative agreement with a physician or a physician's assistant who has a supervising physician and works under the licensed physician.~~

~~A.7. - B. ...~~

~~AUTHORITY NOTE: Promulgated in accordance with R.S. 36:254 and R.S. 40:2009.~~

~~HISTORICAL NOTE: Promulgated by the Department of Health and Hospitals, Bureau of Health Services Financing, LR 38:399 (February 2012), amended LR 39:2511 (September 2013), amended by the Department of Health, Bureau of Health Services Financing, LR 44:295 (February 2018).~~

~~Rebekah E. Gee MD, MPH~~
~~Secretary~~

~~1802#043~~

## RULE

## Department of Health
## Office of Public Health

Water Works Construction, Operation and Maintenance
(LAC 51:XII.Chapters 1, 2, and 3)

Under the authority of R.S. 40:4, 40:4.13, and 40:5 and in accordance with R.S. 49:950 et seq., the Administrative Procedure Act, the state health officer, acting through the Louisiana Department of Health, Office of Public Health (LDH-OPH), adopts and amends Part XII (Water Supplies) of the Louisiana State Sanitary Code (LAC 51). When effective, the amendments to Part XII will assist LDH-OPH in ensuring the continued protection of the health of the public from contaminated drinking water through enforceable construction, operation and maintenance standards that address the proper design, operation and maintenance of public water systems.

The rulemaking is authorized under Act 292 and Act 488 of the Regular Legislative Sessions, 2013 and 2014, respectively. These Louisiana standards were developed and approved by the *Louisiana Standards for Water Works Construction, Operation, and Maintenance Committee* (a.k.a., "water committee") which was initially created by Act 292 of 2013. The *Recommended Standards for Water Works, 2012 Edition* (commonly referred to as the "Ten State Standards" and published by the Great Lakes—Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers) was used as the basis of this Rule and the text therein was modified by the water committee to develop a customized state version which, in certain instances, is more applicable to the South's climatic conditions and to Louisiana, in particular. The effective date of the Rule is proposed to be postponed until August 1, 2018 for the permitting of new public water systems or the modification to existing public water systems. The bulk of the Louisiana standards are contained in the following listed Subchapters (with the general subject matter listed in the same order as in the Ten State Standards).

| | |
|---|---|
| Chapter 1. | General |
| Subchapter A. | Submission of Plans §§111-123; |
| Subchapter B. | General Design §§125-163; |
| Subchapter C. | Source Development §§165-169; |
| Subchapter D. | Treatment §§171-191; |
| Chapter 2. | Public Water System Construction, Operation and Maintenance |
| Subchapter A. | Chemical Application §§201-209; |
| Subchapter B. | Pumping Facilities §§211-223; |
| Subchapter C. | Finished Water Storage §§225-231; |
| Subchapter D. | Distribution System Piping and Appurtenances §§233-255; and |
| Subchapter F. | Waste Residuals §§257-275. |

For these reasons set forth above, Part XII (Water Supplies) of the Louisiana State Sanitary Code (LAC 51:XII) is to be amended as follows.

## Title 51
## PUBLIC HEALTH—SANITARY CODE
## Part XII. Water Supplies

### Chapter 1. General

### §101. Definitions [formerly paragraph 12:001]

A. Unless otherwise specifically provided herein, the following words and terms used in this Part of the Sanitary Code, and all other Parts which are adopted or may be adopted, are defined for the purposes thereof as follows.

* * *

*Average Daily Demand during the Month of Maximum Water Use*—the largest volume of flow anticipated to occur during a calendar month, expressed as a daily average.

* * *

*Engineer of Record*—the Louisiana licensed professional engineer responsible for the submission of plans and specifications for an installation to be permitted by the state health officer under this Part.

* * *

*Hospital*—see LAC 51:XIX.101.

* * *

*Ten State Standards*—Repealed.

* * *

AUTHORITY NOTE: Promulgated in accordance with R.S. 36:258(B), R.S. 36:254 (B)(7), R.S. 40:4.A.(8), R.S. 40:4.13.D.(1)(2) , R.S. 40:5.A. (2)(3)(5)(6)(17)(20), and R.S. 40:1148.

HISTORICAL NOTE: Promulgated by the Department of Health and Hospitals, Office of Public Health, LR 28:1318 (June 2002), amended LR 28:2513 (December 2002), LR 30:1194 (June 2004), LR 30:2326 (October 2004), LR 35:484 (March 2009), LR 35:1240 (July 2009), LR 38:2375 (September 2012), LR 38:2793 (November 2012), LR 38:3232 (December 2012), amended by the Department of Health, Office of Public Health, LR 43:84 (January 2017), LR 44:296 (February 2018), effective August 1, 2018.

### §105. Permit Requirements for a Potable Water Supply [formerly paragraph 12:002-2]

A. No public water supply shall be constructed, operated or modified to the extent that the capacity, hydraulic conditions, functioning of treatment processes, or the quality of finished water is affected, without, and except in accordance with, a permit from the state health officer.

B. …

C. Submission of plans for maintenance and replacement of existing facilities in-kind shall not be required.

D. Detailed plans and specifications for the installation for which a permit is requested shall be submitted by the Engineer of Record or the person having responsible charge of a municipally owned public water supply or by the owner of a privately owned public water supply.

E. Effective August 1, 2018, the provisions set forth under LAC 51:XII.111-191 and 201-277, together with any additional requirements of the state health officer as set forth in this Part, shall be used as the basis of the design of any new public water system or any proposed new construction or modification to an existing public water system. After a permit by the state health officer has been issued, such system/modification shall be constructed, installed and maintained in accordance with said permit.

F. Permits required by this Section and any related letters issued by the state health officer or copy of letters issued to the state health officer concerning the review of related plans and specifications, as well as the related approved plans and specifications themselves, shall be permanently retained by the owner of the public water system including any subsequent or successor owner.

AUTHORITY NOTE: Promulgated in accordance with R.S. 40:4 (A)(8), 40:4.13.D.(1)(2) and R.S. 40:5.A.(2)(3) (5)(6)(7)(17)(19).

HISTORICAL NOTE: Promulgated by the Department of Health and Hospitals, Office of Public Health, LR 28:1320 (June 2002), amended LR 38:2376 (September 2012), amended by the Department of Health, Office of Public Health, LR 44:297 (February 2018), effective August 1, 2018.

### §107. Provision for Grandfather Systems [formerly paragraph 12-002-3]

A. Permits issued and approvals of plans and specifications granted by the state health officer prior to August 1, 2018 shall remain valid as they pertain to the design of the public water supply, unless the revision of such is determined necessary by the state health officer.

B. Notwithstanding §107.A of this Part, every public water system shall undertake corrective action in accordance with §319.B and C of this Part regarding any significant deficiencies, as defined in §319.D of this Part, identified on a sanitary survey conducted by the state health officer.

C. The owner shall have the burden of proving that a public water system, and any modifications thereto or component parts thereof, was permitted by and conforms to plans and specifications approved by the state health officer.

AUTHORITY NOTE: Promulgated in accordance with R.S. 40:4 (A)(8), 40:4.13D.(1)(2) and R.S. 40:5.A.(2)(3) (5)(6)(7)(17)(19).

HISTORICAL NOTE: Promulgated by the Department of Health and Hospitals, Office of Public Health, LR 28:1320 (June 2002), amended by the Department of Health, Office of Public Health, LR 44:297 (February 2018), effective August 1, 2018.

## Subchapter A. Submission of Plans

### §111. General Requirements

A. All reports, final plans, specifications, and design criteria required by §105 of this Part shall be submitted at least 60 days prior to the date on which action by the state health officer is desired. Environmental assessments, and permits for construction, to take water, for waste discharges, for stream crossings, etc., may be required from other federal, state, or local agencies.

B. No approval for construction can be issued until final, complete, detailed plans and specifications have been submitted to the state health officer and found to be satisfactory.

C. Documents submitted for formal approval shall include but not be limited to:

1. engineer's report, where applicable;
2. summary of the design criteria;
3. operation requirements, where applicable;
4. general layout;
5. detailed plans;
6. specifications;
7. cost estimates;
8. documentation of adequate source of supply (e.g., water purchase contracts between water supplies, and/or inter-municipal agreements), where applicable;
9. evaluation of technical, managerial, and financial capacity where applicable:

a. public water systems are required by the Louisiana Department of Health, Office of Public Health (LDH-OPH) to demonstrate adequate capacity development under LAC 48:V.77, Subchapter B;

b. except as may otherwise be required under LAC 48:V.77.Subchapter B., the evaluation for existing public water systems shall include:

i. a discussion of the system's current technical capacity along with any project related changes with respect to operator certification requirements and the operator's ability to implement any system changes that may be required upon project completion;

ii. a discussion of the system's current overall management and how the system's management will be impacted by the project including but not limited to whether the system has an asset management plan and, if so, how the project components will be incorporated into that plan;

iii. a discussion of the water system's overall financial capacity along with user projected water rates including the system's outstanding obligations combined with the anticipated debt from the current project under review and the overall operation and maintenance. If applicable, the financial capacity discussion should include details of any energy efficiency components included as part of the project along with the estimated long term cost and energy savings associated with them; and

iv. other additional information as required by the state health officer.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:297 (February 2018), effective August 1, 2018.

### §113. Engineer's Report

A. The engineer's report for water supply system improvements shall, where applicable, present the following information.

1. General information, including:

a. description of the existing water works and sewerage facilities;

b. identification of the municipality or area served;

c. name and mailing address of the owner or official custodian; and

d. imprint of professional engineer's seal or conformance with engineering registration requirements of the Louisiana Professional Engineering and Land Surveying Board.

2. Extent of water supply system, including:

a. description of the nature and extent of the area to be served;

b. provisions for extending the water supply system to include additional areas;

c. appraisal of the future requirements for service, including existing and potential industrial, commercial, institutional, and other water supply needs.

3. Justification of the Project. Where two or more solutions exist for providing public water system facilities, each of which is feasible and practicable, discuss the alternatives. Give reasons for selecting the one recommended, including financial considerations, operational requirements, operator qualifications, reliability, and water quality considerations.

4. Soil, groundwater conditions, and foundation problems, including a description of:

a. the character of the soil through which water mains are to be laid;

b. foundation conditions prevailing at sites of proposed structures;

c. the approximate elevation of ground water in relation to subsurface structures.

5. Water use data, including:

a. a description of the population trends as indicated by available records, and the estimated population which will be served by the proposed water supply system or expanded system 20 years in the future in 5 year intervals or over the useful life of critical structures and/or equipment;

b. present water consumption and the projected average and maximum daily demands, including fire flow demand (Subchapter C);

c. present and/or estimated yield of the sources of supply;

d. unusual occurrences;

e. current percent of unaccounted water for the system and the estimated reduction of unaccounted for water after project completion if applicable, i.e., project is to replace aged water mains, leaking storage, or other improvements that will result in reduced water loss.

6. Flow requirements, including:

a. hydraulic analyses based on flow demands and pressure requirements (see §237.A)

b. fire flows, when fire protection is provided, meeting the recommendations of the Insurance Services Office or other similar agency for the service area involved.

7. Description of the proposed source or sources of water supply to be developed, the reasons for their selection, and provide information as follows:

a. Surface water sources, including:

i. hydrological data, stream flow and weather records;

ii. safe yield, including all factors that may affect it;

iii. maximum flood flow, together with approval for safety features of the spillway and dam from the state health officer;

iv. description of the watershed, noting any existing or potential sources of contamination (such as highways, railroads, chemical facilities, land/water use activities, etc.) which may affect water quality;

v. summarized quality of the raw water with special reference to fluctuations in quality, changing meteorological conditions, etc.

vi. source water protection issues or measures, including erosion and siltation control structures that need to be considered or implemented.

b. Groundwater sources, including:

i. sites considered;

ii. advantages of the site selected;

iii. elevations with respect to surroundings;

iv. probable character of formations through which the source is to be developed;

v. geologic conditions affecting the site, such as anticipated interference between proposed and existing wells;

vi. summary of source exploration, test well depth, and method of construction; placement of liners or screen; test pumping rates and their duration; water levels and specific yield; water quality;

viii. sources of possible contamination such as sewers and sewage treatment/disposal facilities, highways, railroads, landfills, outcroppings of consolidated water-bearing formations, chemical facilities, waste disposal wells, agricultural uses, etc.;

ix. wellhead protection measures being considered (see §169 of this Part).

8. Proposed treatment processes, including:

a. a summary establishing the adequacy of proposed processes and unit parameters for the treatment of the specific water under consideration. Bench scale test, pilot studies, or demonstrations may be required to establish adequacy for some water quality standards.

b. Alternative methods of water treatment and chemical use should be considered as a means of reducing waste handling and disposal problems.

9. Sewerage System Available. Describe the existing sewerage system and sewage treatment works, with special reference to their relationship to existing or proposed water supply system structures which may affect the operation of the water supply system, or which may affect the quality of the supply.

10. Waste disposal, including:

a. Discuss the various wastes from the water treatment plant, their volume, proposed treatment and points of discharge.

b. If discharging to a sanitary sewerage system, verify that the system, including any lift stations, is capable of handling the flow to the sewage treatment works and that the treatment works is capable and will accept the additional loading.

11. Automation, including:

a. supporting data justifying automatic equipment, including the servicing and operator training to be provided.

b. Manual override must be provided for any automatic controls.

c. Highly sophisticated automation may put proper maintenance beyond the capability of the plant operator, leading to equipment breakdowns or expensive servicing. Adequate funding shall be assured for maintenance of automatic equipment.

12. Project sites, including:

a. discussion of the various sites considered and advantages of the recommended ones;

b. the proximity of residences, industries, and other establishments;

c. any potential sources of pollution that may influence the quality of the supply or interfere with effective operation of the water supply system, such as sewage absorption systems, septic tanks, privies, cesspools, sink holes, sanitary landfills, refuse and garbage dumps, etc.

13. Financing, including:

a. estimated cost of integral parts of the system, broken down by dollar amount or percentages for source development, storage, distribution mains, pumping, transmission mains, treatment, and planning (including all soft costs);

b. detailed estimated annual cost of operation;

c. proposed methods to finance both capital charges and operating expenses.

d. Summarize planning for future needs and services.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:298 (February 2018), effective August 1, 2018.

### §115. Plans

A. Plans for water supply system improvements shall, where applicable, provide the following:

1. general layout, including:

a. suitable title;

b. name of municipality, or other entity or person responsible for the water supply;

c. area or institution to be served;

d. scale;

e. north point;

f. datum used;

g. boundaries of the municipality or area to be served;

h. seal, signature and date of the Louisiana licensed professional engineer or in conformance with engineering registration requirements of the Louisiana Professional Engineering and Land Surveying Board;

i. imprint of professional engineer's seal or in conformance with engineering registration requirements of the Louisiana Professional Engineering and Land Surveying Board;

j. legible prints suitable for reproduction;

k. location and size of existing water mains;

l. location and nature of existing water supply structures and appurtenances affecting the proposed improvements, noted on one sheet, if possible;

2. detailed plans, including:

a. stream crossings, providing profiles with elevations of the stream bed and the normal and extreme high and low water levels except where submarine crossings are to be installed by means of directional drilling then the extreme high water level may be omitted;

b. profiles having a horizontal scale of not more than 100 feet to the inch and a vertical scale of not more than 10 feet to the inch, with both scales clearly indicated;

c. location and size of the property to be used for the groundwater development with respect to known references such as roads, streams, section lines, or streets;

d. topography and arrangement of present or planned wells or structures, with contour intervals not greater than two feet;

e. elevations of the highest known flood level, floor of the structure, upper terminal of protective casings and outside surrounding grade, using United States Coast and Geodetic Survey, United States Geological Survey or equivalent elevations where applicable as reference;

f. plat and profile drawings of well construction, showing diameter and depth of drill holes, casing and liner diameters and depths, grouting depths, elevations and other details to describe the proposed well completely. Upon completion submit record drawings reflecting geologic formations and water levels;

g. location of all existing and potential sources of pollution which may affect the water source or, underground treated water storage facilities;

h. size, length, and materials of proposed water mains;

i. location of existing or proposed streets; water sources, ponds, lakes, and drains; storm, sanitary, combined and house sewers; septic tanks, disposal fields and cesspools;

j. schematic flow diagrams and hydraulic profiles showing the flow through various plant units;

k. piping in sufficient detail to show flow through the plant, including waste lines;

l. locations of all chemical storage areas, feeding equipment and points of chemical application (see Subchapter A of Chapter 2 of this Part);

m. all appurtenances, specific structures, equipment, water treatment plant waste disposal units and points of discharge having any relationship to the plans for water mains and/or water supply structures;

n. locations of sanitary or other facilities, such as lavatories, showers, toilets, and lockers, when applicable or required by the state health officer;

o. locations, dimensions, and elevations of all proposed plant facilities;

p. locations of all sampling taps;

q. adequate description of any features not otherwise covered by the specifications.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:299 (February 2018), effective August 1, 2018.

### §117. Specifications

A. Complete, detailed technical specifications for those applicable sanitary components shall be supplied for the proposed project, including:

1. a program for keeping existing water supply facilities in operation during construction of additional facilities so as to minimize interruption of service;
2. laboratory facilities and equipment, including the capacity to perform laboratory analyses of required tests;
3. the number and design of chemical feeding equipment (see §201 and §203 of this Part);
4. procedures for flushing, disinfection and testing, as needed, prior to placing the project in service;
5. materials or proprietary equipment for sanitary or other facilities including any necessary backflow or back-siphonage protection.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:300 (February 2018), effective August 1, 2018.

### §119. Design Criteria

A. A summary of complete design criteria for those applicable sanitary components shall be submitted for the proposed project.

B. The summary shall contain but shall not be limited to the following:

1. long-term dependable yield of the source of supply;
2. reservoir surface area, volume, and a volume-versus-depth curve, if applicable;
3. area of watershed, if applicable;
4. estimated average and maximum day water demands for the design period;
5. number of proposed services;
6. fire fighting requirements;
7. flash mix, flocculation and settling basin capacities;
8. retention times;
9. unit loadings;
10. filter area and the proposed filtration rate;
11. backwash rate;
12. chemical feeder capacities and ranges;
13. minimum and maximum chemical application rates.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:300 (February 2018), effective August 1, 2018.

### §121. Revisions to Approved Plans

A. Any substantial deviations from approved plans or specifications must be approved by the state health officer before such changes are made.

B. Substantial deviations include, but are not limited to deviations in:

1. capacity;
2. hydraulic conditions; and
3. operating units; the functioning of water treatment processes, or the quality of water to be delivered.

C. Revised plans or specifications should be submitted in time to permit the review and approval of such plans or specifications before any construction work, which will be affected by such changes, is begun.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:300 (February 2018), effective August 1, 2018.

### §123. Additional Information Required

A. The state health officer may require additional information which is not part of the construction drawings, such as head loss calculations, proprietary technical data, copies of deeds, copies of contracts, etc.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:300 (February 2018), effective August 1, 2018.

## Subchapter B. General Design

### §125. Design Basis

A. The system including the water source and treatment facilities shall be designed for average daily flow of the maximum month.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:300 (February 2018), effective August 1, 2018.

### §127. Plant Layout

A. Plant layout, at a minimum, shall consider the following:

1. functional aspects of the plant layout;
2. provisions for future plant expansion;
3. provisions for expansion of the plant waste treatment and disposal facilities;
4. access roads;
5. site grading;
6. site drainage;
7. walks;
8. driveways; and
9. chemical delivery.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:300 (February 2018), effective August 1, 2018.

### §129. Building Layout

A. Building layout shall be designed to provide for:

1. adequate ventilation;
2. adequate lighting;
3. adequate heating;
4. adequate drainage;
5. dehumidification equipment, if necessary;
6. accessibility of equipment for operation, servicing, and removal;
7. flexibility of operation;
8. operator safety;
9. convenience of operation; and
10. if rooms are used for chemical storage and feed equipment use of a separate room to reduce hazards and dust problems.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:301 (February 2018), effective August 1, 2018.

### §131. Location of Structures

A. The appropriate regulating authority must be consulted regarding any structure which is so located that normal or flood stream flows may be impeded.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:301 (February 2018), effective August 1, 2018.

### §133. Electrical and Controls

A. Electrical equipment, electrical instrumentation and controls shall be located above grade, in areas not subject to flooding or protected from damage due to water inundation.

B. The design of all electrical work for new facilities or modifications to existing facilities shall conform to the applicable requirements of the State Uniform Construction Code, LAC 17:I and any other applicable local code(s) which may have stricter requirements.

C. Existing electrical equipment, electrical instrumentation and controls at facilities may remain provided they do not create an unsafe condition and do not reduce the reliability of the equipment or cause failure to system components.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:301 (February 2018), effective August 1, 2018.

### §135. Standby Power

A. Dedicated standby power shall be provided by any community water supply and any non-community water supply serving a hospital so that water can be treated and/or pumped to the distribution system during power outages to meet the average daily demand during the month of maximum water use.

B. Carbon monoxide detectors should be installed where fuel-fired generators are housed.

C. Alternatives to dedicated standby power may be considered by the state health officer with proper justification.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:301 (February 2018), effective August 1, 2018.

### §137. Laboratory Facilities

A. Each public water system shall have equipment and facilities or contracted services for the routine daily laboratory testing necessary to ensure the proper operation of the water supply system.

B. Laboratory equipment selection shall be based on:

1. the characteristics of the raw water source;
2. the complexity of the treatment process involved;
3. the contaminants or analytes for which monitoring is required or desired; and
4. the particular laboratory methodology and minimum accuracy to be performed for such contaminants or analytes.

C. Laboratory test kits which simplify procedures for making one or more tests may be acceptable.

D. An operator or chemist qualified to perform the necessary laboratory tests shall be required.

E. Other than those analytes allowed to be analyzed in a LDH-OPH Approved Chemical Laboratory/Drinking Water (see Chapter 15 of this Part), analyses conducted to determine compliance with drinking water regulations shall be performed in a LDH-OPH certified or a U. S. Environmental Protection Agency (EPA) certified laboratory in accordance with the requirements of this Part.

F. Persons designing and equipping laboratory facilities shall confer with the state health officer before beginning the preparation of plans or the purchase of equipment. Methods for verifying adequate quality assurances and for routine calibration of equipment shall be provided.

G. Testing Equipment. As a minimum, the following laboratory equipment shall be provided.

1. Surface water systems or groundwater under the direct influence of surface water (GWUDISW) systems shall have a nephelometric turbidimeter meeting the requirements of the approved turbidity methods in Chapter 11 of this Part.
2. Each surface water treatment plant or GWUDISW plant utilizing flocculation and sedimentation, including those which lime soften, shall have a pH meter, jar test equipment, and titration equipment for both hardness and alkalinity.
3. Each ion-exchange softening plant, and lime softening plant treating only groundwater shall have a pH meter and titration equipment for both hardness and alkalinity.
4. Each iron and/or manganese removal plant shall have test equipment capable of accurately measuring iron to a minimum of 0.1 milligrams per liter, and/or test equipment capable of accurately measuring manganese to a minimum of 0.05 milligrams per liter.
5. Public water systems which chlorinate shall have test equipment for determining both free and total chlorine residual by the applicable methods listed in Table 1 of §1105.C of this Part.

6. If a public water system adjusts its fluoride level, equipment shall be provided for measuring the quantity of fluoride in the water. Such equipment shall be subject to the approval of the state health officer.

7. Public water systems which feed poly and/or orthophosphates shall have test equipment capable of accurately measuring phosphates from 0.1 to 20 milligrams per liter or to 0.1 to 1.2 times the target dose whichever is less.

8. Public water systems that use chlorine dioxide shall have test equipment for determining both chlorine dioxide and chlorite residual by the applicable methods listed in Chapters 11 and 13 of this Part.

9. Surface water systems, GWUDISW systems, and any groundwater system required to or choosing to achieve a minimum CT value [residual disinfectant concentration ("C") times the contact time ("T") when the pipe, vessel, etc., is in operation] at or before the first customer shall have a method of measuring water temperature using a thermometer or thermocouple with a minimum accuracy of plus or minus 0.5 degrees Celsius (0.5°C).

H. Physical Facilities. Where laboratory facilities are provided each public water system shall provide:

1. sufficient bench space;
2. adequate ventilation;
3. adequate lighting;
4. storage room;
5. laboratory sink; and
6. auxiliary facilities (e.g., restroom facilities available on-site of the in-house lab for the operator, analyst, or chemist running the lab tests; special fire-proof cabinets for storing volatile reagents as may be required by the state fire marshal; special ventilation hoods as may be required by OSHA over the work area; refrigerator; Bunsen burner, stirrers; etc.);
7. air conditioning as deemed necessary.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:301 (February 2018), effective August 1, 2018.

### §139. Monitoring Equipment

A. Water treatment plants shall be provided with equipment (including recorders, where applicable) to monitor the water as follows.

1. Plants treating ground water using iron removal and/or ion exchange softening shall have the capability to monitor and record free chlorine residual.

2. Ion exchange plants for nitrate removal shall continuously monitor and record the treated water nitrate level.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:302 (February 2018), effective August 1, 2018.

### §141. Sample Taps

A. Sampling facilities shall be provided so that water samples can be obtained from each water source and from appropriate locations in each unit operation of treatment, and from the finished water.

B. Taps shall be consistent with sampling needs and shall not be of the petcock type.

C. Taps used for obtaining samples for bacteriological analysis:

1. shall be: of the smooth-nosed type without interior or exterior threads:
2. shall not be of the mixing type; and
3. shall not have a screen, aerator, or other such appurtenance.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:302 (February 2018), effective August 1, 2018.

### §143. Facility Water Supply

A. The water treatment plant's service connection line and the finished water sample tap line shall both be supplied from a source of finished water at a point where all chemicals have been thoroughly mixed, and the required disinfectant contact time has been achieved (see §179.C of this Part).

B. In some cases the take off point of the water treatment plant's own service connection line and the finished water sample tap line may be downstream of the plant itself but at or before the first customer.

C. There shall be no cross-connections between the water treatment plant's service connection line or the finished water sample tap line and any piping, troughs, tanks, or other treatment units containing wastewater, treatment chemicals, raw or partially treated water.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:302 (February 2018), effective August 1, 2018.

### §145. Wall Castings

A. Consideration shall be given to providing extra wall castings built into the structure to facilitate future uses whenever pipes pass through walls of concrete structures.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:302 (February 2018), effective August 1, 2018.

### §147. Meters

A. All public water systems shall have an acceptable means of measuring the flow from: each source, the washwater, the recycled water and any blended water of different quality, and the finished water.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:302 (February 2018), effective August 1, 2018.

### §149. Piping Color Code

A. Except for those systems that comply with Louisiana Revised Statute 40:4.12, a water supply system shall utilize the color scheme provided in Table 149.B below to facilitate the identification of above ground piping in treatment plants and pumping stations.

| Table 149.B Piping Color Code | |
|---|---|
| **Water Lines** | |
| Raw or Recycle | Olive Green |
| Settled or Clarified | Aqua |
| Finished or Potable | Dark Blue |
| **Chemical Lines** | |
| Alum or Primary Coagulent | Orange |
| Ammonia | White |
| Carbon Slurry | Black |
| Caustic | Yellow with Green Band |
| Chlorine (Gas or Solution) | Yellow |
| Chlorine Dioxide | Yellow with Violet Band |
| Fluoride | Light Blue with Red Band |
| Lime Slurry | Light Green |
| Ozone | Yellow with Orange Band |
| Phosphate Compounds | Light Green with Red Band |
| Polymers or Coagulant Aids | Orange with Green Band |
| Potassium Permanganate | Violet |
| Soda Ash | Light Green with Orange Band |
| Sulfuric Acid | Yellow with Red Band |
| Sulfur Dioxide | Light Green with Yellow Band |
| **Waste Lines** | |
| Backwash Waste | Light Brown |
| Sludge | Dark Brown |
| Sewer (Sanitary or Other) | Dark Gray |
| **Other** | |
| Compressed Air | Dark Green |
| Gas | Red |
| Reclaimed Water | Purple |
| Other liquids | Light Gray with a label |

B. Any nonpotable water lines considered as plumbing (e.g., piping and outlets conveying nonpotable water within an office building, restroom, or other structure normally served by finished, potable water) and located on the water supply system's property is required to be identified in accordance with the State Uniform Construction Code, LAC 17:I.

C. In lieu of the color coding of pipes as described above, all pipes may be painted similar colors as long as each and every pipe is banded and labeled at 5 foot intervals with the name of the liquid or gas clearly displayed on the pipe. Arrows indicating the direction of flow should be included in this labeling or utilize other methods approved by the state health officer.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:302 (February 2018), effective August 1, 2018.

### §151. Disinfection

A. Water from new systems, or from any new part(s) of existing systems shall not be furnished for consumer's use until all wells, pipes, tanks, and equipment which can convey or store potable water are disinfected in accordance with AWWA procedures as required in §§169, 225, and 245 of this Part.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:303 (February 2018), effective August 1, 2018.

### §153. Operation and Maintenance Manual

A. An operation and maintenance manual shall be supplied to the water supply system as part of any proprietary unit installed in the facility.

B. The manual shall provide:

1. a parts list;
2. a parts order form,
3. operator safety procedures; and
4. an operational trouble-shooting section.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:303 (February 2018), effective August 1, 2018.

### §155. Operator Instruction

A. Provisions shall be made for operator instruction at the start-up of a plant or pumping station.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:303 (February 2018), effective August 1, 2018.

### §157. Safety

A. Consideration shall be given to the safety of water plant personnel and visitors.

B. The design shall comply with all applicable safety codes and regulations that include, but are not limited to, the codes adopted under the authority of Act 12 of the 2005 First Extraordinary Session, State Fire Marshal regulations (see LAC 55:V), National Fire Protection Association (NFPA) standards, and federal Occupational Health and Safety Administration (OSHA) standards.

C. Items to be considered include, but are not limited to, noise arresters, noise protection, confined space entry, protective equipment and clothing, gas masks, safety showers and eye washes, handrails and guards, warning signs, smoke detectors, toxic gas detectors and fire extinguishers.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:303 (February 2018), effective August 1, 2018.

### §159. Security

A. Security measures including but not limited to the requirements of §§315.A and 327.A.13 of this Part, shall be installed and instituted.

B. Design measures to help ensure the security of water system facilities shall be incorporated and, as a minimum, shall include a means to lock all exterior doorways, windows, gates and other entrances to source, production, treatment, pumping and water storage facilities.

C. Other measures may include signage, closed circuit monitoring, real-time water quality monitoring, and intrusion alarms, as well as safety measures to prevent tampering with any electronic, computer or other automated system which may operate or assist in the operation of the water supply system.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:303 (February 2018), effective August 1, 2018.

### §161. Flood Protection

A. Other than surface water intakes, all critical water supply facilities shall be protected to at least the 100-year flood elevation.

B. The water supply system shall provide high water vehicles, boats, or other acceptable means and methods to be able to access, safely operate, and maintain its critical water supply facilities during floods or other high water events.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:304 (February 2018), effective August 1, 2018.

### §163. Design; Other Considerations

A. Consideration shall be given to the design requirements of other federal, state, and local regulatory agencies for items including, but not limited to:

1. energy efficiency;
2. water conservation;
3. environmental impact;
4. safety requirements;
5. special designs for the handicapped;
6. plumbing and electrical codes; and
7. construction in the flood plain.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:304 (February 2018), effective August 1, 2018.

## Subchapter C. Source Development

### §165. General Requirements

A. In selecting the source of water supply to be developed, the designing engineer shall prove to the satisfaction of the state health officer and other applicable reviewing authorities that an acceptable source having an adequate quantity of water will be available, and that the water which is to be delivered to the consumers shall be adequately treated, when necessary or required, to meet the current requirements of the state health officer with respect to microbiological, physical, chemical and radiological qualities.

B. Each water supply system should take its raw water from the best available source which is economically reasonable and technically possible.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:304 (February 2018), effective August 1, 2018.

### §167. Surface Water

A. A source water protection plan enacted for continued protection of the watershed from potential sources of contamination shall be provided as determined by the state health officer. Surface water includes sources of water supply such as, but not limited to:

1. all streams;
2. tributary streams;
3. drainage basins,
4. natural and man-made ponds and lakes; and
5. artificial reservoirs or impoundments.

B. Surface Water Quantity. The quantity of water at the source shall be adequate to meet the maximum projected water demand of the service area as shown by calculations based on a 1 in 50 year drought or the extreme drought of record, and should include consideration of multiple year droughts. Requirements for minimum flows downstream of the intake shall:

1. comply with requirements of the appropriate reviewing authority/authorities;
2. provide a reasonable surplus for anticipated growth;
3. be adequate to compensate for all losses such as silting, evaporation, seepage, etc; and
4. be adequate to provide ample water for other legal users of the source.

C. Surface Water Quality. A study shall be made of the factors, both natural and man-made, which may affect water quality in the water supply stream, river, lake or reservoir and shall include, but not be limited to:

1. determining possible future uses of impoundments or reservoirs;
2. determining degree of control of watershed by owner;
3. assessing degree of hazard to the supply posed by agricultural, domestic, industrial, or recreational activities in the watershed, which may generate toxic or harmful substances detrimental to treatment processes;
4. assessing all waste discharges (point source and non-point sources) and activities that could impact the water supply. The location of each waste discharge shall be shown on a scale map;
5. obtaining samples over a sufficient period of time to assess the microbiological, physical, chemical and radiological characteristics of the water;
6. assessing the capability of the proposed treatment process to reduce contaminants to applicable standards; and
7. consideration of currents, wind and ice conditions, salt water wedges/intrusion and the effect of confluencing streams.

D. Structures. Structures shall be designed in accordance with the following requirements.

1. The design of intake structures shall provide for:
   a. withdrawal of water from more than one level if quality varies with depth, as determined by the state health officer;
   b. separate facilities for release of less desirable water held in storage;
   c. inspection of manholes every 1000 feet for pipe sizes large enough to permit visual inspection;
   d. occasional cleaning of the inlet line;
   e. adequate protection against rupture by dragging anchors, ice, etc.;
   f. ports located above the bottom of the stream, lake or impoundment, but at sufficient depth to be kept submerged at low water levels;
   g. where shore wells are not provided, a diversion device capable of keeping large quantities of fish or debris from entering an intake structure; and

h. when buried surface water collectors are used, sufficient intake opening area must be provided to minimize inlet headloss. Particular attention should be given to the selection of backfill material in relation to the collector pipe slot size and gradation of the native material over the collector system.

2. Raw water pumping wells shall:

a. have motors and electrical controls located above grade, and protected from flooding as required by the state health officer;

b. be accessible;

c. be designed against flotation;

d. be equipped with removable or traveling screens before the pump suction well;

e. provide for introduction of chlorine or other chemicals in the raw water transmission main if necessary for quality control;

f. have intake valves and provisions for backflushing or cleaning by a mechanical device and testing for leaks, where practical;

g. have provisions for withstanding surges where necessary; and

h. be constructed in a manner to prevent intrusion of contaminants.

3. Off Stream Raw Water Storage Reservoirs. An off-stream raw water storage reservoir is a facility into which water is pumped during periods of good quality and high stream flow for future release to treatment facilities. The off-stream raw water storage reservoirs shall be constructed to assure that:

a. water quality is protected by controlling runoff into the reservoir;

b. dikes are structurally sound and protected against wave action and erosion;

c. intake structures and devices meet requirements of §167.D.1;

d. point of influent flow is separated from the point of withdrawal;

e. separate pipes are provided for influent to and effluent from the reservoir; and

f. a bypass line is provided around the reservoir to allow direct pumping to the treatment facilities.

E. Nuisance Plant or Animal. If it is determined that chemical treatment is warranted for the control of nuisance plants or animals treatment shall be in accordance with Subchapter D of Chapter 1 of this Part and shall be acceptable to the state commissioner of agriculture and the state health officer. In addition, the following requirements shall be met.

1. Chemical treatment shall be in accordance with the manufacturer's label and application instructions, the Louisiana Pesticide Law (R.S. 3:3201, et seq.) and its implementing rules and regulations [see LAC Title 7 (Agriculture and Animals), Part XXIII (Pesticides) including, but not limited to, Chapter 31 (Water Protection)], LAC Title 51 (Public Health—Sanitary Code) Part XII (Water Supplies).

2. Chemical treatment shall be performed in such a manner as to prevent a USEPA (or state-equivalent) maximum contaminant level of a primary drinking water contaminant to be exceeded in finished drinking water.

3. Any analyses of finished drinking water to confirm whether or not a USEPA (or state-equivalent) maximum contaminant level of a primary drinking water contaminant has been exceeded shall only be acceptable if the water sample is collected, transported and stored in accordance with USEPA-approved methods [see 40 CFR Part 136.3, Table II] and then analyzed by a LDH - Certified Chemical Laboratory/Drinking Water.

4. In all cases involving a pesticide application for nuisance plant or animal control, when the water being treated is a source of water supply, the final determination of the safety of finished drinking water shall be made exclusively by the state health officer

a. Facility safety items, including but not limited to ventilation, operator protective equipment, eyewashes/showers, cross connection control, etc. shall be provided;

b. Solution piping and diffusers shall be installed within the intake pipe or in a suitable carrier pipe.

c. Provisions shall be made to prevent dispersal of chemical into the water environment outside the intake. Diffusers shall be located and designed to protect all intake structure components;

d. A spare solution line should be installed to provide redundancy and to facilitate the use of alternate chemicals;

e. The chemical feeder shall be interlocked with plant system controls to shut down automatically when the raw water flow stops;

f. when alternative control methods are proposed for nuisance plant and animal control, appropriate piloting or demonstration studies, satisfactory to the state health officer, may be required.

F. Impoundments and Reservoirs. Site preparation of impoundments and reservoirs shall provide where applicable:

1. removal of brush and trees to high water elevation;

2. protection from floods during construction;

3. abandonment of all wells which will be inundated, in accordance with requirements of the Department of Natural Resources, Office of Conservation, and the state health officer.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:304 (February 2018), effective August 1, 2018.

**§169. Groundwater**

A. A groundwater source includes all water obtained from:

1. dug;
2. drilled;
3. bored or driven wells;
4. springs; and
5. infiltration lines.

B. Groundwater quantity shall conform to the following standards.

1. Source capacity. The total developed groundwater source capacity, unless otherwise specified by the state health officer, shall equal or exceed the design maximum day demand with the largest producing well out of service.

2. Number of sources. When groundwater is the only source of water supply for any community water supply or for any non-community water supply serving a hospital, a minimum of two approved and active groundwater wells (or, if not a second well, connection to another approved water supply of sufficient capacity) shall be provided, unless otherwise specified by the state health officer.

a. Each of these two groundwater wells (or, if not a second well, connection to another approved water supply of sufficient capacity) shall be maintained and regularly operated to ensure that each one can immediately supply safe drinking water into the system when the other fails.

b. Consideration should be given to locating redundant sources in different aquifers or different locations of an aquifer.

3. Standby power. To ensure continuous service provided by any community water supply and any non-community water supply serving a hospital when the primary power has been interrupted, a standby power supply shall be provided through a dedicated portable or in-place auxiliary power of adequate supply and connectivity. When automatic pre-lubrication of pump bearings is necessary, and an auxiliary power supply is provided, design shall assure that the pre-lubrication is provided when auxiliary power is in use.

C. Groundwater Quality shall conform to the following standards.

1. An assessment should be made of the factors, both natural and man-made, which may affect water quality in the well and aquifer. Such an assessment may include, obtaining samples over a sufficient period of time to assess the microbiological and physical characteristics of the water including dissolved gases, chemical, and radiological characteristics.

2. Unless LDH-OPH's exclusion criteria are met, a ground water under the direct influence of surface water (GWUDISW) determination acceptable to the state health officer shall be provided for all new wells.

a. Part of this determination shall include the proper submission of one or more 1 micron filters through which at least 500 gallons of produced groundwater being tested have passed at a regulated flow rate over a period of no more than a 24 hours.

b. Such filters shall be refrigerated, as appropriate, and delivered to a laboratory for the identification of insects or other macroorganisms, algae, rotifers and large diameter pathogens such as Giardia or Cryptosporidium [see USEPA's "Consensus Method for Determining Groundwaters under the Direct Influence of Surface Water Using Microscopic Particulate Analysis (MPA)"].

c. The laboratory utilized shall be recognized by the USEPA for such work and it shall identify such macroorganisms found on the filter and, in the case of Giardia or Cryptosporidium, whether any observed specimens were alive or dead.

d. In addition, the laboratory report shall indicate the overall risk as being either a low, medium, or high occurrence of such macroorganisms.

e. This information, in combination, with other factors mentioned under the definition of GWUDISW contained in Chapter 11 of this Part, shall be used by the state health officer in determining whether or not a new well will be deemed as a GWUDISW source.

3. Microbiological quality. After disinfection of each new, modified or reconditioned groundwater source, one or more water samples shall be submitted to a LDH-OPH-certified drinking water laboratory for microbiological analysis with satisfactory results reported to the state health officer prior to placing the well into service.

4. Physical, chemical and radiological characteristics. Every new, modified or reconditioned groundwater source shall be examined for applicable physical, chemical and radiological characteristics as required by the state health officer by tests of representative samples in a LDH-OPH certified drinking water laboratory, with results reported to the state health officer.

a. Samples shall be collected and analyzed at the conclusion of the test pumping procedure.

b. Field determinations of physical and chemical constituents or special sampling procedures may be required by the state health officer.

D. Groundwater location shall conform to the following requirements.

1. Well location. The state health officer shall be consulted prior to design and construction regarding proposed well location as it relates to required separation between existing and potential sources of contamination and groundwater development.

a. All ground water sources of water supply shall comply with the following requirements.

i. The ground surface within a safe horizontal distance of the source in all directions shall not be subject to flooding (as defined in Footnote 4 of a.ii below) and shall be so graded and drained as to facilitate the rapid removal of surface water. This horizontal distance shall in no case be less than 10 feet for potable water supplies.

ii. Every potable water well, and the immediate appurtenances thereto that comprise the well, shall be located at a safe distance from all possible sources of contamination, including but not limited to, privies, cesspools, septic tanks, subsurface tile systems, sewers, drains, barnyards and pits below the ground surface. The horizontal distance from any such possible source of pollution shall be as great as possible, but in no case less than the following minimum distances, except as otherwise approved by the state health officer.

| **Table 169.D.1.a.ii.<br>Sources of Contamination** | **Distance in Feet** |
|---|---|
| Septic tanks | 50 |
| Storm or sanitary sewer | 50[1] |
| Cesspools, outdoor privies, oxidation ponds, subsurface absorption fields, pits, mechanical sewage treatment plants, etc. | 100[2] |
| Another water-well | 25[3] |
| Sanitary landfills, feed lots, manure piles, solid waste dumps and similar installations | 100 |
| Drainage canal, ditch or stream | 50[4] |

[1]This distance may be reduced to 30 feet if the sewer is of ductile iron with water-tight joints or pressure rated plastic pipe.
[2]For a private water well this distance may be reduced to 50 feet.
[3]This minimum distance requirement does not take into consideration the effects of interference from pumping nearby wells in the same aquifer.

[4]Horizontally measured from the water's edge to the well at the highest water level which may have occurred in a 10-year period.

iii. No toilet, sewer, soil pipe or drain shall be located above or where leakage therefrom can reach any water storage basin, reservoir or source of water supply.

iv. There shall be no unauthorized pits or unfilled spaces below level of ground surface, any part of which is within 50 feet of such water supply, except properly constructed well, pump, or valve pits as covered under §329.A.4 of this Part.

v. Earth formations above the water-bearing stratum shall be of such character and depth as to exclude contamination of the source of supply by seepage from the surface of the ground.

b. A well shall be located far enough from a building to allow reworking or rehabilitation with a drilling rig. A well shall not be located below ground surface, such as in pits and basements, and shall not be located within the foundation of a building, except a building constructed solely to house pumping and water system equipment.

c. Groundwater development shall be in conformance with the applicable standards, laws, and regulations of the government agency or agencies having jurisdiction.

2. Continued sanitary protection of the well site from potential sources of contamination shall be provided by having a minimum 50-foot radius of ownership and a minimum 100-foot radius of control from the well head. The radius of control required beyond the minimum 50-foot radius of ownership shall be provided either through ownership, zoning, easements, leasing or other means acceptable to the state health officer which shall be maintained for the life of the well until the well is ultimately properly abandoned.

3. Wellhead Protection. Wellhead protection assessment for continued protection of the wellhead from potential sources of contamination shall be provided as determined by the state health officer.

E. General Well Construction. All wells constructed to serve a potable water supply shall be constructed in accordance with LAC 56, Part I, Water Wells. Drillers of wells that serve a potable water supply shall comply with these requirements pursuant to Louisiana Revised Statutes 38:2226, 38:3098-3098.8. In addition, the following requirements shall be met.

1. Drilling fluids and additives shall:

a. not impart any toxic substances to the water or promote bacterial contamination; and

b. be acceptable to the state health officer.

2. Minimum protected depths of drilled wells shall provide watertight construction to such depth as may be required by the state health officer, to:

a. exclude contamination; and

b. seal off formations that are, or may be, contaminated or yield undesirable water.

3. All well and spring basin casings or curbings shall extend a safe distance below the ground surface. The minimum depth of casings or curbings shall not be less than 50 feet in the case of public water supplies and not less than 10 feet in the case of private water supplies.

4. Polyvinyl Chloride Plastic (PVC). The state health officer may approve the use of PVC casing for all or for limited applications. PVC casing shall not be used at sites where permeation by hydrocarbons or degradation may occur.

5. Other Nonferrous Casing Materials. Approval of the use of any nonferrous material as well casing shall be subject to special determination by the state health officer prior to submission of plans and specifications. Nonferrous material proposed as a well casing must be resistant to the corrosiveness of the water and to the stresses to which it will be subjected during installation, grouting and operation.

6. Packers. Packers shall be of material that will not impart taste, odor, toxic substances or bacterial contamination to the well water. Lead packers shall not be used.

7. Screens. Screens shall be provided with a bottom plate or washdown bottom fitting of the same material as the screen.

8. Upper terminal well construction shall be in accordance with the following requirements.

a. In wells with pipe casings, the casings shall project at least 12 inches above ground level or the top of the cover or floor, and the cover or floor shall slope away from the well casing or suction pipe in all directions.

i. Dug well linings shall extend at least 12 inches above the ground surface and cover installed thereon. The cover shall be watertight, and its edges shall overlap and extend downward at least 2 inches over the walls or curbings of such wells.

ii. In flood-prone areas the top of the casing shall be at least two feet above the 100-year flood elevation, but in no case less than two feet above the ground surface.

b. Where a well house is constructed, the floor surface shall be at least six inches above the final ground elevation.

c. Sites subject to flooding shall be provided with an earth mound to raise the pumphouse floor to an elevation at least two feet above the 100-year flood elevation or other suitable protection as determined by the state health officer.

d. Protection from physical damage shall be provided as required by the state health officer.

e. The upper terminal shall be constructed to prevent contamination from entering the well.

f. Where well appurtenances protrude through the upper terminal, the connections to the upper terminus shall be mechanical or welded connections that are water tight.

9. Disinfection of every new, modified or reconditioned groundwater source shall:

a. be provided after completion of work, if a substantial period elapses prior to test pumping or placement of permanent pumping equipment;

b. be provided after placement of permanent pumping equipment; and

c. be done in accordance with AWWA C654 or method approved by the state health officer.

10. Well Abandonment. Abandoned water wells and well holes shall be plugged in accordance with LAC 56, Part I, Water Wells.

F. Testing and records shall comply with the following requirements.

1. Yield and Drawdown Tests shall:

a. be conducted in accordance with a protocol pre-approved by the reviewing authority;

b. be performed on every production well after construction or subsequent treatment and prior to placement of the permanent pump;

c. utilize methods clearly indicated in the project specifications;

d. be performed with a test pump with a capacity at least 1.5 times the flow anticipated at maximum anticipated drawdown;

e. shall provide, as a minimum, for continuous pumping for at least 24 hours at the design pumping rate or until stabilized drawdown has continued for at least six hours when test pumped at 1.5 times the design pumping rate, or as required by the state health officer;

f. provide the following data to be submitted to the state health officer:

i. test pump capacity-head characteristics;

ii. static water level;

ii. depth of test pump setting;

iii. time of starting and ending each test cycle; and

iv. the zone of influence for the well or wells;

g. provide a report which details recordings and graphic evaluation of the following at one hour intervals or less as may be required by the state health officer:

i. pumping rate;

ii. pumping water level;

iii. drawdown; and

iv. water recovery rate and levels;

h. at the discretion of the state health officer, more comprehensive testing may be required.

2. Plumbness and alignment shall conform to the following requirements.

a. Every well shall be tested for plumbness and alignment in accordance with AWWA Standard for Water Wells (A100).

b. The test method and allowable tolerance shall be clearly stated in the specifications.

c. If the well fails to meet these requirements, it may be accepted by the engineer if it does not interfere with the installation or operation of the pump or uniform placement of grout or affect long term integrity.

3. Geological data shall:

a. be determined from samples collected at 5-foot intervals and at each pronounced change in formation;

b. be recorded and submitted to the Louisiana Department of Natural Resources, Office of Conversation (DNR-OC) and the state health officer.

c. be supplemented with a driller's log, accurate geographical location such as latitude and longitude or GIS coordinates, and other information on accurate records of drill hole diameters and depths, assembled order of size and length of casing, screens and liners, grouting depths, formations penetrated, water levels, and location of any blast charges.

4. The owner of each well shall retain all records pertaining to each well, until the well has been properly abandoned.

G. Aquifer Types and Construction Methods. Aquifer types and construction methods shall conform to the following requirements.

1. Criteria for Sand or Gravel Wells

a. If clay or hard pan is encountered above the water bearing formation, the permanent casing and grout shall extend through such materials or at least 50 feet below the original ground elevation, whichever is lower.

b. If a sand or gravel aquifer is overlaid only by permeable soils the permanent casing and grout shall extend to at least 50 feet below original or final ground elevation, whichever is lower. Excavation of topsoil around the well casing should be avoided.

c. If a temporary surface casing is used, it shall be completely withdrawn.

d. If a permanent surface casing is used, it shall be grouted in place.

2. The following requirements shall apply to gravel pack materials.

a. Gravel pack materials shall

i. be sized based on sieve analysis of the formation; and

ii. be 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.

b. Gravel pack installation shall:

i. be in one continuous operation.

ii. provide the material be placed in a manner that prevents segregation and gradation during placement.

c. The annular space between the well screen and the hole shall be adequate to allow proper placement of gravel pack.

d. 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.

e. Gravel refill pipes located in the grouted annular opening shall be surrounded by a minimum of 1 ½ inches of grout.

f. Gravel pack shall extend above the highest well screen with an allowance for settling.

g. Protection from leakage of grout into the gravel pack or screen shall be provided.

h. Permanent inner casing and outer casings shall meet requirements of §169.E.4 or 5 of this Part.

3. Radial collectors shall conform to the following:

a. Locations of all caisson construction joints and porthole assemblies shall be indicated.

b. The caisson wall shall be reinforced to withstand the forces to which it will be subjected.

c. Radial collectors shall be in areas and at depths approved by the state health officer.

d. Provisions shall be made to assure that radial collectors are essentially horizontal.

e. The top of the caisson shall be covered with a watertight floor.

f. All openings in the floor shall be curbed and protected from entrance of foreign material.

g. The pump discharge piping shall not be placed through the caisson walls. In unique situations where this is not feasible, a water tight seal must be obtained at the wall.

4. Infiltration lines should be considered only where geological conditions preclude the possibility of developing an acceptable drilled well.

a. The area around infiltration lines shall be under the control of the water purveyor for a distance acceptable to or required by the state health officer.

b. Flow in the lines shall be by gravity to the collecting well.

c. Water from infiltration lines shall be considered as groundwater under the direct influence of surface water unless demonstrated otherwise.

5. Limestone or sandstone wells, where the depth of unconsolidated formations is more than 50 feet, the permanent casing shall be firmly seated in uncreviced or unbroken rock.

a. Grouting requirements shall be determined by the state health officer.

b. Where the depth of unconsolidated formations is less than 50 feet, the depth of casing and grout shall be at least 50 feet or as determined by the state health officer.

6. Naturally flowing wells shall require special consideration by the state health officer where there is an absence of an impervious confining layer.

a. Flow shall be controlled. Overflows shall discharge at least 18 inches above grade and flood level, and be visible. Discharge shall be to an effective drainage structure.

b. Permanent casing and grout shall be provided.

c. If erosion of the confining bed appears likely, special protective construction may be required by the state health officer.

H. Well Pumps, Discharge Piping and Appurtenances. Well pumps, discharge piping and appurtenances shall conform to the following requirements.

1. Line Shaft Pumps. Wells equipped with line shaft pumps shall:

a. have the casing firmly connected to the pump structure or have the casing inserted into a recess extending at least one-half inch into the pump base;

b. have the pump foundation and base designed to prevent water from coming into contact with the joint; and

c. avoid the use of oil lubrication at pump settings less than 400 feet. Lubricants must meet NSF/ANSI Standard 61 or be approved by the state health officer.

d. All water pumps shall be so constructed and installed as to prevent contamination of the water supply.

i. Where pumps or pump motors are placed directly over the well, the pump or motor shall be supported on a base provided therefor. The well casing shall not be used to support pump or motor. This requirement shall not apply to submersible pumps/motors and single-pipe jet pumps/motors. The pump or motor housing shall have a solid watertight metal base without openings to form a cover for the well, recessed to admit the well casing or pump suction. The well casing or pump suction shall project into the base at least 1 inch above the bottom thereof, and at least 1 inch above the level of the foundation on which the pump rests. The well casing shall project at least 12 inches above ground level or the top of the floor.

ii. Where power pumps are not placed directly over the well, the well casing shall extend at least 12 inches above the floor of the pump house. In flood-prone areas the top of the casing shall extend at least two feet above the 100-year flood elevation, but in no case less than two feet above the ground surface. The annular space between the well casing and the suction pipe shall be closed by a sanitary well seal to prevent the entrance of contamination.

2. Submersible Pumps. Where a submersible pump is used:

a. 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; and

b. the electrical cable shall be firmly attached to the riser pipe at 20 foot intervals or less.

3. Discharge Piping. The design criteria for discharge piping is as follows.

a. The discharge piping shall:

i. be designed to minimize friction loss;

ii. have control valves and appurtenances located above the pumphouse floor when an above-ground discharge is provided;

iii. be protected against the entrance of contamination;

iv. be equipped with a check valve in or at the well, a shutoff valve, a pressure gauge, and a means of measuring flow;

v. be equipped with a smooth nosed sampling tap located at a point before any treatment chemicals are applied. The sample tap shall be at least 18-inches above the floor to facilitate sample collection.

vi. where applicable, 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 18 inches above the floor and covered with a 24 mesh corrosion resistant screen;

vii. be valved to permit test pumping and control of each well;

viii. have all exposed piping, valves and appurtenances protected against physical damage and freezing;

ix. be properly anchored to prevent movement, and be properly supported to prevent excessive bending forces;

x. be protected against surge or water hammer;

xi. conform to §235 of this Part; and

xii. be constructed so that it can be disconnected from the well or well pump to allow the well pump to be pulled.

b. The discharge piping should be provided with a means of pumping to waste, but shall not be directly connected to a sewer.

c. For submersible, jet and line shaft pumps, the discharge, drop or column piping inside the well shall:

i. conform to §235 of this Part; where such standards exist, or in the absence of such standards, conform to applicable product standards and be acceptable to the state health officer. Any lubricants, fittings, brackets, tape or other appurtenances shall meet NSF/ANSI Standards 60/61, where applicable;

ii. be capable of supporting the weight of the pump, piping, water and appurtenances and of withstanding the thrust, torque and other reaction loads created during pumping. The actions of fatigue from repeated starting and stopping of the pump shall be considered when choosing a pipe and fittings;

iii. be fitted with guides or spacers to center piping and well pump in the casing.

4. Pitless Well Units. Pitless well units shall conform to the following standards and requirements.

a. The state health officer must be contacted for approval of specific applications of pitless units.

b. Pitless units shall:

i. be shop-fabricated from the point of connection with the well casing to the unit cap or cover;

ii. be threaded or welded to the well casing;

iii. be of watertight construction throughout;

iv. be of materials and weight at least equivalent and compatible to the casing;

v. have field connection to the lateral discharge from the pitless unit of threaded, flanged or mechanical joint connection; and

vi. terminate at least 18 inches above final ground elevation or three feet above the 100-year flood level or the highest known flood elevation, whichever is higher, or as the state health officer directs.

c. The design of the pitless unit shall make provision for:

i. access to disinfect the well;

ii. a properly constructed casing vent meeting the requirements of §169.H.6 of this Part;

iii. facilities to measure water levels in the well (see §169.H.7);

iv. a cover at the upper terminal of the well that will prevent the entrance of contamination;

v. a contamination-proof entrance connection for electrical cable;

vi. 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; and

vii. at least one check valve within the well casing or in compliance with requirements of the state health officer.

d. 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 will be that needed to connect a pitless unit to the casing.

5. Pitless Adapters. Pitless adapters may be acceptable at the discretion of the state health officer. The use of any pitless adapter must be pre-approved by the state health officer.

6. Casing Vent. All potable water well casings shall be vented to atmosphere as provided below, with the exception that no vent will be required when single-pipe jet pumps are used.

a. All potable water well vents shall be so constructed and installed as to prevent the entrance of contamination.

b. All vent openings shall be piped water tight to a point not less than 24 inches above the 100-year flood elevation, but in no case less than 24 inches above the ground surface.

i. Such vent openings and extensions thereof shall be not less than 1/2 inch in diameter, covered with a 24 mesh, corrosion resistant screen with extension pipe firmly attached thereto.

ii. The openings of the vent pipes shall face downward and shall be screened to prevent the entrance of foreign matter.

7. Water Level Measurement. Provisions shall be made for periodic measurement of water levels in the completed well.

a. Where pneumatic water level measuring equipment is used it shall be made:

i. using corrosion-resistant materials attached firmly to the drop pipe or pump column; and

ii. in such a manner as to prevent entrance of foreign materials.

8. Liners may be acceptable at the discretion of the state health officer. The use of any liner must be pre-approved by the state health officer.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:305 (February 2018), effective August 1, 2018.

## Subchapter D. Treatment

### §171. General Requirements

A. The design of treatment processes and devices shall depend on evaluation of the nature and quality of the particular water to be treated, seasonal variations, the desired quality of the finished water and the mode of operation planned. Facilities shall be planned with future requirements in mind such as: tightened regulatory requirements, ability to obtain funding, potential growth, expansion and deterioration of existing facilities.

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HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:310 (February 2018), effective August 1, 2018.

### §173. Microscreening

A. Microscreening is a mechanical treatment process capable of removing suspended matter and organic loading from surface water by straining. It shall not be used in place of filtration or coagulation.

1. Design. Design criteria is as followed.

a. consideration shall be given to the following:

i. nature of the suspended matter to be removed;

ii. corrosiveness of the water;

iii. effect of chemicals used for pre-treatment;

iv. duplication of units for continuous operation during equipment maintenance;

v. provision of automated backwashing

b. shall provide:

i. a durable, corrosion-resistant screen;

ii. provisions to allow for by-pass of the screen;

iii. protection against back-siphonage when potable water is used for backwashing;

iv. proper disposal of backwash waters (See Subchapter F, §§257-275 of this Part).

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:310 (February 2018), effective August 1, 2018.

### §175. Clarification Design

A. Clarification is generally considered to consist of any process or combination of processes which reduce the concentration of suspended matter in drinking water prior to filtration.

B. Plants designed to treat surface water, groundwater under the direct influence of a surface water, or for the removal of a primary drinking water contaminant shall have the ability to meet the plant's average daily flow of the maximum month with one unit out of service. Design of the clarification process shall:

1. 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;

2. provide multiple-stage treatment facilities when required by the state health officer; and

3. minimize hydraulic head losses between units to allow future changes in processes without the need for repumping.

C. Presedimentation. Waters containing high turbidity may require pretreatment, usually sedimentation, with or without the addition of coagulation chemicals.

1. Basin Design. Presedimentation basins should have hopper bottoms or be equipped with continuous mechanical sludge removal apparatus, and provide arrangements for dewatering.

2. Inlet. Incoming water shall be dispersed across the full width of the line of travel as quickly as possible to prevent short-circuiting.

3. Bypass. Provisions for bypassing presedimentation basins shall be included.

4. Detention Time. Detention shall consider removal requirements for the unit.

D. Coagulation. Coagulation refers to a process using coagulant chemicals and mixing by which colloidal and suspended material are destabilized and agglomerated into settleable or filterable flocs, or both. The engineer shall submit the design basis for the velocity gradient (G value) selected, considering the chemicals to be added and water temperature, color and other related water quality parameters. For surface water plants using direct or conventional filtration, the use of a primary coagulant is required at all times.

1. Mixing. The detention period should be instantaneous, but not longer than thirty seconds with mixing equipment capable of imparting a minimum velocity gradient (G) of at least 750 feet per second per feet (fps/ft). The design engineer should determine the appropriate G value and detention time through jar testing.

2. Equipment. Basins should be equipped with devices capable of providing adequate mixing for all treatment flow rates. Static mixing may be considered where the flow is relatively constant and will be high enough to maintain the necessary turbulence for complete chemical reactions.

3. Location. The coagulation and flocculation basin shall be as close together as practical.

4. Flow shall be determined at the point of coagulant dosing.

E. Flocculation. Flocculation refers to a process to enhance agglomeration or collection of smaller floc particles into larger, more easily settleable or filterable particles through gentle stirring by hydraulic or mechanical means.

1. Basin Design. Inlet and outlet design shall minimize short-circuiting and destruction of floc. Basins shall be designed so that individual basins may be isolated without disrupting plant operation. A drain and/or pumps shall be provided to handle dewatering and sludge removal.

2. Detention. Detention shall account for regulatory requirements for the plant.

3. Equipment. Agitators shall be designed to provide variable peripheral speed of paddles ranging from 0.5 to 3.0 feet per second.

4. Other Designs. Variations or alternate designs can be submitted to the state health officer at any time.

5. Piping. Flocculation and sedimentation basins shall be as close together as practical. The velocity of flocculated water through pipes or conduits to settling basins shall be no less than 0.5 feet per second (fps) and no greater than 1.5 fps. Allowances must be made to minimize turbulence at bends and changes in direction.

F. Sedimentation. Sedimentation refers to a process that allows particles to settle by gravity and typically precedes filtration. 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 the design of conventional gravity sedimentation units.

1. A minimum of four hours of settling time shall be provided. This may be reduced to two hours for lime-soda softening facilities treating only groundwater. Reduced detention time may also be approved when equivalent effective settling is demonstrated or when the overflow rate is not more than 0.5 gallons per minute [gpm] per square foot [sqft] (1.2 m/hr).

2. Inlet Devices. Inlets shall be designed to distribute the water equally and at uniform velocities. 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.

3. If flow is split, a means of measuring the flow to each train or unit shall be provided.

4. Velocity. The velocity through a sedimentation basin should not exceed 0.5 feet per minute. The basins shall be designed to minimize short-circuiting. Fixed or adjustable baffles shall be provided as necessary to achieve the maximum potential for clarification.

5. If flow is split, it is recommended that a means of modifying the flow to each train or unit be provided.

6. Outlet Devices. Outlet weirs or submerged orifices shall maintain velocities suitable for settling in the basin and 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 flow. Outlet weirs and submerged orifices shall be designed as follows.

a. The rate of flow over the outlet weirs or through the submerged orifices shall not exceed 20,000 gallons per day per foot (250 m3/day/m) of the outlet launder or orifice circumference.

b. Submerged orifices located greater than three feet below the flow line shall be justified.

c. The entrance velocity through the submerged orifices shall not exceed 0.5 feet per second.

7. Overflow. An overflow weir or pipe designed to establish the maximum water level desired on top of the filters shall be provided. The overflow shall discharge by

gravity with a free fall. The discharge shall be equipped with monitoring equipment to annunciate the overflow or be installed at a location where the discharge can be observed.

8. Drainage. Sedimentation basins shall be provided with a means for dewatering. Basin bottoms shall slope toward the drain where mechanical sludge collection equipment is not required.

9. Flushing lines or hydrants shall be provided and shall be equipped with backflow prevention devices acceptable to the state health officer.

10. Sludge collection system shall be designed to ensure the collection of sludge from throughout the basin.

11. Sludge removal design shall provide that:

a. sludge pipes shall be not less than three inches in diameter and arranged to facilitate cleaning;

b. entrance to sludge withdrawal piping shall prevent clogging;

c. valves shall be operable from outside the tank;

d. the operator can observe and sample sludge being withdrawn from the unit.

G. Solids Contact Unit. Plants designed to treat surface water, groundwater under the direct influence of surface water or required to meet primary drinking water standards using solids contact shall have a minimum of two units. The clarifiers shall be designed for the average daily flow of the maximum month such that the plant's design capacity can be met with one unit out of service.

1. Operating equipment shall include:

a. adequate piping with suitable sampling taps or other means to sample sludge located to permit the collection of samples from various depths of the units; and

b. if flow is split, a means of measuring and modifying the flow to each unit.

2. Consideration shall be given to chemical feed location to ensure proper dosing and application.

3. A rapid mix device or chamber ahead of solids contact units may be required by the state health officer to assure proper mixing of the chemicals applied. Mixing devices within the unit shall be constructed to:

a. provide good mixing of the raw water with previously formed sludge particles; and

b. prevent deposition of solids in the mixing zone.

4. Flocculation. Flocculation equipment:

a. shall be adjustable (speed and/or pitch);

b. shall provide for coagulation in a separate chamber or baffled zone within the unit;

c. should provide a flocculation and mixing period of at least 30 minutes.

5. Sludge Concentrators. Large basins should have at least two sumps for collecting sludge located in the central flocculation zone.

6. Sludge removal design shall provide that:

a. sludge pipes are not less than three inches in diameter and so arranged as to facilitate cleaning;

b. entrance to sludge withdrawal piping shall prevent clogging;

c. valves shall be located outside the tank for accessibility, and

d. the operator may observe and sample sludge being withdrawn from the unit.

7. Criteria for backflow protection from cross-connections shall be as follows.

a. Blow-off outlets and drains shall terminate in a location with an acceptable air gap for backflow protection.

b. A backflow prevention device shall be included on potable water lines used to back flush sludge lines.

8. Detention Period. The detention time shall be established on the basis of the raw water characteristics, regulatory requirements and other local conditions that affect the operation of the unit.

9. Water Losses. Units shall be provided with controls to allow for adjusting the rate or frequency of sludge withdrawal.

10. 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 10 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. 10 gpm per foot of weir length (120 L/min/m) for clarifiers;

ii. 20 gpm per foot of weir length (240 L/min/m) for softeners.

c. Where orifices are used the loading rates per foot of launder rates should be equivalent to weir loadings. Either shall produce uniform rising rates over the entire area of the tank.

11. Upflow Rates. Unless supporting data is submitted to the State Health Officer to justify rates exceeding the following, rates shall not exceed:

a. 1.0 gpm/sqft (2.4 m/hr) at the sludge separation line for units used for clarifiers;

b. 1.75 gpm/sqft (4.2 m/hr) at the slurry separation line, for units used for softeners.

H. Tube or Plate Settlers. Settler units consisting of variously shaped tubes or plates which are installed in multiple layers and at an angle to the flow may be used for sedimentation, following flocculation. Proposals for settler unit clarification must demonstrate satisfactory performance under on-site pilot plant conditions or documentation of full scale plant operation with similar raw water quality conditions as allowed by the state health officer prior to the preparation of final plans and specifications for approval.

1. General design criteria for tube or plate settlers is as follows.

a. Inlet and Outlet Considerations. Design to maintain velocities suitable for settling in the basin and to minimize short-circuiting. Plate units shall be designed to minimize maldistribution across the units.

b. Protection from Freezing. In areas where freezing occurs, consideration shall be given regarding sufficient freeboard.

c. Application Rate for Tubes. A maximum rate of 2 gallon per minute per square foot [gpm/sqft] of cross-sectional area (4.8 m/hr) for tube settlers, unless higher rates are successfully shown through pilot plant or in-plant demonstration studies.

d. Application Rates for Plates. A maximum plate loading rate of 0.5 gpm/sqft (1.2 m/hr), based on 80 percent of the projected horizontal plate area.

e. Flushing lines shall be provided to facilitate maintenance and must be properly protected against backflow or back siphonage.

f. Drain piping from the settler units shall be sized to facilitate a quick flush of the settler units and to prevent flooding other portions of the plant.

g. Placement. Modules shall be placed:

i. in zones of stable hydraulic conditions; and

ii. in areas nearest effluent launders for basins not completely covered by the modules.

h. Inlets and outlets shall conform to §175.F.2 and §175.F.6 of this Part.

i. The support system shall be able to carry the weight of the modules when the basin is drained plus any additional weight to support maintenance.

j. Provisions shall be made to allow the water level to be dropped, and a water or air jet system for cleaning the modules.

I. High Rate Clarification Processes. High rate clarification processes may be approved upon demonstrating satisfactory performance under on-site pilot plant conditions or documentation of full scale plant operation with similar raw water quality conditions as allowed by the state health officer.

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**§177. Filtration Design**

A. Rapid Rate Gravity Filters. General design criteria for rapid rate gravity filters is as follows.

1. Pretreatment. The use of rapid rate gravity filters shall require pretreatment.

2. Rate of Filtration. The 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, and competency of operating personnel. Typical filtration rates range from 2 to 4 gpm/sqft. Maximum filtration rates for plants treating surface waters or ground water under the influence of surface water shall not exceed 3.0 gpm/sqft. For surface water treatment plants or GUISW with proposed filtration rates above 3.0 gpm/sqft, data from pilot testing shall be submitted to the state health officer for consideration and approval.

3. Number. Plants employing rapid rate gravity filters shall provide at least two filter units. The filters shall be capable of meeting the plant design capacity at the plants average daily flow of the maximum month with one filter unit removed from service. Where declining rate filtration is provided, the variable aspect of filtration rates, and the number of filters must be considered when determining the design capacity for the filters.

4. Structural Details and Hydraulics. The filter structure shall be designed to provide for:

a. vertical walls within the filter;

b. no protrusion of the filter walls into the filter media;

c. head room to permit normal inspection and operation;

d. minimum depth of filter box of 8.5 feet;

e. minimum water depth over the surface of the filter media of three feet;

f. trapped effluent to prevent backflow of air to the bottom of the filters;

g. prevention of floor drainage in to the filter;

h. prevention of flooding by providing overflow;

i. maximum velocity of treated water in pipe and conduits to filters of two feet per second;

j. cleanouts and straight alignment for influent pipes or conduits where solids loading is heavy, or following lime-soda softening;

k. washwater drain capacity to carry maximum flow;

l. handrails or walls around filter banks adjacent to normal walkways; and

m. construction to prevent cross connections and common walls between potable and non-potable water.

5. Washwater troughs should be constructed to have:

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 level and all at the same elevation;

d. spacing so that each trough serves the same number of square feet of filter area;

e. maximum horizontal travel of suspended particles to reach the trough not to exceed three feet;

f. means to exclude the loss of media when providing for concurrent air/high rate water backwashing; and

g. a two-inch freeboard at the main wash water gullet at the maximum rate of wash.

6. Filter Material. The granular filter media shall be in accordance with AWWA B100 and have the following characteristics:

a. a total depth of not less than 24 inches and generally not more than 30 inches;

b. a uniformity coefficient of the smallest material not greater than 1.65;

c. a minimum of 12 inches of media with an effective size range no greater than 0.45 mm to 0.55 mm unless specified otherwise per the following.

i. Anthracite shall have:

(a). an effective size of 0.45 mm - 0.55 mm with uniformity coefficient not greater than 1.65 when used alone;

(b). an effective size of 0.8 mm - 1.2 mm with a uniformity coefficient not greater than 1.7 when used as a cap; and

(c). an effective size for anthracite used as a single media on potable groundwater for iron and manganese removal only shall be a maximum of 0.8 mm (effective sizes greater than 0.8 mm may be approved based upon onsite pilot plant studies or other demonstration acceptable to the state health officer).

ii. Sand shall have:

(a). an effective size of 0.45 mm to 0.55 mm; and

(b). a uniformity coefficient of not greater than 1.65.

iii. High density sand shall have:

(a). an effective size of 0.2 to 0.3 mm;

(b). a uniformity coefficient of not greater than 1.65.

iv. Granular activated carbon (GAC) shall be in accordance with AWWA B604 and the design of shall meet the following:

(a). The media must meet the basic specifications for filter media as given in §177.A.6.a through §177.A.6.c of this Part.

(b). There shall be provisions for a free chlorine residual and adequate contact time in the water following the filters and prior to distribution (See §177.C and §177.D).

(c). There shall be means for periodic treatment of filter material for control of bacterial and other growth.

(d). Provisions shall be made for frequent replacement or regeneration. Regeneration of GAC shall be in accordance with AWWA B604.

v. Other Media. Other media will be considered based on experimental data and operating experience.

d. Characteristics of support media shall include the following.

i. Torpedo Sand. A three-inch layer of torpedo sand shall be used as a supporting media for filter sand where supporting gravel is used, and shall have:

(a). effective size of 0.8 mm to 2.0 mm; and

(b). uniformity coefficient not greater than 1.7.

ii. Gravel, when used as the supporting media shall consist of cleaned and washed, hard, durable, rounded silica particles and shall not include flat or elongated particles. The coarsest gravel shall be 2.5 inches in size when the gravel rests directly on a lateral system, and shall extend above the top of the perforated laterals. Not less than four layers of gravel shall be provided in accordance with the following size and depth distribution.

**Table 175.A.6.e**

| Size | Depth |
|---|---|
| 3/32 to 3/16 inches | 2 to 3 inches |
| 3/16 to 1/2 inches | 2 to 3 inches |
| 1/2 to 3/4 inches | 3 to 5 inches |
| 3/4 to 1 ½ inches | 3 to 5 inches |
| 1 ½ to 2 ½ inches | 5 to 8 inches |

Reduction of gravel depths and other size gradations may be considered upon justification to the state health officer.

7. Filter bottoms and strainer systems. Departures from these standards may be acceptable for high rate filters and for proprietary bottoms. Porous plate bottoms shall not be used where iron or manganese may clog them or with waters softened by lime. The design of manifold-type collection systems shall:

a. ensure even distribution of washwater and even rate of filtration over the entire area of the filter;

b. provide the ratio of the area of the final openings of the strainer systems to the area of the filter at 0.003;

c. provide the total cross-sectional area of the laterals at twice the total area of the final openings;

d. provide the cross-sectional area of the manifold at 1.5 to 2 times the total area of the laterals;

e. lateral perforations without strainers shall be directed downward.

8. Filter media wash facilities are required except for filters used exclusively for iron, radionuclides, arsenic or manganese removal. Wash water systems shall be designed with:

a. water pressure per manufacturer's requirements;

b. a properly installed vacuum breaker or other approved device to prevent back siphonage if connected to the filtered or finished water system;

c. rate of flow of 2.0 gallons per minute per square foot of filter area (4.9 m/hr) with fixed nozzles or 0.5 gallons per minute per square foot (1.2 m/hr) with revolving arms if provided.

d. Air scouring. When provided, general design criteria for air scouring is as follows.

i. Air flow for air scouring the filter shall be 3-5 standard cubic feet per minute square foot of filter area (0.9-1.5 m3/min/m2) when the air is introduced in the underdrain; a lower air rate shall be used when the air scour distribution system is placed above the underdrains.

ii. When employing concurrent air scour and water back wash a method for avoiding excessive loss of the filter media during backwashing shall be provided.

iii. Air scouring shall be followed by a fluidization wash sufficient to re-stratify the media.

iv. Air shall be free from contamination.

v. Air scour distribution systems should be placed below the media and supporting bed interface; if placed at the interface the air scour nozzles shall be designed to prevent media from clogging the nozzles or entering the air distribution system.

vi. Piping for the air distribution system shall not be flexible hose which will collapse when not under air pressure and shall not be a relatively soft material which may erode at the orifice opening with the passage of air at high velocity.

vii. Air delivery piping shall not pass down through the filter media nor shall there be any arrangement in the filter design which would allow short circuiting between the applied unfiltered water and the filtered water.

viii. The backwash water delivery system must be capable of 15 gallons per minute per square foot of filter surface area (37 m/hr); however, when air scour is provided the backwash water rate must be variable and should not exceed 8 gallons per minute per square foot (20 m/hr) unless operating experience shows that a higher rate is necessary to remove scoured particles from filter media surfaces.

ix. The filter underdrains shall be designed to accommodate air scour piping when the piping is installed in the underdrain.

9. Appurtenances. The following shall be provided for every filter:

a. a means of sampling influent and effluent water sampling taps;

b. a meter indicating the instantaneous effluent rate of flow;

c. where used for surface water, provisions for filtering to waste with appropriate measures for cross connection control;

d. a flow rate controller capable of providing gradual rate increases when placing the filters back into operation; and

e. for surface water or systems using ground water under the direct influence of surface water with three or more filters, on-line turbidimeters shall be installed on the effluent line from each filter. All turbidimeters shall consistently determine and indicate the turbidity of the water in NTUs. Each turbidimeter shall report to a recorder that is designed and operated to allow the operator to accurately determine the turbidity at least once every 15 minutes. Turbidimeters on individual filters should be designed to accurately measure low-range turbidities and have an alarm that will sound when the effluent level exceeds regulatory turbidity limits. It is recommended that turbidimeters be placed in a location that also allows measurement of turbidity during filter to waste.

10. Backwash. Provisions shall be made for washing filters as follows.

a. a minimum rate necessary to provide for a 50 percent expansion of the filter bed shall be provided with a minimum of 15 gpm/sqft. A reduced rate of 10 gallons per minute per square foot (24 m/hr) may be acceptable for full depth anthracite or granular activated carbon filters;

b. filtered water shall be used for backwashing filters;

c. washwater pumps shall be in duplicate unless an alternate means of obtaining washwater is available;

d. a washwater regulator or valve on the main washwater line to obtain the desired rate of filter wash with the washwater valves on the individual filters open wide;

e. a flow meter, preferably with a totalizer, on the main washwater line located so that it can be easily read by the operator during the washing process;

f. design to prevent rapid changes in backwash water flow;

g. automated systems shall be adjustable; and

h. appropriate measures for cross-connection control.

B. Rapid Rate Pressure Filters. The normal use of these filters is for iron and manganese removal. For raw water with iron concentration of 2 mg/L or greater consideration should be given to pretreatment prior to filtration. Pressure filters shall not be used in the filtration of surface or other polluted waters or following lime-soda softening.

1. Minimum criteria relative to rate of filtration, structural details and hydraulics, filter media, etc., provided for rapid rate gravity filters also apply to pressure filters where appropriate. At least two filter units shall be provided. The filters shall be capable of meeting the average daily flow of the maximum month with one filter unit removed from service.

2. Rate of Filtration. The rate shall not exceed six gallons per minute per square foot of filter area except where manufacturer's performance studies of the unit have demonstrated to the satisfaction of the state health officer that higher filtration rates are achievable. Consideration shall be given to backwash frequency and deteriorating water quality when selecting the filtration rate.

3. 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;

c. filtration and backwashing of each filter individually;

d. minimum side wall shell height of five feet for vertical filters. A corresponding reduction in side wall height is acceptable where proprietary bottoms permit reduction of the gravel depth;

e. the top of the washwater collectors to be at least 18 inches above the surface of the media;

f. the underdrain system to efficiently collect the filtered water and to uniformly distribute the backwash water at a rate not less than 15 gallons per minute per square foot of filter area;

g. backwash flow indicators and controls that are easily readable while operating the control valves;

h. an air release valve on the highest point of each filter;

i. an accessible manhole of adequate size to facilitate inspection and repairs for filters 36 inches or more in diameter. Manholes should be at least 24 inches in diameter where feasible;

j. means to observe the wastewater during backwashing; and

k. construction to prevent cross-connection.

C. Diatomaceous Earth Filtration. The use of these filters may be considered for application to surface waters with low turbidity and low bacterial contamination.

1. Conditions of Use. Diatomaceous earth filters are expressly excluded from consideration for the following conditions:

a. bacteria removal;

b. color removal;

c. turbidity removal where either the gross quantity of turbidity is high or the turbidity exhibits poor filterability characteristics; and

d. filtration of waters with high algae counts.

2. Pilot Plant Study. Installation of a diatomaceous earth filtration system shall be preceded by a pilot plant study on the water to be treated.

a. Conditions of the study such as duration, filter rates, head loss accumulation, slurry feed rates, turbidity removal, bacteria removal, etc., must be approved by the state health officer prior to the study.

b. Satisfactory pilot plant results must be obtained prior to preparation of final construction plans and specifications.

c. The pilot plant study must demonstrate the ability of the system to meet applicable drinking water standards at all times.

3. Types of Filters. Pressure or vacuum diatomaceous earth filtration units will be considered for approval. However, the vacuum type is preferred for its ability to accommodate a design which permits observation of the filter surfaces to determine proper cleaning, damage to a filter element, and adequate coating over the entire filter area.

4. Treated water storage capacity in excess of normal requirements shall be provided to:

a. allow operation of the filters at a uniform rate during all conditions of system demand at or below the approved filtration rate, and

b. guarantee continuity of service during adverse raw water conditions without by-passing the system.

5. Number of Units. At least two units shall be provided. Where only two units are provided, each shall be capable of meeting the plant design capacity (normally the projected maximum daily demand) at the approved filtration rate. Where more than two filter units are provided, the

filters shall be capable of meeting the plant design capacity at the approved filtration rate with one filter removed from service.

6. Pre-coating criteria includes the following.

a. Application. A uniform precoat shall be applied hydraulically to each septum by introducing a slurry to the tank influent line and employing a filter-to-waste or recirculation system.

b. Quantity. Diatomaceous earth in the amount of 0.2 pounds per square foot of filter area (0.98 kg/m2) or an amount sufficient to apply a 1/8 inch coating should be used with recirculation.

7. A body feed system to apply additional amounts of diatomaceous earth slurry during the filter run is required to avoid short filter runs or excessive head losses.

a. Rate of body feed is dependent on raw water quality and characteristics and shall be determined in the pilot plant study.

b. Operation and maintenance can be simplified by providing accessibility to the feed system and slurry lines.

c. Continuous mixing of the body feed slurry is required.

8. Filtration criteria includes the following.

a. Rate of Filtration. The recommended nominal rate is 1.0 gallon per minute per square foot of filter area (2.4 m/hr) with a recommended maximum of 1.5 gallons per minute per square foot (3.7 m/hr). The filtration rate shall be controlled by a positive means.

b. Head Loss. The head loss shall not exceed 30 psi (210 kPa) for pressure diatomaceous earth filters, or a vacuum of 15 inches of mercury (-51 kPa) for a vacuum system.

c. Recirculation. A recirculation or holding pump shall be employed to maintain differential pressure across the filter when the unit is not in operation in order to prevent the filter cake from dropping off the filter elements. A minimum recirculation rate of 0.1 gallon per minute per square foot of filter area (0.24 m/hr) shall be provided.

d. Septum or Filter Element. The filter elements shall be structurally capable of withstanding maximum pressure and velocity variations during filtration and backwash cycles, and shall be spaced such that no less than one inch is provided between elements or between any element and a wall.

e. Inlet Design. The filter influent shall be designed to prevent scour of the diatomaceous earth from the filter element.

9. Backwash. A satisfactory method to thoroughly remove and dispose of spent filter cake shall be provided (see Subchapter F. §§257-275 of this Part).

10. The following appurtenances shall be provided for every filter:

a. a means of sampling for raw and filtered water;

b. loss of head or differential pressure gauge;

c. rate-of-flow indicator, preferably with totalizer;

d. a throttling valve used to reduce rates below normal during adverse raw water conditions;

e. evaluation of the need for body feed, recirculation, and any other pumps, in accordance with §217 of this Part; and

f. provisions for filtering to waste with appropriate measures for backflow prevention.

D. Slow Sand Filters. The use of these filters shall require prior engineering studies to demonstrate the adequacy and suitability of this method of filtration for the specific raw water supply.

1. Quality of Raw Water. Slow rate gravity filtration shall be limited to waters having maximum turbidities of 10 units and maximum color of 15 units; such turbidity shall not be attributable to colloidal clay. Microscopic examination of the raw water shall be made to determine the nature and extent of algae growths and their potential adverse impact on filter operations.

2. Number. At least two units shall be provided. Where only two units are provided, each shall be capable of meeting the plant design capacity (normally the projected maximum daily demand) at the approved filtration rate. Where more than two filter units are provided, the filters shall be capable of meeting the plant design capacity at the approved filtration rate with one filter removed from service.

3. Structural Details and Hydraulics. Slow rate gravity filters shall be so designed as to provide:

a. headroom to permit normal movement by operating personnel for scraping and sand removal operations;

b. adequate access hatches and access ports for handling of sand and for ventilation; and

c. an overflow at the maximum filter water level.

4. Rates of Filtration. The permissible rates of filtration shall be determined by the quality of the raw water and shall be on the basis of experimental data derived from the water to be treated. The nominal rate may be 45 to 150 gallons per day per square foot of sand area (1.8 - 6.1 m/day), with somewhat higher rates acceptable when demonstrated to the satisfaction of the approving authority.

5. Underdrains. Each filter unit shall be equipped with a main drain and an adequate number of lateral underdrains to collect the filtered water. The underdrains shall be placed as close to the floor as possible and spaced so that the maximum velocity of the water flow in the underdrain will not exceed 0.75 feet per second. The maximum spacing of laterals shall not exceed 3 feet if pipe laterals are used.

6. Filter material criteria shall be as follows.

a. Filter sand shall be placed on graded gravel layers for a minimum depth of 30 inches.

b. The effective size shall be between 0.15 mm and 0.30 mm. Larger sizes may be considered by the state health officer.

c. The uniformity coefficient shall not exceed 2.5.

d. The sand shall be cleaned and washed free from foreign matter.

e. The sand shall be rebedded when scraping has reduced the bed depth to no less than 19 inches. Where sand is to be reused in order to provide biological seeding and shortening of the ripening process, rebedding shall utilize a "throw over" technique whereby new sand is placed on the support gravel and existing sand is replaced on top of the new sand.

7. Filter Gravel. The supporting gravel should be similar to the size and depth distribution provided for rapid rate gravity filters (see §177.A.6.d.ii of this Part).

8. Depth of Water on Filter Beds. Design shall provide a depth of at least three to six feet of water over the sand. Influent water shall not scour the sand surface.

9. Control Appurtenances. Each filter shall be equipped with:

a. means of sampling influent and effluent water;

b. an indicating loss of head gauge or other means to measure head loss;

c. an indicating rate-of-flow meter. A means of controlling the rate of filtration and limiting the rate of filtration to a maximum rate shall be provided;

d. provisions for filtering to waste with appropriate measures for cross connection control; and

e. an effluent pipe designed to maintain the water level above the top of the filter sand.

10. [Ripening] Slow sand filters shall be operated to waste after scraping or rebedding during a ripening period until the filter effluent turbidity falls to consistently below the regulated drinking water standard established for the system.

E. Direct Filtration. Direct filtration, as used herein, refers to the filtration of a surface water following chemical coagulation and possibly flocculation but without prior settling. The nature of the treatment process will depend upon the raw water quality. A full scale direct filtration plant shall not be constructed without prior pilot studies which are acceptable to the state health officer. In-plant demonstration studies may be appropriate where conventional treatment plants are converted to direct filtration. Where direct filtration is proposed, an engineering report shall be submitted prior to conducting pilot plant or in-plant demonstration studies.

1. Engineering Report

a. In addition to the items considered in §113 of this Part, "Engineering Report", the report shall include a historical summary of meteorological conditions and of raw water quality with special reference to fluctuations in quality, and possible sources of contamination. The following raw water parameters shall be evaluated in the report:

i. color;

ii. turbidity;

iii. bacterial concentration;

iv. microscopic biological organisms;

v. temperature;

vi. total solids;

vii. general inorganic chemical characteristics; and

viii. additional parameters as required by the state health officer.

b. The report shall also include a description of methods and work to be done during a pilot plant study or, where appropriate, an in-plant demonstration study.

2. Pilot Plant Studies. After approval of the engineering report and pilot plant protocol, a pilot study or in-plant demonstration study shall be conducted. The study must be conducted over a sufficient time to treat all expected raw water conditions throughout the year. The pilot plant filter must be of a similar type and operated in the same manner as proposed for full scale operation. The pilot study must determine the contact time necessary for optimum filtration for each coagulant proposed. The study shall emphasize but not be limited to, the following items:

a. chemical mixing conditions including shear gradients and detention periods;

b. chemical feed rates;

c. use of various coagulants and coagulant aids;

d. flocculation conditions;

e. filtration rates;

f. filter gradation, types of media and depth of media;

g. filter breakthrough conditions;

h. adverse impact of recycling backwash water due to solids, algae, trihalomethane formation and similar problems;

i. length of filter runs;

j. length of backwash cycles;

k. quantities and make-up of the wastewater.

Prior to the initiation of design plans and specifications, a final report including the engineer's design recommendations shall be submitted to the state health officer.

3. Pretreatment. The final coagulation and flocculation basin design should be based on the pilot plant or in-plant demonstration studies augmented with applicable portions of §175.D, "Coagulation" and §175.E, "Flocculation" of this Part.

4. Filtration. Filters shall be rapid rate gravity filters with dual or mixed media. The final filter design shall be based on the pilot plant or in-plant demonstration studies and all portions of§177.A "Rapid rate gravity filters" of this Part. Pressure filters or single media sand filters shall not be used.

5. Appurtenances. The following shall be provided for every filter:

a. influent and effluent sampling taps;

b. an indicating loss of head gauge;

c. a meter indicating instantaneous rate of flow;

d. where used for surface water, provisions for filtering to waste with appropriate measures for cross connection control;

e. measures for providing gradual rate increases when placing the filters back into operation; and

f. for systems with three or more filters, on-line turbidimeters shall be installed on the effluent line from each filter. All turbidimeters shall consistently determine and indicate the turbidity of the water in NTUs. Each turbidimeter shall report to a recorder that is designed and operated to allow the operator to accurately determine the turbidity at least once every 15 minutes. Turbidimeters on individual filters should be designed to accurately measure low-range turbidities and have an alarm that will sound when the effluent level exceeds 0.3 NTU.

F. Deep Bed Rapid Rate Gravity Filters. Deep bed rapid rate gravity filters, as used herein, generally refers to rapid rate gravity filters with filter material depths equal to or greater than 48 inches. Filter media sizes are typically larger than those listed in §177.A.6.d of this Part.

1. Deep bed rapid rate filters may be considered based on pilot studies pre-approved by the state health officer.

2. The final filter design shall be based on the pilot plant studies and shall comply with all applicable portions of §177.A. of this Part. Careful attention shall be paid to the design of the backwash system which usually includes simultaneous air scour and water backwash at subfluidization velocities.

G. Biologically Active Filters. Biologically active filtration, as used herein, refers to the filtration of surface water (or a ground water with iron, manganese, ammonia or significant natural organic material) which includes the establishment and maintenance of biological activity within the filter media.

1. Objectives of biologically active filtration may include control of disinfection byproduct precursors, increased disinfectant stability, reduction of substrates for microbial regrowth, breakdown of small quantities of synthetic organic chemicals, reduction of ammonia-nitrogen, and oxidation of iron and manganese. Biological activity can have an adverse impact on turbidity, particle and microbial pathogen removal, disinfection practices; head loss development; filter run times and distribution system corrosion. Design and operation should ensure that aerobic conditions are maintained at all times. Biologically active filtration often includes the use of ozone as a pre-oxidant/disinfectant which breaks down natural organic materials into biodegradable organic matter and granular activated carbon filter media which may promote denser biofilms.

2. Biologically active filters may be considered based on pilot studies pre-approved by the state health officer. The study objectives must be clearly defined and must ensure the microbial quality of the filtered water under all anticipated conditions of operation.

a. The pilot study shall be of sufficient duration to ensure establishment of full biological activity. The pilot study shall establish empty bed contact time, biomass loading, and/or other parameters necessary for successful operation as required by the state health officer.

3. The final filter design shall be based on the pilot plant studies and shall comply with all applicable portions of §177.A. of this Part.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:313 (February 2018), effective August 1, 2018.

### §179. Disinfection

A. Disinfection may be accomplished with gas and liquid chlorine, calcium or sodium hypochlorites, chlorine dioxide, chloramines, ozone, or ultraviolet light. Other disinfecting agents will be considered, providing reliable application equipment is available and testing procedures for a residual are recognized in "Standard Methods for the Examination of Water and Wastewater,". Disinfection is required for all water systems in accordance with §355 and §357 of this Part, other than those public water systems holding valid disinfection variance in accordance with §361 of this Part.

B. Chlorination. Design criteria for chlorination shall be as follows.

1. Chlorination Equipment Type. Solution-feed gas chlorinators or hypochlorite feeders of the positive displacement type shall be provided. (see §§201-209 “Chemical Application” of this Part).

2. Capacity. The chlorinator capacity shall be sufficient to comply with minimum chlorine residuals required in §355 and §357 of this Part. The equipment shall be of such design that it will operate accurately over the desired feeding range.

3. Standby Equipment. Standby equipment shall be available to replace/repair a critical unit unless an alternative is approved by the state health officer. Spare parts shall be readily available to replace parts subject to wear and breakage. If there is a large difference in feed rates between routine and emergency dosages, a gas metering tube should be provided for each dose range to ensure accurate control of the chlorine feed.

4. Automatic Switch-Over. Automatic switch-over of chlorine cylinders shall be provided to assure continuous disinfection.

5. Eductor. Each eductor shall be selected for the point of application with particular attention given to the quantity of chlorine to be added, the maximum injector water flow, the total discharge back pressure, the injector operating pressure, and the size of the chlorine solution line. Gauges for measuring water pressure and vacuum at the inlet and outlet of each eductor should be provided.

6. Injector/Diffuser. The chlorine solution injector/diffuser shall be compatible with the point of application to provide a rapid and thorough mix with all the water being treated.

C. Criteria for Contact Time and Point of Application

1. Due consideration shall be given to the contact time of the disinfectant in water with relation to pH, ammonia, taste-producing substances, temperature, bacterial quality, disinfection byproduct formation potential and other applicable factors. The disinfectant should be applied at a point which will provide adequate contact time (CT). All basins used for disinfection shall be designed to minimize short circuiting.

2. For treating surface waters and groundwaters under the direct influence of surface water, the system shall be designed to meet the CT standards set in Chapter 11 of this Part.

D. Residual Chlorine. Systems shall be designed to meet the minimum disinfectant residual per §355 and §357 of this Part.

E. Testing Equipment. Testing equipment used for compliance monitoring shall comply with approved analytical methods set forth in this Part.

F. Chlorinator Piping. Design criteria for chlorinator piping shall be as follows.

1. Cross-Connection Protection. The chlorinator water supply piping shall be designed to prevent contamination of the treated water supply in accordance with the backflow prevention requirements set forth in §§344 and 346 of this Part.

2. Pipe Material. The pipes carrying elemental liquid or dry gaseous chlorine under pressure shall be Schedule 80 seamless steel tubing or other materials recommended by the Chlorine Institute. PVC is not acceptable upstream of the vacuum regulator. Vacuum piping for gaseous chlorine shall be polyethylene tubing or Schedule 80 PVC pipe. Rubber, Schedule 80 PVC, or polyethylene shall be used for chlorine solution piping and fittings.

G. Chloramination. Chloramination is an application of ammonia and chlorine at a proper mass ratio of chlorine to ammonia to produce a combined chlorine residual predominantly in form of monochloramine. Proper chlorine to ammonia ratio shall be maintained to prevent the formation of dichloramine and trichloramine which create taste and odor in drinking water.

1. Type. The chlorine system shall comply with the applicable requirements of §179.B. Ammonia systems shall supply either anhydrous ammonia, ammonium sulfate or

aqua ammonia in compliance with the requirements of §§201-209 "Chemical Application" of this Part.

2. Capacity. The ammonia supply system shall have sufficient capacity to comply with minimum disinfectant residuals required in §355 and §357 of this Part. The equipment shall be of such design that it will operate accurately over the desired feeding range.

3. Standby Equipment. Standby equipment shall be available to replace/repair a critical unit. Spare parts shall be made available to replace parts subject to wear and breakage.

4. Injector/Diffuser. The ammonia injector/diffuser shall be compatible with the point of application to provide a rapid and thorough mix with all the water being treated. If injectors are used, provisions for scale formation shall be considered.

a. Ammonia solution shall be fed through injectors/diffusers made of appropriate material installed per manufacturer's recommendations for even distribution of the solution. Materials containing copper shall not be used in contact with the ammonia.

5. Cross-Connection Protection. The aqua ammonia water supply piping shall be designed to prevent contamination of the treated water supply in accordance with the backflow prevention requirements set forth in §§344 and 346 of this Part.

6. Pipe Material. The pipes carrying anhydrous ammonia shall be black iron or stainless steel. Aqua (Aqueous) ammonia or ammonium sulfate piping shall be stainless steel, polyethylene tubing or schedule 80 PVC. Stainless steel, rubber, polyethylene tubing or PVC shall be used for aqueous ammonia solution piping and fittings.

H. Ozone

1. Design considerations include the following.

a. Ozonation systems are generally used for the purpose of disinfection, oxidation and microflocculation.

b. Bench scale studies shall be conducted to determine minimum and maximum ozone dosages for disinfection "CT" compliance and oxidation reactions. More involved pilot studies shall be conducted when necessary to document benefits and DBP precursor removal effectiveness. Consideration shall be given to multiple points of ozone addition. Pilot studies shall be conducted for all surface waters. Particularly sensitive measurements include gas flow rate, water flow rate, and ozone concentration.

c. Following the use of ozone, the application of a disinfectant which maintains a measurable residual will be required in order to ensure bacteriologically safe water is carried throughout the distribution system.

d. Furthermore, because of the more sophisticated nature of the ozone process a higher degree of operator maintenance skills and training is required. The ability to obtain qualified operators must be evaluated in selection of the treatment process. The necessary operator training shall be provided prior to plant startup. An operation and maintenance manual shall be provided and maintained onsite while the ozone unit is in operation.

2. Feed Gas Preparation. General design criteria for feed gas preparation shall be as follows.

a. Feed gas can be air, oxygen enriched air, or high purity oxygen. Sources of high purity oxygen include purchased liquid oxygen; on site generation using cryogenic air separation; or temperature, pressure or vacuum swing (adsorptive separation) technology. For high purity oxygen-feed systems, dryers typically are not required.

i. Air handling equipment on conventional low pressure air feed systems shall consist of an air compressor, water/air separator, refrigerant dryer, heat reactivated desiccant dryer, and particulate filters. Some "package" ozonation systems for small plants may work effectively operating at high pressure without the refrigerant dryer and with a "heat-less" desiccant dryer. The maximum dew point of -76ºF (-60ºC) will not be exceeded at any time.

b. Air compression. Design criteria for air compression shall be as follows.

i. Air compressors shall be of the liquid-ring or rotary lobe, oil-less, positive displacement type for smaller systems or dry rotary screw compressors for larger systems.

ii. The air compressors shall have the capacity to simultaneously provide for maximum ozone demand, provide the air flow required for purging the desiccant dryers (where required) and allow for standby capacity.

iii. Air feed for the compressor shall be drawn from a point protected from rain, condensation, mist, fog and contaminated air sources to minimize moisture and hydrocarbon content of the air supply.

iv. A compressed air after-cooler and/or entrainment separator with automatic drain shall be provided prior to the dryers to reduce the water vapor.

v. A back-up air compressor must be provided so that ozone generation is not interrupted in the event of a break-down.

c. Air drying. Design criteria for air drying shall be as follows.

i. Dry, dust-free and oil-free feed gas must be provided to the ozone generator. Dry gas is essential to prevent formation of nitric acid, to increase the efficiency of ozone generation and to prevent damage to the generator dielectrics. Sufficient drying to a maximum dew point of -76ºF (-60ºC) shall be provided at the end of the drying cycle.

ii. Drying for high pressure systems may be accomplished using heatless desiccant dryers only. For low pressure systems, a refrigeration air dryer in series with heat-reactivated desiccant dryers shall be used.

iii. A refrigeration dryer capable of reducing inlet air temperature to 40ºF (4ºC) shall be provided for low pressure air preparation systems.

iv. For heat-reactivated desiccant dryers, the unit shall contain two desiccant filled towers complete with pressure relief valves, two four-way valves and a heater. External type dryers shall have a cooler unit and blowers. The size of the unit shall be such that the specified dew point will be achieved during a minimum adsorption cycle time of 16 hours while operating at the maximum expected moisture loading conditions.

v. Multiple air dryers shall be provided so that the ozone generation is not interrupted in the event of dryer breakdown.

vi. Each dryer shall be capable of venting "dry" gas to the atmosphere, prior to the ozone generator, to allow start-up when other dryers are "on-line".

d. Air filters. Design criteria for air filters shall be as follows.

i. Air filters shall be provided on the suction side of the air compressors, between the air compressors and the dryers and between the dryers and the ozone generators.

ii. The filter before the desiccant dryers shall be of the coalescing type and be capable of removing aerosol and particulates larger than 0.3 microns in diameter. The filter after the desiccant dryer shall be of the particulate type and be capable of removing all particulates greater than 0.1 microns in diameter, or smaller if specified by the generator manufacturer.

e. Preparation piping. Piping in the air preparation system can be common grade steel, seamless copper, stainless steel or galvanized steel. The piping must be designed to withstand the maximum pressures in the air preparation system.

3. Ozone Generator. Design criteria for ozone generators shall be as follows.

a. Capacity. Design criteria for ozone generator capacity shall be as follows.

i. The production rating of the ozone generators shall be stated in pounds per day and kWhr per pound at a maximum cooling water temperature and maximum ozone concentration.

ii. The design shall ensure that the minimum concentration of ozone in the generator exit gas will not be less than 1 percent (by weight).

iii. Generators shall be sized to have sufficient reserve capacity so that the system does not operate at peak capacity for extended periods of time.

iv. The production rate of ozone generators will decrease as the temperature of the coolant increases. If there is to be a variation in the supply temperature of the coolant throughout the year, then applicable data shall be used to determine production changes due to the temperature change of the supplied coolant. The design shall ensure that the generators can produce the required ozone at maximum coolant temperature.

v. Appropriate ozone generator backup equipment must be provided.

b. Electrical. The generators can be low, medium or high frequency type. Specifications shall require that the transformers, electronic circuitry and other electrical hardware be proven, high quality components designed for ozone service.

c. Cooling. Adequate cooling shall be provided. The cooling water must be properly treated to minimize corrosion, scaling and microbiological fouling of the water side of the tubes. Where cooling water is treated, cross connection control shall be provided to prevent contamination of the potable water supply in accordance with the backflow prevention requirements in §§344 and 346 of this Part.

d. Materials. The ozone generator shell and tubes shall be constructed of Type 316L stainless steel.

4. Ozone Contactors. The selection or design of the contactor and method of ozone application depends on the purpose for which the ozone is being used.

a. Bubble Diffusers. Design criteria for bubble diffusers shall be as follows.

i. Where disinfection is the primary application a minimum of two contact chambers each equipped with baffles to prevent short circuiting and induce countercurrent flow shall be provided. Ozone shall be applied using porous-tube or dome diffusers.

ii. The minimum contact time shall be 10 minutes. A shorter contact time may be approved by state health officer.

iii. The contactor must be kept under negative pressure and sufficient ozone monitors shall be provided to protect worker safety. The secondary enclosure for the ozone contactor shall be open to the atmosphere.

iv. Large contact vessels made of reinforced concrete shall comply with ACI 350. All reinforcement bars shall be covered with a minimum of 2.0 inches of concrete. Smaller contact vessels can be made of stainless steel, fiberglass or other material which will be stable in the presence of residual ozone and ozone in the gas phase above the water level.

v. Where necessary a system shall be provided between the contactor and the off-gas destruct unit to remove froth from the air and return the other to the contactor or other location acceptable to the state health officer. If foaming is expected to be excessive, then a potable water spray system shall be placed in the contactor head space.

vi. All openings into the contactor for pipe connections, hatchways, etc. shall be properly sealed using welds or ozone resistant gaskets such as Teflon or Hypalon.

vii. Multiple sampling ports shall be provided to enable sampling of each compartment's effluent water and to confirm "CT" calculations.

viii. A pressure/vacuum relief valve shall be provided in the contactor and piped to a location where there will be no damage to the destruction unit.

ix. The diffusion system shall work on a countercurrent basis such that the ozone is fed at the bottom of the vessel and water is fed at the top of the vessel.

x. The depth of water in bubble diffuser contactors shall be a minimum of 18 feet. The contactor should also have a minimum of 3 feet of freeboard to allow for foaming.

xi. All contactors shall have provisions for cleaning, maintenance and drainage of the contactor. Each contactor compartment shall also be equipped with an access hatchway.

xii. Aeration diffusers shall be fully serviceable by either cleaning or replacement.

b. Other Contactors. Other contactors, such as the venturi or aspirating turbine mixer contactor, may be approved by the state health officer provided adequate ozone transfer is achieved and the required contact times and residuals can be met and verified.

5. Ozone Destruction Unit. Design criteria for ozone destruction unit shall be as follows.

a. A system for treating the final off-gas from each contactor shall be provided in order to meet safety and air quality standards. Acceptable systems include thermal destruction and thermal/catalytic destruction units.

b. The maximum allowable ozone concentration in the discharge is 0.1 ppm (by volume).

c. At least two units shall be provided which are each capable of handling the entire gas flow.

d. Exhaust blowers shall be provided in order to draw off-gas from the contactor into the destruct unit.

e. Catalysts shall be protected from froth, moisture and other impurities which may harm the catalyst.

f. The catalyst and heating elements shall be located where they can easily be reached for maintenance.

6. Piping Materials. Only low carbon 304L and 316L stainless steels shall be used for ozone service.

7. Joints and Connections. Design criteria for ozone joints and connections shall be as follows.

a. Connections on piping used for ozone service are to be welded where possible.

b. Connections with meters, valves or other equipment are to be made with flanged joints with ozone resistant gaskets, such as Teflon of Hypalon.

c. A positive closing plug or butterfly valve plus a leak-proof check valve shall be provided in the piping between the generator and the contactor to prevent moisture reaching the generator.

8. Instrumentation. Design criteria for ozone instrumentation shall be as follows.

a. Pressure gauges shall be provided at the discharge from the air compressor, at the inlet to the refrigeration dryers, at the inlet and outlet of the desiccant dryers, at the inlet to the ozone generators and contactors and at the inlet to the ozone destruction unit.

b. Electric power meters shall be provided for measuring the electric power supplied to the ozone generators. Each generator shall have a trip which shuts down the generator when the wattage exceeds a certain preset level.

c. Dew point monitors shall be provided for measuring the moisture of the feed gas from the desiccant dryers. Because it is critical to maintain the specified dew point, it is recommended that continuous recording charts be used for dew point monitoring which will allow for proper adjustment of the dryer cycle. Where there is potential for moisture entering the ozone generator from downstream of the unit or where moisture accumulation can occur in the generator during shutdown, post-generator dew point monitors shall be used.

d. Air flow meters shall be provided for measuring air flow from the desiccant dryers to each of other ozone generators, air flow to each contactor and purge air flow to the desiccant dryers.

e. Temperature gauges shall be provided for the inlet and outlet of the ozone cooling water and the inlet and outlet of the ozone generator feed gas, and, if necessary, for the inlet and outlet of the ozone power supply cooling water.

f. Water flow meters shall be installed to monitor the flow of cooling water to the ozone generators and, if necessary, to the ozone power supply.

g. Ozone monitors shall be installed to measure zone concentration in both the feed-gas and off-gas from the contactor and in the off-gas from the destruct unit. For disinfection systems, monitors shall also be provided for monitoring ozone residuals in the water. The number and location of ozone residual monitors shall be such that the amount of time that the water is in contact with the ozone residual can be determined.

h. A minimum of one ambient ozone monitor shall be installed in the vicinity of the contactor and a minimum of one shall be installed in the vicinity of the generator. Ozone monitors shall also be installed in any areas where ozone gas may accumulate.

9. Alarms. The following alarm/shutdown systems shall be considered at each installation:

a. dew point shutdown/alarm. This system should shut down the generator in the event the system dew point exceeds -76ºF (-60ºC);

b. ozone generator cooling water flow shutdown/alarm. This system should shut down the generator in the event that cooling water flows decrease to the point that generator damage could occur;

c. ozone power supply cooling water flow shutdown/alarm. This system should shut down the power supply in the event that cooling water flow decreases to the point that damage could occur to the power supply;

d. ozone generator cooling water temperature shutdown/alarm. This system should shutdown the generator if either the inlet or outlet cooling water exceeds a certain preset temperature;

e. ozone power supply cooling water temperature shutdown/alarm. This system should shutdown the power supply if either the inlet or outlet cooling water exceeds a certain preset temperature;

f. ozone generator inlet feed-gas temperature shutdown/alarm. This system should shutdown the generator if the feed-gas temperature is above a preset value;

g. ambient ozone concentration shutdown/alarm. The alarm should sound when the ozone level in the ambient air exceeds 0.1 ppm or a lower value chosen by the water supplier. Ozone generator shutdown should occur when ambient ozone levels exceed 0.3 ppm (or a lower value) in either the vicinity of the ozone generator or the contactor; and

h. ozone destruct temperature alarm. The alarm should sound when temperature exceeds a preset value.

10. Safety. Design criteria for ozone safety shall be as follows.

a. The maximum allowable ozone concentration in the air to which workers may be exposed must not exceed 0.1 ppm (by volume).

b. Emergency exhaust fans shall be provided in the rooms containing the ozone generators to remove ozone gas if leakage occurs.

c. A sign shall be posted indicating "No smoking, oxygen in use" at all entrances to the treatment plant. In addition, no flammable or combustible materials shall be stored within the oxygen generator areas.

I. Chlorine Dioxide. When choosing chlorine dioxide, consideration must be given to formation of the regulated byproducts and chlorite.

1. Chlorine Dioxide Generators. Chlorine dioxide generation equipment shall be factory assembled pre-engineered units with a minimum efficiency of 95 percent. The excess free chlorine shall not exceed five percent of the theoretical stoichiometric concentration required. Generators designed or intended to operate outside of this criteria shall require justification and be considered on a case-by-case

basis. Generator yield shall be defined as the ratio of chlorine dioxide generated to the theoretical stoichiometric maximum, as presented in EPA's Alternative Disinfectants and Oxidants Guidance Manual, Section 4.2.2 (EPA 815-R-99-014, April 1999).

a. Generators shall be designed, built and certified in compliance to NSF 61.

b. Bench scale testing shall be conducted to determine chlorine dioxide demand and decay kinetics for the specific water being treated in order to establish the correct design dose for required log inactivation compliance (if required), oxidation reactions, and chlorite generation.

c. An operation and maintenance manual (O&M) shall be provided. The O&M shall cover, at a minimum, operating instructions, identification and location of components, maintenance information and checklists; manufacturer's product information (including trouble shooting information, a parts list and parts order form, special tools, spare parts list, etc.) and a chlorine dioxide and chlorite residual monitoring action plan (RMAP). The RMAP shall identify actions to be taken by properly trained certified operators in the event that the chlorine dioxide residual or chlorite level meet or exceed specified maximum levels at specified testing locations (e.g., generator effluent, treatment units, point-of-entry).

d. Certified operators charged with handling and/or conducting chlorine dioxide and chlorite testing shall be properly trained on the production and testing equipment, the generator O&M manual, and the RMAP. Documentation of training shall be signed by the individual having responsible authority over the operators. Training documentation shall be provided to the OPH District Office and maintained on-site for review during sanitary surveys.

2. Feed and storage facilities. When chlorine gas and sodium chlorite are used feed and storage facilities shall comply with §209.A and §209.C of this Part, respectively. Sodium hypochlorite feed and storage facilities shall comply with §209.D of this Part. All chlorine dioxide feed and storage facilities shall comply with §179.I.5 and §179.I.6 of this Part.

3. Other design requirements shall include the following.

a. The design shall comply with all applicable portions of §179.B, §179.C, and §179.F of this Part.

b. Alarms shall be provided to indicate a lack of chemical (chlorine and sodium chlorite) or motive water flow.

4. Public Notification. Notification of a change in disinfection practices and the schedule for the changes shall be made known to the public; particularly to hospitals, kidney dialysis facilities, and fish breeders, as chlorine dioxide and its byproducts may have similar effects as chloramines.

5. Chlorine Dioxide Feed System. Design criteria for chlorine dioxide feed system shall be as follows.

a. Use fiberglass reinforced vinyl ester plastic (FRP) or high density linear polyethylene (HDLPE) tanks with no insulation.

b. If centrifugal pumps are used, provide Teflon packing material. Pump motors must be totally enclosed, fan-cooled, equipped with permanently sealed bearings, and equipped with double mechanical seals or other means to prevent leakage.

c. Provide chlorinated PVC, vinyl ester or Teflon piping material. Do not use carbon steel or stainless steel piping systems.

d. Provide glass view ports for the reactor if it is not made of transparent material.

e. All chlorite solutions shall have concentrations less than 30 percent. Higher strength solutions are susceptible to crystallization and stratification.

6. Chlorine Dioxide Storage Requirements. Design criteria for chlorine dioxide storage shall be as follows.

a. Chlorine dioxide storage and operating area shall conform to the following.

i. The chlorine dioxide facility shall be physically located in a separate room from other water treatment plant operating areas.

ii. The chlorine dioxide area shall have a ventilation system separate from other operating areas.

iii. Provision shall be made to ventilate the chlorine dioxide facility area and maintain the ambient air chlorine dioxide concentrations below the Permissible Exposure Limit (PEL).

(a). The ventilating fan(s) take suction near the floor, as far as practical from the door and air inlet, with the point of discharge so located as not to contaminate air inlets of any rooms or structures.

(b). Air inlets are provided near the ceiling.

(c). Air inlets and outlets shall be louvered.

(d). Separate switches for the fans are outside and near the entrance of the facility.

iv. There shall be observation windows through which the operating area can be observed from outside the room to ensure operator safety.

v. Manual switches to the light in the operating area shall be located outside the door to the room.

vi. An emergency shutoff control to shut flows to the generator shall be located outside the operating area.

vii. Gaseous chlorine feed to the chlorine dioxide generator shall enter the chlorine dioxide facility area through lines which can only feed to vacuum.

viii. There shall not be any open drains in the chlorine dioxide operating area.

J. Ultraviolet Light. Any Ultraviolet unit installed for treatment of cryptosporidium is required to meet the requirements of the USEPA's 2006 Ultraviolet Disinfection Guidance Manual.

K. Other disinfecting agents. Use of disinfecting agents other than those listed shall be approved by the state health officer prior to preparation of final plans and specifications.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:318 (February 2018), effective August 1, 2018.

**§181. Softening**

A. Lime or Lime-Soda Process. Design standards for rapid mix, flocculation and sedimentation are in §175 of this Part. Additional consideration must be given to the following process elements.

1. Hydraulics. When split treatment is used, the bypass line should be sized to carry total plant flow, and an accurate means of measuring and splitting the flow shall be provided.

2. Rapid Mix. Rapid mix detention times should be instantaneous, but not longer than 30 seconds with adequate velocity gradients to keep the lime particles dispersed.

3. Stabilization. Equipment for stabilization of water softened by the lime or lime-soda process is required. (see §189 of this Part).

4. Sludge Collection. A means for sludge removal shall be provided in the sedimentation basin.

5. Sludge Disposal. Provisions shall be included for proper disposal of softening sludges. (see Subchapter F. §§257-275 of this Part).

B. Cation Exchange Process. Design criteria for cation exchange process shall be as follows.

1. Pre-treatment requirements. Iron, manganese, or a combination of the two, should not exceed 0.3 mg/L in the water as applied to the ion exchange resin. Pre-treatment is required when the content of iron, manganese, or a combination of the two, is one milligram per liter or more (see §187 of this Part). Waters having 5 units or more turbidity should not be applied directly to the cation exchange softener.

2. 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 shall be used unless manual regeneration is justified and is approved by the state health officer. A manual override shall be provided on all automatic controls.

3. Exchange Capacity. The design capacity shall be in accordance with the manufacturer's specifications for hardness removal.

4. Depth of Resin. The depth of the exchange resin shall not be less than three feet.

5. Flow Rates. The rate of softening shall not exceed seven gallons per minute per square foot of bed area and the backwash rate shall be between six and eight gallons per minute per square foot of bed area. Rate-of-flow controllers or the equivalent shall be installed for the above purposes.

6. Freeboard. The freeboard will depend upon the size and specific gravity of the resin and the direction of water flow. Adequate freeboard shall be provided to prevent loss of media during backwashing.

7. 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 §177.A.6 and §177.A.7 of this Part).

8. Brine Distribution. Facilities should be included for even distribution of the brine over the entire surface of both upflow and downflow units.

9. Cross-Connection Control. Backwash, rinse and air relief discharge pipes shall be installed in such a manner as to prevent any possibility of back-siphonage.

10. Bypass Piping and Equipment. Bypass shall be provided around softening units to produce a blended water of desirable hardness. Totalizing meters shall be installed on the bypass line and on each softener unit. The bypass line shall have a shutoff valve and should have an automatic proportioning or regulating device.

11. Additional Limitations. When the applied water contains a chlorine residual, the cation exchange resin shall be a type that is not damaged by residual chlorine.

12. Sampling Taps. A means of collecting samples shall be provided for the collection of representative samples. If sample taps are provided, they shall be Smooth-nose type. The taps sampling locations shall be located to provide for sampling of the softener influent, effluent and blended water. The sampling locations for the blended water shall be at least 20 feet downstream from the point of blending.

13. Brine and Salt Storage Tanks. Design criteria for brine and salt storage tanks shall be as follows.

a. Salt dissolving or brine tanks and wet salt storage tanks shall be covered and must be corrosion-resistant.

b. The make-up water inlet shall be protected from back-siphonage.

c. Wet salt storage basins shall be equipped with manholes or hatchways for access and for direct dumping of salt from truck or railcar. Openings shall be provided with raised curbs and watertight covers having overlapping edges. Each cover shall be hinged on one side, and shall have locking device.

d. Overflows, where provided, shall be protected with corrosion resistant screens and must terminate with either a turned downed bend having a proper free fall discharge or a self-closing flap valve.

e. The salt shall be supported on graduated layers of gravel placed over a brine collection system.

14. Stabilization. Refer to §189 of this Part.

15. Waste Disposal. Suitable disposal shall be provided for brine waste (see Subchapter F. §§257-275 of this Part).

16. Construction Materials. Pipes and contact materials shall be resistant to the aggressiveness of salt. Steel and concrete must be coated with a non-leaching protective coating which is compatible with salt and brine.

17. Housing. Bagged salt and dry bulk salt storage shall be enclosed and separated from other operating areas in order to prevent damage to equipment.

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### §183. Anion Exchange Treatment

A. Pre-Treatment Requirements. Iron, manganese or a combination of the two, should not exceed 0.3 mg/L in the water as applied to the ion exchange resin. Pre-treatment is required when a combination of iron and manganese exceeds 0.5 mg/L.

B. Design criteria for anion exchange treatment is as follows.

1. Anion exchange units are typically of the pressure type, down flow design. Automatic regeneration based on volume of water treated shall be used unless manual regeneration is justified and is approved by the state health officer. A manual override shall be provided on all automatic controls.

2. If a portion of the water is bypassed around the units and blended with treated water, the maximum blend ratio allowable must be determined based on the highest

anticipated raw water contaminant level. If bypassing is provided, a totalizing meter and a proportioning or regulating device or flow regulating valves shall be provided on the bypass line.

C. Number of Units. At least two units shall be provided. The treatment capacity shall be capable of producing the water at the average daily flow at the maximum month of the plant at a level below the MCL of the contaminant being removed, with one exchange unit out of service.

D. Type of Media. The anion exchange media shall be of the type required to for the contaminant being removed.

E. Flow Rates. The treatment flow rate should not exceed 5 gallons per minute per square foot of bed area (20 cm/minute down flow rate). The backwash flow rate should be approximately 4.0 to 6.0 gallons per minute per square foot of bed area (16 to 24 cm/minute rise rate). The regeneration rate should be approximately 1.0 gallon per minute per square foot of bed area (4 cm/minute rise rate) with a fast rinse approximately equal to the service flow rate.

F. Freeboard. Adequate freeboard shall be provided to accommodate the backwash flow rate of the unit.

G. Miscellaneous Appurtenances. Miscellaneous appurtenances shall include the following.

1. The system shall be designed to include an adequate under drain and supporting gravel system and brine distribution equipment.

2. Sample taps, and brine and salt storage shall be as required in §181.B.12 and §181.B.13 of this Part.

H. Cross Connection Control. Backwash, rinse and air relief discharge pipes shall be installed in such a manner as to prevent any possibility of back-siphonage.

I. Construction Materials. Pipes and contact materials must be resistant to the aggressiveness of salt. Plastic and red brass are acceptable materials. Steel and concrete shall be coated with a non-leaching protective coating which is compatible with salt and brine.

J. Housing. Bagged salt and dry bulk salt storage shall be enclosed and separated from other operating areas in order to prevent damage to equipment.

K. Preconditioning of the Media. Prior to startup of the equipment, the media shall be regenerated with no less than two bed volumes of water containing sodium chloride followed by an adequate rinse.

L. Waste Disposal. Suitable disposal must be provided for brine waste (see Subchapter F. §§257-275 of this Part).

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### §185. Aeration

A. Aeration processes generally are used in two types of treatment applications. One is the transfer of a gas to water (e.g., adding oxygen to assist in iron and/or manganese removal) and is called gas absorption, or aeration. The second is the removal of gas from water (reduce or remove objectionable amounts of carbon dioxide, hydrogen sulfide, etc. or reduce the concentration of taste and odor-causing substances or removal of volatile organic compounds) and is classified as desorption or air stripping. The materials used in the construction of the aerator(s) shall meet NSF/ANSI 61 or be approved by the state health officer.

1. Natural Draft Aeration. Design shall provide:

a. perforations in the distribution pan 3/16 to 1/2 inches in diameter, spaced 1 to 3 inches on centers 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 12 inches;

d. loading at a rate of 1 to 5 gallons per minute for each square foot of total tray area (2.5 - 12.5 m/hr);

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; and

g. protection from insects by 24-mesh screen when used in applications where the water will not be subject to open vessels in downstream treatment processes.

2. Forced or Induced Draft Aeration. Devices shall be designed to:

a. insure adequate counter current of air through the enclosed aerator column;

b. exhaust air directly to the outside atmosphere;

c. include a down-turned air outlet and inlet. Protection from insects by 24-mesh screen when used in applications where the water will not be subject to open vessels in downstream treatment processes;

d. be such that air introduced in the column shall be as free from obnoxious fumes, dust, and dirt as possible;

e. 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;

f. provide loading at a rate of 1 to 5 gallons per minute for each square foot of total tray area (2.5 - 12.5 m/hr);

g. insure that the water outlet is adequately sealed to prevent unwarranted loss of air;

h. when trays are used, discharge through a series of five or more trays with separation of trays not less than six inches or as approved by the state health officer;

i. provide distribution of water uniformly over the top tray; and

j. be of durable material resistant to the aggressiveness of the water and dissolved gases.

3. Spray Aeration. Design shall provide:

a. a hydraulic head of between 5 - 25 feet;

b. nozzles, with the size, number, and spacing of the nozzles being dependent on the flowrate, space, and the amount of head available;

c. nozzle diameters in the range of 1 to 1.5 inches to minimize clogging; and

d. an enclosed basin to contain the spray. Any openings for ventilation, etc. shall be protected from insects by 24-mesh screen when used in applications where the water will not be subject to open vessels in downstream treatment processes.

4. Pressure Aeration. Pressure aeration shall be used for oxidation and biological filtration purposes only. Filters following pressure aeration must have adequate exhaust devices for release of air. Pressure aeration devices shall be designed to:

a. give thorough mixing of compressed air with water being treated; and

b. provide screened and filtered air, free of obnoxious fumes, dust, dirt and other contaminants.

5. Packed Tower Aeration. Packed tower aeration (PTA) which is also known as air stripping involves passing water down through a column of packing material while pumping air counter-currently up through the packing. PTA is used for the removal of volatile organic chemicals, trihalomethanes, carbon dioxide, and radon.

a. Process design for PTA includes the following.

i. The tower shall be designed to reduce contaminants to below the maximum contaminant level (MCL).

ii. The ratio of the packing height to column diameter should be at least 7:1 for the pilot unit and at least 10:1 for the full scale tower. The type and size of the packing used in the full scale unit shall be the same as that used in the pilot work.

iii. The minimum volumetric air to water ratio at peak water flow should be 25:1 and the maximum should be 80:1. Air to water ratios outside these ranges should not be used without prior approval from the state health officer.

iv. The design shall consider potential fouling problems from calcium carbonate and iron precipitation and from bacterial growth

b. Materials of Construction. The tower shall be constructed of a material that is suitable for contact with the water being treated. Packing materials shall be resistant to the aggressiveness of the water, dissolved gases and cleaning materials and shall be suitable for contact with potable water.

c. Water Flow System. Design of the water flow system includes the following.

i. Water should be distributed uniformly at the top of the tower using spray nozzles or orifice-type distributor trays that prevent short circuiting.

ii. A mist eliminator shall be provided above the water distributor system.

iii. A side wiper redistribution ring shall be provided at least every 10 feet in order to prevent water channeling along the tower wall and short circuiting.

iv. Sample taps shall be provided in the influent and effluent piping.

v. The effluent sump, if provided, shall have easy access for cleaning purposes and be equipped with a drain valve. The drain shall not be connected directly to any storm or sanitary sewer.

vi. A blow-off line should be provided in the effluent piping to allow for discharge of water/chemicals used to clean the tower.

vii. A means of measuring the water flow to each tower shall be provided.

viii. An overflow line shall be provided which discharges 12 to 14 inches above a splash pad or drainage inlet. Proper drainage shall be provided to prevent flooding of the area.

ix. Means shall be provided to prevent flooding of the air blower.

x. The water influent pipe should be supported separately from the tower's main structural support.

d. Air Flow System. Design of the air flow system includes the following.

i. The air inlet to the blower and the tower discharge vent shall be downturned and protected with a non-corrodible 24-mesh screen to prevent contamination from extraneous matter.

ii. The air inlet shall be in a protected location.

iii. A means of ensuring that air is being provided when water is being delivered to the air strippers shall be provided.

e. The following features shall be provided.

i. A sufficient number of access ports with a minimum diameter of 24 inches to facilitate inspection, media replacement, media cleaning and maintenance of the interior.

ii. A method of cleaning the packing material when fouling may occur.

iii. An acceptable alternative treatment shall be available during periods of maintenance and operation interruptions when used for treatment of a primary contaminant. No bypass shall be provided unless specifically approved by the state health officer.

iv. Disinfection application points ahead of the tower to control biological growth.

v. Adequate packing support to allow free flow of water and to prevent deformation with deep packing heights.

6. 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 shall be designed to meet the particular needs of the water to be treated and are subject to the approval of the state health officer.

7. Protection of Aerators. All aerators except those discharging to lime softening or clarification plants shall be protected from contamination by birds, insects, wind borne debris, rainfall and water draining off the exterior of the aerator.

8. Bypass. A bypass should be provided for all aeration units except those installed to comply with maximum contaminant levels.

9. Redundancy. Redundant equipment shall be provided for units installed to comply with the Safe Drinking Water Act primary contaminants, unless otherwise approved by the state health officer.

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### §187. Iron and Manganese Control

A. 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 state health officer. It may be necessary to operate a pilot plant in order to gather all information applicable to the design. Consideration should be given to adjusting pH of the raw water to optimize the chemical reaction.

1. Design elements for removal by oxidation, detention and filtration are as follows.

a. Oxidation. Oxidation may be by aeration, as indicated in §185 of this Part, or by chemical oxidation with chlorine, potassium permanganate, sodium permanganate, ozone or chlorine dioxide.

b. Reaction. A detention time shall be provided following aeration to insure that the oxidation reactions are as complete as possible. The reaction tank/detention basin shall be designed to prevent short circuiting. If a reaction tank/detention basin is provided, it shall be provided with an overflow, vent and access hatch in accordance with §225.I, §225.J, and §225.K of this Part.

c. Sedimentation. Sedimentation basins shall be provided when treating water with high iron and/or manganese (≥ 7*SMCL) content, or where chemical coagulation is used to reduce the load on the filters. Provisions for sludge removal shall be made.

d. Filtration. Filters shall be provided and shall conform to §177 of this Part.

2. For removal by the lime-soda softening process, see §181.A of this Part.

3. Removal by manganese coated media filtration. This process consists of a continuous or batch feed of potassium permanganate to the influent of a manganese coated media filter.

a. Provisions should be made to apply the permanganate as far ahead of the filter as practical and to a point immediately before the filter.

c. An anthracite media cap of at least six inches or more as required by the state health officer shall be provided over manganese coated media.

d. Normal filtration rate shall be based on the manufacturer's performance studies.

e. Sample taps shall be provided:

i. for the raw water;

ii. immediately ahead of filtration; and

iii. at the filter effluent.

4. 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 or other oxidants.

5. Sequestration by Polyphosphates. The total phosphate applied shall not exceed 10 mg/L as phosphate (PO4). Possible adverse effects on corrosion must be addressed when phosphate addition is proposed for iron sequestering.

a. Feeding equipment shall conform to the requirements of Subchapter A "Chemical Application" §201-§209 of this Part.

b. Polyphosphates shall not be applied ahead of iron and manganese removal treatment.

c. The phosphate feed point shall be located at least five feet ahead of the oxidant feed point.

6. Sequestration by Sodium Silicates. Sodium silicate sequestration of iron and manganese is appropriate only for groundwater supplies prior to air contact. On-site pilot tests are required to determine the suitability of sodium silicate for the particular water and the minimum feed needed. Rapid oxidation of the metal ions such as by chlorine or chlorine dioxide must accompany or closely precede the sodium silicate addition. Injection of sodium silicate more than 15 seconds after oxidation may cause detectable loss of chemical efficiency. Dilution of feed solutions much below five per cent silica as SiO2 should also be avoided for the same reason. Sodium silicate treatment may be less effective for sequestering manganese than for iron.

a. Sodium silicate addition is applicable to waters containing up to 2 mg/L of iron, manganese or combination thereof.

b. Chlorine residuals shall be maintained throughout the distribution system to prevent biological breakdown of the sequestered iron.

c. The amount of silicate added shall be limited to 20 mg/L as SiO2, but the amount of added and naturally occurring silicate shall not exceed 60 mg/L as SiO2.

d. Feeding equipment shall conform to the requirements of Subchapter A "Chemical Application" §201-§209 of this Part.

e. Sodium silicate shall not be applied ahead of iron or manganese removal treatment.

7. Sampling taps. Smooth-nosed sampling taps shall be provided for control purposes. A means of collecting samples shall be provided for each raw water source, each treatment unit influent and each treatment unit effluent.

8. Testing equipment shall be provided for all plants. Where polyphosphate sequestration is practiced, appropriate phosphate testing equipment shall be provided that meets the requirements of §137.G of this Part.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:325 (February 2018), effective August 1, 2018.

**§189. Stabilization**

A. Carbon Dioxide Addition. Where liquid carbon dioxide is used, adequate precautions shall be taken to prevent carbon dioxide from entering the plant from the recarbonation process.

1. Consideration shall be given to the installation of a carbon dioxide alarm system with light and audio warning, especially in low areas.

2. Recarbonation tanks shall be located outside or be sealed and vented to the outside with adequate seals and adequate purge flow of air to ensure workers safety.

a. Provisions shall be made for draining the recarbonation basin and removing sludge.

B. Acid Addition. Design elements for acid addition include the following.

1. Feed equipment shall conform to Subchapter A "Chemical Application" §201-§209 of this Part.

2. Adequate precautions shall be taken for operator safety, such as not adding water to the concentrated acid. (see §207 and §209 of this Part).

C. Phosphates. The feeding of phosphates may be applicable for sequestering calcium, for corrosion control, and in conjunction with alkali feed following ion exchange softening.

1. Feed equipment shall conform to Subchapter A "Chemical Application" §201-§209 of this Part.

2. Stock phosphate solution shall be kept covered and disinfected by carrying approximately 10 mg/L free chlorine

residual unless the phosphate is not able to support bacterial growth. Phosphate solutions having a pH of 2.0 or less may also be exempted from this requirement by the state health officer.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:326 (February 2018), effective August 1, 2018.

### §191. Taste and Odor Control

A. Powdered Activated Carbon. Design elements for powdered activated carbon (PAC) include the following.

1. Continuous agitation or resuspension equipment shall be provided to keep the carbon from depositing in the slurry storage tank.

2. Provision shall be made for adequate dust control.

3. The required rate of feed of carbon in a water treatment plant depends upon the tastes and/or odors involved, but provision should be made for adding from 0.1 milligrams per liter to at least 40 milligrams per liter.

4. Powdered activated carbon shall be handled as a potentially combustible material.

B. Granular Activated Carbon. Replacement of anthracite with granular activated carbon (GAC) may be considered as a control measure for geosmin and methyl isoborneol (MIB) taste and odors from algae blooms. Demonstration studies may be required by the state health officer. See §177.A.6.iv of this Part for application within filters.

C. 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 milligrams per liter as copper in the plant effluent or distribution system. Care shall be taken to assure an even distribution of the chemical within the treatment area.

D. For aeration, see §185 of this Part.

E. Ozone. Ozonation can be used as a means of taste and odor control. Adequate contact time shall be provided to complete the chemical reactions involved. Ozone is generally more desirable for treating water with high threshold odors. (See §179.H of this Part)

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:327 (February 2018), effective August 1, 2018.

## Chapter 2. Public Water System Construction, Operation and Maintenance

## Subchapter A. Chemical Application

### §201. General Requirements

A. General. Chemicals applied to treat potable drinking water shall meet the requirements of NSF/ANSI Standard 60 as certified by an ANSI-accredited testing agency.

B. Plans and Specifications. Plans and specifications shall be submitted for review and approval, as provided for in Chapter 1, Subchapter A of this Part, and shall include:

1. descriptions of feed equipment, including maximum and minimum feed ranges;

2. location of feeders, piping layout and points of application;

3. storage and handling facilities;

4. operating and control procedures including proposed application rates;

5. description of testing equipment; and

6. description of system including all tanks with capacities, (with drains, overflows, and vents), feeders, transfer pumps, connecting piping, valves, points of application, backflow prevention devices, air gaps, secondary containment, and safety eye washes and showers.

C. Chemical Application. Chemicals shall be applied to the water at such points and by such means as to:

1. assure maximum efficiency of treatment;

2. assure maximum safety to consumer;

3. provide maximum safety to operators;

4. assure satisfactory mixing of the chemicals with the water;

5. provide maximum flexibility of operation through various points of application, when appropriate; and

6. prevent backflow or back-siphonage between multiple points of feed through common manifolds.

D. General equipment design shall be such that:

1. feeders will be able to supply, at all times, the necessary amounts of chemicals at an accurate rate, throughout the range of feed;

2. chemical-contact materials and surfaces are resistant to the aggressiveness of the chemical solution;

3. corrosive chemicals are introduced in such a manner as to minimize potential for corrosion;

4. chemicals that are incompatible are not stored or handled together;

5. all chemicals are conducted from the feeder to the point of application in separate conduits;

6. chemical feeders are as near as practical to the feed point;

7. chemical feeders and pumps shall operate at no lower than 20 percent of the feed range unless two fully independent adjustment mechanisms such as pump pulse rate and stroke length are fitted then the pump shall operate at no lower than 10 percent of the rated maximum; and

8. gravity may be used where practical.

E. For each chemical the information submitted shall include:

1. documentation that the chemical is certified to NSF/ANSI Standard 60;

2. specifications for the chemical to be used;

3. purpose of the chemical;

4. proposed minimum non-zero, average and maximum dosages, solution strength or purity (as applicable), and specific gravity or bulk density;

5. method for independent calculation of amount fed daily; and

6. safety data sheet (SDS).

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:327 (February 2018), effective August 1, 2018.

### §203. Feed Equipment

A. Feeder Redundancy. Where a chemical feed and booster pump is necessary for the protection of the supply, such as chlorination, coagulation or other essential processes, a standby unit or a combination of units of sufficient size to meet capacity shall be provided to replace the largest unit when out of service.

1. A separate feeder shall be used for each chemical applied.

2. Spare parts shall be available on site for each type of feeder and chemical booster pump to replace parts which are subject to wear and damage.

B. Control. Feeders may be manually or automatically controlled.

1. Automatic controls shall be designed so as to allow override by manual controls.

2. Chemical feed rates shall be proportional to the flow stream being dosed.

3. A means to measure the flow stream being dosed shall be provided in order to determine chemical feed rates.

4. Provisions shall be made for measuring the quantities of chemicals used.

5. Weighing scales:

a. shall be provided for weighing cylinders at all plants utilizing chlorine gas;

b. shall be required for fluoride solution fed from supply drums or carboys;

c. should be provided for volumetric dry chemical feeders;

d. shall be capable of providing reasonable precision in relation to average daily dose; and

e. shall not be required for chlorine gas cylinders when used as a backup or standby source of chlorine gas.

6. Where conditions warrant, for example with rapidly fluctuating intake turbidity, coagulant and coagulant aid addition may be made according to turbidity, streaming current or other sensed parameter.

C. Dry Chemical Feeders. Dry chemical feeders shall:

1. measure chemicals volumetrically (see §203.B.5.c of this Part) or gravimetrically;

2. provide adequate solution/slurry water and agitation of the chemical at the point of placing in solution/slurry; and

3. completely enclose chemicals to reduce emission of dust to the operating room.

D. Positive Displacement Solution Feed Pumps. Positive displacement type solution feed pumps should be used to feed liquid chemicals.

1. Pumps shall be capable of operating at the required maximum rate against the maximum head conditions found at the point of injection.

2. Equipment utilized to readily measure feed rates in the pumped liquid shall be designed to handle the liquid being measured and shall be provided.

3. A pressure relief valve should be provided on the pump discharge line.

E. Siphon Control for Liquid Chemical Feeders. Liquid chemical feeders shall be such that chemical solutions cannot be siphoned or overfed into the water supply, by:

1. assuring discharge at a point of positive pressure;

2. providing vacuum relief;

3. providing a suitable air gap, or anti-siphon device; or

4. providing other suitable means or combinations as necessary.

F. Cross-connection control shall be provided to assure that:

1. the service water lines discharging to liquid storage tanks shall be properly protected from backflow as required by the state health officer;

2. chemical solutions or slurries cannot be siphoned through liquid chemical feeders into the water supply as required in §203.E of this Part;

3. no direct connection exists between any sewer and a drain or overflow from the liquid chemical feeder, liquid storage chamber or tank by providing that all drains terminate at least six inches or two pipe diameters, whichever is greater, above the overflow rim of a receiving sump, conduit or waste receptacle;

4. in the absence of other cross connection control measures, separate feeders shall be provided for chemical feed systems that have feed points at both unfiltered and filtered water locations such that all unfiltered water feed points are fed from one feeder, and that all filtered water feed points are fed from another feeder.

G. Location. Chemical feed equipment:

1. shall be readily accessible for servicing, repair, and observation of operation;

2. should be located in a separate room if hazards and dust problems may exist; and

3. should be conveniently located near points of application to minimize length of feed lines.

H. In-plant water supply shall be:

1. ample in quantity and adequate in pressure;

2. provided with means for measurement when preparing specific solution concentrations by dilution;

3. properly treated for hardness, when necessary;

4. properly protected against backflow; and

5. obtained from the finished water supply, or from a location sufficiently downstream of any chemical feed point to assure adequate mixing.

I. Supply and Storage of Chemicals. A minimum of 10 days of chemical supply shall be on site at all times that will allow the facility to satisfy a maximum average day demand for all ten days. Additional supply of chemicals that will not degrade is recommended. Chemicals for which the EPA has established a threshold quantity for risk management plan purposes need not be stored on site provided the system has a plan in place for effective timely deliveries of such chemicals.

1. Storage space shall:

a. be convenient and provide for efficient handling of chemicals;

b. have dry storage conditions; and

c. provide a minimum storage volume of 1.5 truck loads where purchase can only be made by truck load lots.

2. Storage tanks and pipelines for liquid chemicals shall be specified for use with individual chemicals and not used for different chemicals. Offloading areas shall be clearly labeled to prevent accidental cross-contamination.

3. Chemicals shall be stored in covered or unopened shipping containers, unless the chemical is transferred into an approved storage unit.

4. Liquid chemical storage tanks shall:

a. have a means to readily determine the volume of liquid retained in the storage tank; and,

b. have an overflow and a receiving basin capable of receiving accidental spills or overflows without uncontrolled discharge; a common receiving basin may be provided for each group of compatible chemicals, which provides sufficient containment volume to prevent accidental discharge in the event of failure of the largest tank.

J. Bulk Liquid Storage Tanks. Bulk liquid storage tanks shall comply with the following requirements:

1. A means which is consistent with the nature of the chemical stored shall be provided in a liquid storage tank to maintain a uniform chemical strength. Continuous agitation shall be provided to maintain slurries in suspension.

2. A means to assure continuity of chemicals to treat the water to comply with federal primary drinking water standards and state drinking water regulations shall be provided while servicing a liquid storage tank.

3. A means shall be provided to readily measure the liquid level in the liquid storage tank.

4. Liquid storage tanks shall have a lid. Large liquid storage tanks with access openings shall have such openings curbed and fitted with overhanging covers or, bolted and gasketed manways.

5. Subsurface locations for liquid storage tanks shall:

a. be free from sources of possible contamination; and

b. assure positive drainage away from the area for ground waters, accumulated water, chemical spills and overflows.

6. Overflow pipes, when provided, shall:

a. be turned downward, with the end screened;

b. have a free fall discharge; and

c. be located where noticeable.

7. Liquid storage tanks must be vented, but not through vents in common with other chemicals or day tanks. Acid storage tanks shall be vented to the outside atmosphere.

8. Each liquid storage tank shall be provided with a method to be drained.

9. Each liquid storage tank shall be protected against contamination by cross-connections.

10. Liquid storage tanks shall be located and secondary containment provided so that chemicals from equipment failure, spillage or accidental drainage shall not enter the water in conduits, treatment or storage basins. Secondary containment volumes shall be able to hold the volume of the largest storage tank. Piping shall be designed to minimize or contain chemical spills in the event of pipe ruptures.

K. Overfeed Protection. Overfeed protection shall be provided and comply with the following requirements.

1. A LDH-approved overfeed process control and/or procedure shall be provided for liquid chemical feeds. The process control and/or procedure must be in addition to the requirements of §203.E (siphon control) of this Part. When day tanks are used for overfeed protection, day tanks shall meet requirements of §203.K.3 of this Part.

2. Day tanks shall be provided when bulk storage of fluoride is used.

3. When day tanks are used, all day tanks shall meet all of the following requirements and requirements of §203.J of this Part, except that shipping containers do not require §203.J.6 (overflow pipes) and §203.J.8. (drain method) and day tanks do not require secondary containment.

a. Day tanks should hold no more than a 30 hour supply.

b. Day tanks shall be scale-mounted, or have a calibrated gauge painted or mounted on the side if liquid level can be observed in a gauge tube or through translucent sidewalls of the tank. In opaque tanks, a gauge rod may be used.

c. Except for fluorosilicic acid, hand pumps may be provided for transfer from a shipping container. A tip rack may be used to permit withdrawal into a bucket from a spigot.

d. A means which is consistent with the nature of the chemical solution shall be provided to maintain uniform chemical strength in a day tank. Continuous agitation shall be provided to maintain chemical slurries in suspension.

e. Tanks and tank refilling line entry points shall be clearly labeled with the name of the chemical contained.

f. Filling of day tanks shall not be automated, unless redundancy of controls is provided.

g. Where motor-driven transfer pumps are provided, an automated means to prevent an overflow shall be provided.

L. Feed Lines. Feed lines:

1. should be as short as possible;

2. should be of durable, corrosion-resistant material;

3. be easily accessible throughout the entire length;

4. be readily cleanable;

5. shall be protected from freezing;

6. should slope upward from the chemical source to the feeder when conveying gases;

7. shall be designed consistent with scale-forming or solids depositing properties of the water, chemical, solution or mixtures conveyed; and

8. should be color coded and labeled.

M. Handling. Carts, elevators and other appropriate means shall be provided for lifting chemical containers to minimize excessive lifting by operators.

1. Provisions shall be made for disposing of empty bags, drums, carboys, or barrels by an approved procedure which will minimize exposure to dusts.

2. Provisions shall be made for the proper transfer of dry chemicals from shipping containers to storage bins or hoppers, in such a way as to minimize the quantity of dust which may enter the room in which the equipment is installed. Control should be provided by use of:

a. vacuum pneumatic equipment or closed conveyor systems;

b. facilities for emptying shipping containers in special enclosures, and/or;

c. exhaust fans and dust filters.

3. Provision shall be made for measuring quantities of chemicals used to prepare feed solutions.

N. Housing. Housing of feed equipment shall comply with the following.

1. Floor surfaces shall be smooth and impervious, slip-proof and well drained.

2. Vents from feeders, storage facilities and equipment exhaust shall discharge to the outside atmosphere above grade and remote from air intakes.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:327 (February 2018), effective August 1, 2018.

### §205. Chemicals

A. Chemical shipping containers shall be fully labeled to include:

1. chemical name, purity and concentration; and
2. supplier name and address.

B. Chemicals shall meet the appropriate ANSI/AWWA standards and/or be certified to NSF/ANSI Standard 60.

C. The state health officer may require assay of chemicals.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:330 (February 2018), effective August 1, 2018.

### §207. Operator Safety

A. Special provisions shall be made for ventilation of chlorine feed and storage rooms.

B. Respiratory protection equipment shall:

1. meet the requirements of the National Institute for Occupational Safety and Health (NIOSH);
2. be available where chlorine gas is handled;
3. shall be stored at a convenient heated location, but not be stored inside any room where chlorine is used or stored; and
4. if compressed air is used shall have at least a 30 minute capacity.

C. Leak detection for chlorine gas. A bottle of concentrated ammonium hydroxide (56 per cent ammonia 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. Where pressurized chlorine gas is present, continuous chlorine leak detection equipment is required and shall be equipped with both an audible alarm and a warning light.

D. Other protective equipment shall be provided as follows.

1. At least one pair of rubber gloves, a dust respirator of a type certified by NIOSH for toxic dusts, an apron or other protective clothing and goggles or face mask shall be provided for each operator on duty.
2. An appropriate deluge shower and eye washing device shall be installed where strong acids and alkalis are used or stored.
3. Other protective equipment should be provided as necessary.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:330 (February 2018), effective August 1, 2018.

### §209. Specific Chemicals

A. Chlorine Gas. Chlorinators should be housed in a room separate from but adjacent to the chlorine storage room.

1. Chlorinator rooms should be heated to 60°F, and be protected from excessive heat. Cylinders and gas lines should be protected from temperatures above that of the feed equipment.
2. Both the chlorine gas feed and storage rooms should be located in a corner of the building on the prevailing downwind side of the building and be away from entrances, windows, louvers, walkways, etc.
3. If chlorine gas feed and storage is enclosed, the chlorine gas shall be separated from other operating areas. Both the feed and storage rooms shall be constructed so as to meet the following requirements:
   a. a shatter resistant inspection window shall be installed in an interior wall unless secondary containment is provided for chlorine gas;
   b. all openings between the rooms and the remainder of the plant shall be sealed;
   c. doors shall be equipped with panic hardware, assuring ready means of exit and opening outward only to the building exterior;
   d. a ventilating fan with a capacity to complete one air change per minute when the room is occupied; where this is not appropriate due to the size of the room, a lesser rate may be considered;
   e. the ventilating fan shall take suction near the floor and as great a distance as is practical from the door and air inlet, with the point of discharge located so as not to contaminate air inlets to any rooms or structures;
   f. air inlets with corrosion resistant louvers shall be installed near the ceiling;
   g. air intake and exhaust louvers shall facilitate airtight closure;
   h. separate switches for the ventilating fan and for the lights shall be located outside and at the inspection window. Outside switches must be protected from vandalism. A signal light indicating ventilating fan operation shall be provided at each entrance when the fan can be controlled from more than one point;
   i. vents from chlorinator and storage areas must be screened and discharge to the outside atmosphere, above grade;
   j. floor drains are discouraged. Where provided, the floor drains must discharge to the outside of the building and not be connected to other internal or external drainage systems; and
   k. provisions should be made to chemically neutralize chlorine gas where feed and/or storage is located near residential or developed areas in the event of any measured chlorine release. The equipment must be sized to treat the entire contents of the largest storage container on site.
4. Chlorine gas not stored in a room shall be:
   a. protected from direct sunlight and windblown debris;
   b. shielded from public view;
   c. located inside a fenced and secure area;
   d. secured in a fixed position, and
   e. all chlorine pipelines shall be under vacuum with no pressure chlorine lines allowed.
5. Chlorine gas feed systems shall be of the vacuum type and include the following.
   a. vacuum regulators on all individual cylinders in service; and
   b. service water to injectors/eductors shall be of adequate supply and pressure to operate feed equipment

within the needed chlorine dosage range for the proposed system.

6. Pressurized chlorine feed lines shall not carry chlorine gas beyond the chlorinator room.

7. Full and empty cylinders of chlorine gas shall meet the following requirements:

a. housed only in the chlorine storage room or designated area conforming with §209.A.4 of this Part;

b. isolated from operating areas;

c. restrained in position;

d. stored in locked and/or secure rooms separate from ammonia storage; and

e. protected from direct sunlight or exposure to excessive heat.

B. Acids and Caustics. Acids and caustics shall:

1. be kept in closed corrosion-resistant shipping containers or bulk liquid storage tanks; and

2. not be handled in open vessels, but should be pumped in undiluted form to and from bulk liquid storage tanks and covered day tanks or from shipping containers through suitable hoses, to the point of treatment.

C. Sodium chlorite for chlorine dioxide generation. Proposals for the storage and use of sodium chlorite shall be approved by the state health officer prior to the preparation of final plans and specifications. Provisions shall be made for proper storage and handling of sodium chlorite to eliminate any danger of fire or explosion associated with its powerful oxidizing nature.

1. Storage. The storage of sodium chlorite shall comply with the following.

a. Sodium chlorite shall be stored by itself in a separate room and preferably shall be stored in an outside building detached from the water treatment facility. It shall be stored away from organic materials because many materials will catch fire and burn violently when in contact with sodium chlorite.

b. The storage structures shall be constructed of noncombustible materials.

c. If the storage structure shall be located in an area where a fire may occur, water shall be available to keep the sodium chlorite area cool enough to prevent heat induced explosive decomposition of the sodium chlorite.

2. Handling. The criteria for handling of sodium chlorite is as follows.

a. Care should be taken to prevent spillage.

b. An emergency plan of operation should be available for the clean-up of any spillage.

c. Storage drums shall be thoroughly flushed to an acceptable drain prior to recycling or disposal.

3. Feeders. Feeders shall comply with the following requirements.

a. Positive displacement feeders shall be provided.

b. Tubing for conveying sodium chlorite or chlorine dioxide solutions shall be Type 1 PVC, polyethylene or materials recommended by the manufacturer.

c. Chemical feeders may be installed in chlorine rooms if sufficient space is provided or in separate rooms meeting the requirements of §209.A.3 of this Part.

d. Feed lines shall be installed in a manner to prevent formation of gas pockets and shall terminate at a point of positive pressure.

e. Check valves shall be provided to prevent the backflow of chlorine into the sodium chlorite line.

D. Sodium Hypochlorite. Sodium hypochlorite storage and handling procedures should be arranged to minimize the slow natural decomposition process of sodium hypochlorite either by contamination or by exposure to more extreme storage conditions. In addition, feed rates should be regularly adjusted to compensate for this progressive loss in chlorine content.

1. Storage. The storage of sodium hypochlorite shall comply with the following.

a. Sodium hypochlorite shall be stored in the original shipping containers or in sodium hypochlorite compatible bulk liquid storage tanks.

b. Storage containers or tanks shall be located out of the sunlight in a cool area and shall be vented to the outside of the building when enclosed.

c. Wherever reasonably feasible, stored sodium hypochlorite shall be pumped undiluted to the point of addition. Where dilution is utilized, deionized or softened water should be used.

d. Storage areas, tanks, and pipe work shall be designed to avoid the possibility of uncontrolled discharges.

e. Reusable sodium hypochlorite storage containers shall be reserved for use with sodium hypochlorite only and shall not be exposed to contamination.

2. Feeders. Sodium hypochlorite feeders shall comply with the following.

a. Positive displacement pumps with sodium hypochlorite compatible materials for wetted surfaces shall be used.

b. To avoid air locking in smaller installations, small diameter suction lines shall be used with foot valves and degassing pump heads as required.

c. In larger installations flooded suction shall be used with pipe work arranged to ease escape of gas bubbles.

d. Calibration tubes or mass flow monitors which allow for direct physical checking of actual feed rates shall be provided.

e. Injectors shall be made removable for regular cleaning where hard water is to be treated.

E. Ammonia. Ammonia for chloramine formation may be added to water either as a water solution of ammonium sulfate, or as aqua ammonia, or as anhydrous ammonia (purified 100 percent ammonia in liquid or gaseous form). Special provisions required for each form of ammonia are listed below.

1. Ammonium Sulfate. A water solution is made by addition of ammonium sulfate solid to water with agitation. The tank and dosing equipment contact surfaces should be made of corrosion resistant non-metallic materials. Provision should be made for removal of the agitator after dissolving the solid. The tank should be fitted with an air-tight lid and vented outdoors. The application point should be at the center of treated water flow at a location where there is high velocity movement.

2. Aqua Ammonia (ammonium hydroxide). When the exception criteria in §209.E.2.i of this Part is not met, Aqua ammonia feed pumps and storage shall be enclosed and separated from other operating areas. The aqua ammonia room shall conform to §209.A.3 of this Part and to the following:

a. corrosion resistant, closed, pressurized tank shall be used for bulk liquid storage and day tanks, vented through inert liquid traps to a high point outside;

b. an incompatible connector or lockout provisions shall be provided to prevent accidental addition of other chemicals to the bulk liquid storage tank(s);

c. the bulk liquid storage tank(s) should be designed to avoid conditions where temperature increases cause the ammonia vapor pressure over the aqua ammonia to exceed atmospheric pressure. Such provisions shall include either:

i. refrigeration or other means of external cooling, and/or;

ii. dilution and mixing of the contents with water without opening the bulk liquid storage tank.

d. An exhaust fan shall be installed to withdraw air from high points in the room and makeup air shall be allowed to enter at a low point.

e. The aqua ammonia feed pump, regulators, and lines shall be fitted with pressure relief vents discharging outside the building away from any air intake and with water purge lines leading back to the headspace of the bulk storage tank.

f. The application point should be placed in a region of rapid, preferably turbulent, water flow.

g. Provisions should be made for easy access for removal of calcium scale deposits from the injector.

h. Provision of a modestly-sized scrubber capable of handling occasional minor emissions should be considered.

i. An exception to the requirement for enclosing aqua ammonia shall be made when aqua ammonia is stored in a manner which satisfies all of the following criteria:

i. protection is provided from direct sunlight and windblown debris;

ii. shielded from public view;

iii. located inside a fenced and secured area, and

iv. secured in a fixed position.

3. Anhydrous Ammonia. Anhydrous ammonia is readily available as a pure liquefied gas under moderate pressure in cylinders or as a cryogenic liquid boiling at $^{-}15°$ Celsius at atmospheric pressure. The liquid causes severe burns on skin contact.

a. When the exception criteria in §209.E.3.i of this Part is not met, anhydrous ammonia storage and feed systems (including heaters where required) shall be enclosed and separated from other works areas and constructed of corrosion resistant materials. Bulk anhydrous ammonia storage tanks holding more than 500 gallons shall not be located in an enclosed area.

b. An emergency air exhaust system, as in §209.A.3 of this Part but with an elevated intake, shall be provided in the ammonia storage room.

c. Leak detection systems shall be provided in all areas through which ammonia is piped.

d. Special vacuum breaker/regulator provisions must be made to avoid potentially violent results of backflow of water into cylinders or storage tanks.

e. Carrier water systems of soft or pre-softened water may be used to transport ammonia to the application point and to assist in mixing.

f. The ammonia injector should use a vacuum eductor or should consist of a perforated tube fitted with a closely fitting flexible rubber tubing seal punctured with a number of small slits to delay fouling by lime or other scale deposits.

g. Provision should be made for the periodic removal of lime or other scale deposits from injectors and carrier piping.

h. Consideration should be given to the provision of an emergency gas scrubber capable of absorbing the entire contents of the largest anhydrous ammonia storage unit whenever there is a risk to the public as a result of potential ammonia leaks.

i. An exception to the requirement for enclosing anhydrous ammonia shall be made when anhydrous ammonia is stored in a manner which satisfies all of the following criteria:

i. protection is provided from direct sunlight and windblown debris;

ii. shielded from public view;

iii. located inside a fenced and secured area, and

iv. secured in a fixed position.

F. Potassium Permanganate. Design criteria for potassium permanganate is as follows.

1. A source of heated water should be available for dissolving potassium permanganate, and

2. mechanical mixers shall be provided.

G. Fluoride. Sodium fluoride, sodium silicofluoride and fluorosilicic acid shall conform to the applicable AWWA Standards and be certified to NSF/ANSI Standard 60. Other fluoride compounds which may be available shall be approved by the state health officer.

1. Storage. Design criteria for storage of fluoride compounds is as follows.

a. Fluoride chemicals should be isolated from other chemicals to prevent contamination.

b. Compounds shall be stored in covered or unopened shipping containers and should be stored inside a building.

c. Unsealed storage units for fluorosilicic acid should be vented to the atmosphere at a point outside any building. The vents to atmosphere shall be provided with a corrosion resistant 24 mesh screen.

d. Bags, fiber drums and steel drums should be stored on pallets.

2. Chemical Feed Equipment and Methods. Design criteria for chemical feed and methods for fluoride compounds is as follows.

a. At least two diaphragm operated anti-siphon devices shall be provided on all fluoride saturator or fluorosilicic acid feed systems.

i. one diaphragm operated anti-siphon device shall be located on the discharge side of the feed pump; and

ii. a second diaphragm operated anti-siphon device shall be located at the point of application unless a suitable air gap is provided.

b. A physical break box may be required in high hazard situations where the application point is substantially lower than the metering pump. In this situation, either a dual head feed pump or two separate pumps are required and the anti-siphon device at the discharge side of the pump may be omitted.

c. Scales, loss-of-weight recorders or liquid level indicators, as appropriate, accurate to within five percent of the average daily change in reading shall be provided for chemical feeds.

d. Feeders shall be accurate to within five percent of any desired feed rate.

e. Fluoride compound shall not be added before lime-soda softening or ion exchange softening.

f. The point of application if into a horizontal pipe, shall be in the lower half of the pipe, preferably at a 45 degree angle from the bottom of the pipe and protrude into the pipe one third of the pipe diameter.

g. Except for constant flow systems, a device to measure the flow of water to be treated is required.

h. Water used for sodium fluoride dissolution shall be softened if hardness exceeds 75 mg/L as calcium carbonate.

i. Fluoride solutions shall be injected at a point of continuous positive pressure unless a suitable air gap is provided.

j. The electrical outlet used for the fluoride feed pump should have a nonstandard receptacle and shall be interconnected with the well or service pump, or have flow pacing as allowed by the state health officer,

k. Saturators should be of the upflow type and be provided with a meter and backflow protection on the makeup water line.

l. Consideration shall be given to providing a separate room for fluorosilicic acid storage and feed.

3. Secondary control systems for fluoride chemical feed devices shall be provided as a means of reducing the possibility for overfeed; these may include flow or pressure switches, break boxes, or other devices.

4. Personal protective equipment as outlined in §207.D of this Part shall be provided for operators handling fluoride compounds. Deluge showers and eye wash devices shall be provided at all fluorosilicic acid installations.

5. Dust control requirements are as follows.

a. Provision shall 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. The enclosure shall be provided with an exhaust fan and dust filter which places the hopper under a negative pressure. Air exhausted from fluoride handling equipment shall discharge through a dust filter to the outside atmosphere of the building.

b. Provision shall be made for disposing of empty bags, drums or barrels in a manner which will minimize exposure to fluoride dusts. A floor drain should be provided to facilitate the washing of floors.

6. Equipment shall be provided for measuring the quantity of fluoride in the water. Such equipment shall be subject to the approval of the state health officer.

H. Activated carbon is a potentially combustible material requiring isolated storage.

1. Storage facilities should be:

a. fire proof; and

b. equipped with explosion-proof electrical outlets, lights and motors in areas of dry handling.

2. Bags of powdered carbon should be stacked in rows with aisles between in such a manner that each bag is accessible for removal in case of fire.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:330 (February 2018), effective August 1, 2018.

## Subchapter B. Pumping Facilities

### §211. General

A. Pumping facilities shall be designed to maintain the sanitary quality of pumped water.

B. Subsurface pits or pump rooms and inaccessible installations should be avoided.

C. No pumping station shall be subject to flooding, unless critical components are protected from damage or contamination by inundation.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:333 (February 2018), effective August 1, 2018.

### §213. Site Protection

A. The station's critical components that could be damaged or contaminated by inundation shall be:

1. elevated to a minimum of two foot above the 100-year flood elevation, or protected to such elevations including the use of a levee system;

2. readily accessible at all times unless permitted to be out of service for the period of inaccessibility;

3. graded around the station so as to lead surface drainage away from the station;

4. protected to prevent vandalism and entrance by animals or unauthorized persons. The pump station should be located within a secure area such as a locked building or fenced area;

5. labeled such that the pumps and valves in the station are tagged to correspond to the maintenance record and for proper identification.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:333 (February 2018), effective August 1, 2018.

### §215. Pumping Stations

A. Both raw and finished water pumping stations shall:

1. be of durable construction, fire and weather resistant;

2. have any underground structure waterproofed

3. have all floors slope to a suitable drain in such a manner that the quality of the potable water will not be endangered;

4. provide a suitable outlet for drainage without allowing discharge across the floor, including pumping glands, vacuum air relief valves, etc.

B. A suction well is a component(s) designed to facilitate the suction of water by way of pump excluding intake structures, ground storage tanks and clearwells. Suction wells shall:

1. be watertight;

2. have floors sloped to permit removal of water and settled solids;

3. be covered or otherwise protected against contamination; and

4. have two pumping compartments or other means to allow the suction well to be taken out of service for inspection maintenance or repair.

C. Equipment servicing pump stations shall:

1. provide adequate facilities or other means for servicing or removal of pumps, motors or other heavy equipment; and

2. have openings in floors, roofs or wherever else needed for removal of heavy or bulky equipment.

D. Stairways or ladders shall:

1. be provided between all floors, and in dry pits or compartments which must be entered; and

2. conform to the applicable requirements of the state and local building codes.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:333 (February 2018), effective August 1, 2018.

### §217. Pumps

A. Where necessary to meet minimum system requirements such as pressure, at least two pumping units shall be provided. With any pump out of service, the remaining pump or pumps shall be capable of providing the maximum design capacity of that station.

B. The pumping units shall:

1. have ample capacity to supply the peak demand against the required distribution system pressure without dangerous overloading;

2. be driven by prime movers able to meet the maximum horsepower condition of the pumps;

3. be provided with readily available spare parts and tools;

4. be served by control equipment that has proper heater and overload protection for air temperature encountered.

C. Prime water must not be of lesser sanitary quality than that of the water being pumped. Means shall be provided to prevent either backpressure or backsiphonage backflow. When an air-operated ejector is used, the screened intake shall draw clean air from a point at least 10 feet above the ground or other source of possible contamination, unless the air is filtered by an apparatus approved by the state health officer. Vacuum priming may be used.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:334 (February 2018), effective August 1, 2018.

### §219. Booster Pumps

A. Booster pumps shall be located or controlled so that:

1. they will not produce negative pressure in their suction lines;

2. pumps taking suction from storage tanks shall be provided adequate net positive suction head;

3. pumps taking suction from ground storage tanks shall be equipped with automatic shutoffs or low pressure controllers as recommended by the pump manufacturer;

4. automatic or remote control devices shall have a range between the start and cutoff pressure which will prevent excessive cycling; and

5. a bypass is available.

B. Inline Booster Pumps. In addition to the other requirements of this section, inline booster pumps shall:

1. be accessible for servicing and repairs;

2. maintain inlet pressure installed in the distribution system as required in §237.A of this Part under all operating conditions;

3. maintain at least 20 psig (140 kPa) in the suction line under all operating conditions with automatic shutoff or low pressure controller, unless otherwise acceptable to the state health officer; and

4. have a bypass.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:334 (February 2018), effective August 1, 2018.

### §221. Automatic and Remote Controlled Stations

A. All automatic stations shall:

1. be provided with automatic signaling apparatus which will report when the station is out of service; and

2. be electrically operated and controlled and shall have signaling apparatus of proven performance if remotely controlled.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:334 (February 2018), effective August 1, 2018.

### §223. Appurtenances

A. Valves. Each pump shall have:

1. an isolation valve on the intake and discharge side of the pump to permit satisfactory operation, maintenance and repair of the equipment;

2. a positive-acting check valve on the discharge side between the pump and the shut-off valve;

a. 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.

b. Surge relief valves or slow acting check valves if used shall be designed to minimize hydraulic transients.

B. Piping. In general, piping shall:

1. be designed so that the friction losses will be minimized;

2. not be subject to contamination;

3. have watertight joints;

4. be protected against surge or water hammer and provided with suitable restraints where necessary; and

5. be designed 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.

C. Gauges and Meters. The station shall have a flow rate indicator and totalizing meter, and a method of recording the total water pumped and station water pressure. Each pump:

1. shall have a standard pressure gauge on its discharge line;

2. shall have a compound gauge on its suction line;

D. 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 seal shall:

1. be provided with either an approved reduced pressure principle backflow preventer or a break tank open to atmospheric pressure; and

2. where a break tank is provided, have an air gap of at least six inches or two pipe diameters, whichever is greater, between the feeder line and the flood rim of the tank.

E. 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, provisions shall be made for alternations.

1. Motors shall be equipped with a non-reversing ratchet or other mechanical means to prevent backspin. If mechanical means are not provided, provisions shall be made to prevent energizing the motor in the event of a backspin cycle.

2. Electrical controls shall be located at least two feet above the 100-year flood elevation, but in no case less than two feet above the ground surface.

3. Equipment shall be provided or other arrangements made to prevent surge pressures from activating controls which switch on pumps or activate other equipment outside the normal design cycle of operation.

F. Standby Power. To ensure continuous service when the primary power has been interrupted, a power supply shall be provided from a standby or auxiliary source where necessary to maintain minimum 20 psig pressure throughout the system based on systems average hourly demand during the peak annual day.

1. If standby power is provided by onsite generators or engines, the fuel storage:

a. shall have a minimum supply of 72 hours; and

b. the fuel line must be designed to protect the water supply from contamination (see §135).

G. When automatic pre-lubrication of pump bearings is necessary and an auxiliary power supply is provided, design shall assure that pre-lubrication is provided when auxiliary power is in use, or that bearings can be lubricated manually before the pump is started.

H. All oil or grease lubricants which come into contact with the potable water shall be listed in NSF/ANSI Standard 60.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:334 (February 2018), effective August 1, 2018.

## Subchapter C. Finished Water Storage

### §225. General

A. The materials and designs used for finished water storage structures shall provide stability and durability as well as protect the quality of the stored water.

B. Steel structures shall be constructed in accordance with the American Water Works Association (AWWA) standards, incorporated by reference into these rules (see §277 for referenced 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 Subchapter.

C. Sizing. The following criteria applies to the sizing of storage facilities.

1. Storage facilities should have sufficient capacity, as determined from engineering studies, to meet domestic demands, and where fire protection is provided, fire flow demands.

2. The minimum storage capacity (or equivalent capacity) for systems not providing fire protection shall be equal to the average daily consumption.

a. This requirement may be reduced when the source and treatment facilities have sufficient capacity with standby power to supplement peak demands of the system.

3. Excessive storage capacity should be avoided to prevent potential water quality deterioration problems.

D. Location of Reservoirs. The following criteria applies to the location of reservoirs.

1. Ground level reservoirs shall be protected from contamination to a point two feet above the 100-year flood elevation requirements and from groundwater infiltration. Sewers, drains, standing water, and similar sources of possible contamination must be kept at least 50 feet from the reservoir. Gravity sewers constructed of water main quality pipe, pressure tested in place without leakage, may be used at distances greater than 20 feet but less than 50 feet.

2. The bottom of ground level reservoirs and standpipes should be placed at the normal ground surface. If the bottom of a storage reservoir shall be below the normal ground surface, at least 50 percent of the water depth must be above grade.

3. The top of a partially buried storage structure shall not be less than two feet above normal ground surface. Clearwells constructed under filters may be exempted from this requirement when the design provides adequate protection from contamination.

E. Protection from Contamination. All finished water storage structures shall have suitable watertight roofs which exclude birds, animals, insects, and excessive dust. The installation of appurtenances, such as antenna, shall be done in a manner that ensures no damage to the tank, coatings or water quality, or corrects any damage that occurred.

F. Protection from Trespassers. Fencing, locks on access manholes, and other necessary precautions shall be provided to prevent trespassing, vandalism, and sabotage. Consideration should be given to the installation of high strength, cut resistant locks or lock covers to prevent direct cutting of a lock.

G. Drains. No drain on a water storage structure may have a direct connection to a sewer or storm drain. The design shall allow draining the storage facility for cleaning or maintenance without causing loss of pressure in the distribution system.

H. Stored Water Age. Finished water storage designed to facilitate fire flow requirements and meet average daily consumption shall be designed to minimize stagnation and/or stored water age.

1. Consideration shall be given to separate inlet and outlet pipes, mechanical or similar mixing, or other acceptable means to prevent poor water circulation and long detention times that can lead to loss of disinfectant residual,

microbial growth, formation of disinfectant byproducts, taste and odor problems, and other water quality problems.

I. Overflow. Water storage structure overflow shall comply with the following.

1. 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 over a drainage inlet structure or a splash plate. No overflow may be connected directly to a sewer or a storm drain. All overflow pipes shall be located so that any discharge is visible.

2. Certain pre-stressed concrete tanks having an overflow opening installed on the top or side of the tank shall not be required to have an internal overflow pipe as long as each opening is covered with an "eyelid" that prevents contamination of the water in the tank. The discharge from such overflow openings shall still be required to discharge over a splash plate large enough to prevent erosion of the tank's foundation or any other support structures. Caution shall be taken to ensure that any overflow down the outside of the tank will not affect electrical or cause other safety concerns.

a. When an internal overflow pipe is used on elevated tanks, it should be located in the access tube. For vertical drops on other types of storage facilities, the overflow pipe should be located on the outside of the structure.

b. The overflow for a ground-level storage reservoir shall open downward and be screened with twenty- four mesh non-corrodible screen. The screen shall be installed within the overflow pipe at a location least susceptible to damage by vandalism.

c. The overflow for an elevated tank shall open downward and be screened with a four mesh, non-corrodible screen to keep out animals or insects. The screen should be installed within the overflow pipe at a location least susceptible to damage by vandalism.

d. The overflow pipe shall be of sufficient diameter to permit waste of water in excess of the filling rate.

J. Access. Finished water storage structures shall be designed with reasonably convenient access to the interior for cleaning and maintenance. At least two (2) manholes shall be provided above the waterline at each water compartment where space permits.

1. Elevated Storage or Dome Roof Structures shall comply with the following.

a. At least one of the access manholes shall be framed at least four inches above the surface of the roof at the opening. They shall be fitted with a solid water tight cover which overlaps the framed opening and extends down around the frame at least two inches, shall be hinged on one side, and shall have a locking device.

b. All other manholes or access ways shall be bolted and gasketed according to the requirements of the state health officer, or shall meet the requirements of Subparagraph a of this Paragraph.

2. Ground Level or Flat Roof Structures shall comply with the following.

a. Each manhole shall be elevated at least 24 inches above the top of the tank or the finished grade of the surrounding ground, whichever is higher.

b. Each manhole shall be fitted with a solid water tight cover which overlaps a framed opening and extends down around the frame at least two inches. The frame shall be at least four inches high. Each cover shall be hinged on one side, and shall have a locking device.

K. Vents. Finished water storage structures shall be vented. The overflow pipe shall not be considered a vent. Open construction between the sidewall and roof is not permissible. The vents:

1. shall prevent the entrance of surface water and rainwater;

2. shall exclude birds and animals;

3. should exclude insects and dust, as much as this function can be made compatible with effective venting;

4. shall, on ground-level structures, open downward with the opening at least 24 inches above the roof and be covered with twenty-four mesh non-corrodible screen. The screen shall be installed within the pipe at a location least susceptible to vandalism;

5. shall, on ground storage tanks, open downward with the opening at least 24 inches above the finished grade of the surrounding ground and be covered with twenty-four mesh non-corrodible screen. The screen shall be installed within the pipe at a location least susceptible to vandalism; and

6. shall, on elevated tanks and standpipes, open downward, and be fitted with either four mesh non-corrodible screen, or with finer mesh non-corrodible screen in combination with an automatically resetting pressure-vacuum relief mechanism, as required by the state health officer.

L. Roof and Sidewalls. The roof and sidewalls of all water storage structures shall be watertight with no openings except properly constructed vents, manholes, overflows, risers, drains, pump mountings, control ports, or piping for inflow and outflow. Particular attention shall be given to the sealing of roof structures which are not integral to the tank body.

1. Any pipes running through the roof or sidewall of a metal storage structure must be welded, or properly gasketed. In concrete tanks, these pipes shall be connected to standard wall castings which were poured in place during the forming of the concrete. These wall castings should have seepage rings imbedded in the concrete.

2. Openings in the roof of a storage structure designed to accommodate control apparatus or pump columns, shall be curbed and sleeved with proper additional shielding to prevent contamination from surface or floor drainage.

3. 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.

4. 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.

5. The roof of concrete reservoirs with earthen cover shall be sloped to facilitate drainage. Consideration should be given to installation of an impermeable membrane roof covering.

6. Reservoirs with pre-cast concrete roof structures must be made watertight with the use of a waterproof membrane or similar product.

M. The material used in construction of reservoirs shall be acceptable to the state health officer. Porous material, including wood and concrete block, are not suitable for potable water contact applications.

N. Safety must be considered in the design of the storage structure. The design shall conform to applicable laws and regulations of the area where the water storage structure is constructed.

1. Ladders, ladder guards, balcony railings, and safely located entrance hatches shall be provided where applicable.

2. Elevated tanks with riser pipes over eight inches in diameter shall have protective bars over the riser openings inside the tank.

3. Confined space entry requirements shall be considered.

O. Freezing. 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.

1. Equipment used for freeze protection that will come into contact with the potable water shall meet NSF/ANSI Standard 61 or be approved by the state health officer.

2. If a water circulation system is used, it is recommended that the circulation pipe be located separately from the riser pipe.

P. Internal Catwalk. Every catwalk over finished water in a storage structure shall have a solid floor with sealed raised edges, designed to prevent contamination from shoe scrapings and dirt.

Q. Silt Stop. The discharge pipes from water storage structures shall be located in a manner that will prevent the flow of sediment into the distribution system. Removable silt stops should be provided.

R. 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.

S. Painting and/or cathodic protection. Proper protection shall be given to metal surfaces by paints or other protective coatings, by cathodic protective devices, or by both.

1. Paint systems shall meet NSF/ANSI Standard 61 and be acceptable to the state health officer. Interior paint must be applied, cured, and used in a manner consistent with the NSF/ANSI approval. After curing, the coating shall not transfer any substance to the water which will be toxic or cause taste or odor problems. Prior to placing in service, an analysis for volatile organic compounds is advisable to establish that the coating is properly cured. Consideration should be given to 100 percent solids coatings.

2. Wax coatings for the tank interior shall not be used on new tanks or in the rehabilitation of existing tanks. Old wax coating must be completely removed before using another tank coating.

3. Cathodic protection should be designed and installed by competent technical personnel, and a maintenance contract should be provided.

T. Disinfection. Finished water storage structures shall be disinfected in accordance with AWWA Standard C652-11 (see Table 277).

1. If bacteriological testing for coliform organisms is negative and chlorine residuals are at acceptable distribution system levels, the storage tank may be placed into service. If such testing shows the presence of coliform bacteria, the tank cannot be placed into service and repeat samples shall be taken until two consecutive samples, taken at 24-hour intervals, are negative. The tank shall not be placed into service until the sample results are satisfactory.

2. Disposal of heavily chlorinated water from the tank disinfection process shall be in accordance with Paragraph 4.3.5.1 of AWWA Standard C652-11 or in accordance with the requirements of the Louisiana Department of Environmental Quality (LDEQ) or other state or federal authorities, whichever is stricter.

U. Smooth-nosed sampling tap(s) or similar non-threaded stainless steel sampling taps shall be provided to facilitate collection of water samples for both bacteriological and chemical analyses. The sample tap(s) shall be easily accessible.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:335 (February 2018), effective August 1, 2018.

### §227. Treatment Plant Storage

A. The applicable design standards of §225 shall be followed for plant storage.

B. Filter Washwater Tanks. Filter washwater tanks shall be sized, in conjunction with available pump units and finished water storage, to provide the backwash water required by §177.A.10 of this Part. Consideration shall be given to the backwashing of several filters in rapid succession.

C. Clearwell. Clearwell storage should be sized, in conjunction with distribution system storage, to relieve the filters from having to follow fluctuations in water use.

1. When finished water storage is used to provide disinfectant contact time (see §179.C) special attention shall be given to tank size and baffling (see §227.C.2)

2. To ensure adequate disinfectant contact time, sizing of the clearwell should include extra volume to accommodate depletion of storage during the nighttime for intermittently operated filtration plants with automatic high service pumping from the clearwell during non-treatment hours.

3. An overflow and vent shall be provided.

a. A minimum of two clearwell compartments shall be provided.

D. Finished or treated water must not be stored or conveyed in a compartment adjacent to untreated or partially treated water when the two compartments are separated by a single wall, unless approved by the state health officer.

E. Unless otherwise allowed by the state health officer, other treatment plant storage tanks/basins such as detention basins, backwash reclaim tanks, receiving basins and pump wet-wells for finished water shall be designed as finished water storage structures.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:337 (February 2018), effective August 1, 2018.

### §229. Hydropneumatic Tank Systems

A. Pressure tanks shall meet ASME code requirements or an alternative approved by the state health officer. Any alternative must be rated to at least 1.5 times the maximum discharge pressure of the pump.

B. Location. The tank shall be located above normal ground surface.

C. System Sizing. The following criteria applies to the sizing of hydropneumatic systems.

1. The capacity of the wells and pumps in a hydropneumatic system shall be at least five times the average daily demand expressed in gallons per minute.

2. The gross volume of the hydropneumatic tank, in gallons, shall be at least ten times the capacity of the largest pump, rated in gallons per minute. For example, a 250 gpm pump shall be a minimum of 2,500 gallon pressure tank, unless other measures (e.g., variable speed drives in conjunction with the pump motors) are provided to meet the maximum demand.

3. Sizing of hydropneumatic storage tanks must consider the need for disinfectant contact time.

D. The hydropneumatic tank(s) shall have bypass piping to permit operation of the system while the tank is being repaired or painted.

E. Appurtenances. Each tank shall have an access manhole, a drain, and control equipment consisting of a pressure gauge, water sight glass, automatic or manual air blow-off, means for adding air, and pressure operated start-stop controls for the pumps.

1. A pressure relief valve shall be installed and be capable of handling the full pumpage rate of flow at the pressure vessel design limit.

2. Where practical the access manhole should be 24 inches in diameter. The water sight glass shall not be mandatory if an automated control to maintain the proper water-to-air ratio in the tank is provided.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:338 (February 2018), effective August 1, 2018.

### §231. Distribution System Storage

A. The applicable design standards of §225 of this Part shall be followed for distribution system storage.

B. Pressures. The maximum variation between high and low levels in storage structures providing pressure to a distribution system should not exceed 30 feet. The minimum working pressure in the distribution system shall be 20 psi gauge and the normal working pressure should be approximately 60 to 80 psi gauge. When static pressures exceed 100 psi gauge, pressure reducing devices shall be provided on mains or as part of the meter setting on individual service lines in the distribution system.

C. Drainage. Finished water storage structures which provide pressure directly to the distribution system shall be designed so they can be isolated from the distribution system and drained for cleaning or maintenance without causing a loss of pressure in the distribution system. The storage structure drain shall discharge to the ground surface with no direct connection to a sewer or storm drain.

D. Level Controls. Adequate controls shall be provided to maintain levels in distribution system storage structures. Level indicating devices should be provided at a central location.

1. Pumps should be controlled from tank levels with the signal transmitted by telemetering equipment when any appreciable head loss occurs in the distribution system between the source and the storage structure.

2. Altitude valves or equivalent controls may be required for second and subsequent structures on the system.

3. Overflow and low-level warnings or alarms should be located where they will be under responsible surveillance 24 hours a day.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:338 (February 2018), effective August 1, 2018.

## Subchapter D. Distribution System Piping and Appurtenances

### §233. General

A. All potable water distribution systems shall be designed, constructed, and maintained so as to prevent leakage of water due to defective materials, improper jointing, corrosion, settling, impacts, freezing, or other causes.

B. Valves and blow-offs shall be provided so that necessary repairs can be made with a minimum interruption of service.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:338 (February 2018), effective August 1, 2018.

### §235. Materials

A. Standard and Material Selection. Standard and material selection shall comply with the following.

1. Any solder or flux which is used in the installation or repair of any public water system or any plumbing in a residential or nonresidential facility providing water for human consumption shall be lead free (*i.e.*, shall not contain more than 0.2 percent lead).

2. Any pipe, pipe fitting, plumbing fitting, fixture, and any other appurtenance which is used in the installation or repair of any public water system or any plumbing in a residential or nonresidential facility providing water for human consumption shall be lead free (*i.e.*, shall not contain more than a weighted average of 0.25 percent lead when used with respect to the wetted surfaces of pipes, pipe fittings, plumbing fittings, fixtures, and any other appurtenances).

3. The lead free requirements referenced in §235.A.1 and 2 of this Subchapter shall not apply to:

a. leaded joints necessary for the repair of existing cast iron pipes;

b. pipes, pipe fittings, plumbing fittings, or fixtures, including backflow preventers, that are used exclusively for nonpotable services such as manufacturing, industrial processing, irrigation, outdoor watering, or any other uses where the water is not anticipated to be used for human consumption; or,

c. toilets, bidets, urinals, fill valves, flushometer valves, tub fillers, shower valves, fire hydrants, service saddles, or water distribution main gate valves that are 2 inches in diameter or larger.

B. Water Piping Quality. Quality of the piping materials shall comply with the following:

1. All potable water pipes, pipe related products and materials that join or seal pipes and pipe related products shall be evaluated and listed as conforming with a national consensus product (or material) standard, ASTM, AWWA, NSF/ANSI Standard 61, and/or NSF/ANSI 372.

2. Any solder or flux which is used in the installation or repair of any public water system or any plumbing in a residential or nonresidential facility providing water for human consumption shall be lead free (*i.e.*, shall not contain more than 0.2 percent lead).

3. The lead free requirements referenced in §235.B.2 of this Subchapter shall not apply to:

a. leaded joints necessary for the repair of existing cast iron pipes;

b. pipes, pipe fittings, plumbing fittings, or fixtures, including backflow preventers, that are used exclusively for nonpotable services such as manufacturing, industrial processing, irrigation, outdoor watering, or any other uses where the water is not anticipated to be used for human consumption; or,

c. toilets, bidets, urinals, fill valves, flushometer valves, tub fillers, shower valves, fire hydrants, service saddles, or water distribution main gate valves that are 2 inches in diameter or larger.

C. Permeation by Organic Compounds. Where distribution systems are installed in areas contaminated by organic compounds and such organic compounds are detected at levels that are known to pose a health risk:

1. pipe and joint materials which do not allow permeation of the organic compounds shall be used; and

2. non-permeable materials shall be used for all portions of the system including hydrant leads and service connections.

D. Used Materials. Water mains which have been used for the purpose of conveying potable water may be reused provided they meet the materials standard of §235 and have been restored substantially to their original condition.

E. Manufacturer approved transition joints shall be used between dissimilar piping materials.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:338 (February 2018), effective August 1, 2018.

### §237. Distribution System Design

A. The system shall be designed to maintain a minimum pressure of 20 psig (140 kPa) at ground level at all points in the distribution system under all conditions of flow.

B. The minimum size of water main which provides for fire protection and serving fire hydrants shall be six-inch diameter. Larger size mains will be required if necessary to allow the withdrawal of the required fire flow while maintaining the minimum residual pressure specified in §237 of this Subchapter.

C. The minimum size of water main in the distribution system where fire protection is not to be provided shall be a minimum of 3 inch diameter. Any departure from minimum requirements shall be justified by hydraulic analysis and future water use, and may be considered only in special circumstances.

D. Dead end mains shall be equipped with a means to provide adequate flushing. No flushing device shall be directly connected to any sewer.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:339 (February 2018), effective August 1, 2018.

### §239. Valves

A. Valve spacing shall not exceed one mile except for transmission mains 24 inches or larger.

B. Valve spacing shall not exceed five miles for transmission mains 24 inches or larger.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:339 (February 2018), effective August 1, 2018.

### §241. Hydrants

A. Hydrant Leads. The hydrant lead shall be at least as large as the hydrant. For new construction and hydrant replacement, auxiliary valves shall be installed on all hydrant leads.

B. Hydrant Drainage. Where hydrant drains are not plugged, a gravel pocket or dry well shall be provided unless the natural soils will provide adequate drainage.

1. Hydrant drains shall not be connected to sanitary sewers or located within 6 feet of sanitary sewers, storm sewers, or storm drains and where allowed, shall be above the seasonal groundwater table.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:339 (February 2018), effective August 1, 2018.

### §243. Air Relief Valves

A. At points in water mains where air can significantly accumulate provisions shall be made to remove the air by means of air relief valves.

B. When used, the open end of an air relief pipe from automatic valves shall be extended to at least one foot above grade and provided with a screened, downward-facing elbow.

C. Discharge piping from air relief valves shall not connect directly to any storm drain, storm sewer, or sanitary sewer.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:339 (February 2018), effective August 1, 2018.

### §245. Installation of Water Mains

A. Specifications for installation of water mains shall incorporate the applicable provisions of the AWWA standards and/or manufacturer's recommended installation procedures including those specifications and requirements for bedding, cover and blocking.

B. Installed pipe shall be pressure tested and leakage tested in accordance with the appropriate AWWA Standards.

C. New, cleaned and repaired water mains shall be disinfected in accordance with AWWA Standard C651 (Disinfecting Water Mains) and are subject to the following additional provisions.

1. Water from new water mains shall not be furnished for consumer's use until tests performed by a laboratory certified by the state health officer have shown the new water mains to be free from contamination by coliform bacteria (following EPA approved procedures prescribed in Standard Methods for the Examination of Water and Wastewater, Nineteenth Edition).

2. After cutting into or repairing existing mains, the water shall be tested by a laboratory certified by the state health officer for coliform bacteria (following EPA approved procedures prescribed in Standard Methods for the Examination of Water and Wastewater, Nineteenth Edition) to determine the effectiveness of the disinfection procedure unless an alternate method is approve by the state health officer. If the direction of flow is unknown, then samples shall be taken on each side of the main break. If samples are E. coli/fecal coliform positive then the state health officer shall be notified. If samples are total coliform positive, then corrective action must be taken, and daily sampling shall continue until two consecutive samples are negative.

3. Samples shall not be collected from the new facilities until such new facilities have been disinfected as prescribed herein, and the chlorinated water thoroughly flushed from the system until such chlorine measurements are no higher than those generally prevailing in the distribution system.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:340 (February 2018), effective August 1, 2018.

### §247. Separation Distances from Contamination Sources

A. Parallel installation. Water mains shall be laid at least 6 feet horizontally from any existing or proposed gravity sanitary or storm sewer, septic tank, or subsoil treatment system. This distance shall be measured edge to edge.

1. In cases where it is not practical to maintain a 6 foot separation, the state health officer may allow deviation on a case-by-case basis, if supported by data from the design engineer.

B. Crossings. Where water mains cross sewers, either above which is the preferred method, or below the sewer:

1. the water main shall be laid to provide a minimum vertical distance of 18 inches between the outside of the water main and the outside of the sewer.

2. there shall be one full length of water pipe so that both joints will be as far from the sewer as possible. Special structural support for the water and sewer pipes may be required by the state health officer.

C. Exception. When it is impossible to obtain the minimum specified separation distances, the state health officer shall specifically approve any variance from the requirements of §247.A and §247.B of this Subchapter and the following methods of installation may be used:

1. Installation of the water main closer to a sewer, provided that the water main is laid in a separate trench or on an undisturbed earth shelf located on one side of the sewer at such an elevation that the bottom of the water main is at least 18 inches above the top of the gravity sewer.

2. The sewer materials shall be water works grade 150 psi (1.0 Mpa) pressure rated pipe meeting AWWA standards or pipe approved by the state health officer and shall be pressure tested to ensure water tightness.

D. Force Mains. There shall be at least a 6 foot horizontal separation between water mains and sanitary sewer force mains. This measurement shall be from edge to edge. There shall be an 18 inch vertical separation at crossings as required in §247 of this Subchapter.

E. Sewer manholes. No water pipe shall pass through or come in contact with any part of a sanitary sewer manhole and shall be located at least 6 feet from sanitary sewer manholes.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:340 (February 2018), effective August 1, 2018.

### §249. Surface Water Crossings

A. Above-water crossings or above-grade piping, if present shall be:

1. adequately supported and anchored;
2. protected from vandalism;
3. protected from foreseeable sources of damage;
4. protected from freezing by water velocity, heating trace systems and thermal insulation or other effective method; and
5. shall be placed so as to be accessible for repair or replacement.

B. Underwater crossings if present:

1. shall have over it a minimum cover of five feet unless otherwise approved by the state health officer; and

2. when crossing water courses which are greater than 15 feet in width measured at low flow, the following shall be provided:

a. the pipe shall be of special construction, having flexible, restrained or welded watertight joints;

b. valves shall be provided at both ends of water crossings within one half mile for less than 24 inch mains or within 2.5 miles for 24 inch for larger mains so that the section can be isolated for testing or repair; the valves shall be easily accessible, and not subject to flooding under normal conditions. All other mains, services, taps, hydrants, or other devices located inside of the limits of these isolation valves shall also have easily accessible isolation valve;

c. permanent taps or other acceptable means to allow the use of a small meter to determine leakage and obtain water samples on each side of the valve closest to the supply source. Combination taps for both an air relief valve and a pressure tap are permissible provided the assembly meets the above criteria and the air relief valve can be isolated during the testing of the crossing.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:340 (February 2018), effective August 1, 2018.

### §251. Interconnections

A. The approval of the state health officer shall be obtained for interconnections between potable water supplies.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:341 (February 2018), effective August 1, 2018.

### §253. Water Services and Plumbing

A. Water services and plumbing shall conform to the applicable provisions of the State Uniform Construction Code, LAC 17:I.

B. Where permitted by the water supplier, booster pumps that are used to draw water from a water supply distribution system or are placed in a system to increase the line pressure, shall not reduce the pressure at the customer connection to less than 20 psi (pounds per square inch) gauge.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:341 (February 2018), effective August 1, 2018.

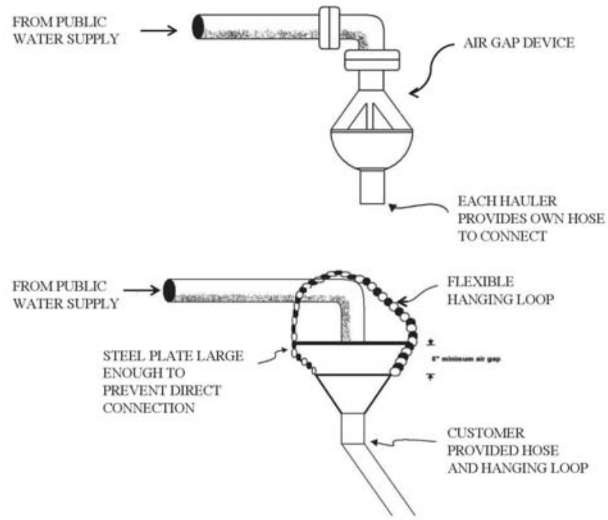
### §255. Water Loading Stations

A. Water loading stations present special problems since the fill line may be used for filling both potable water vessels and other tanks or contaminated vessels.

B. For the purposes of preventing contamination of both the public water supply and any potable water vessels being filled, the following shall apply to the use and operation of water loading stations:

1. there shall be no backflow to the public water supply;
2. the piping arrangement shall be such as to prevent contamination from a hauling vessel being transferred to subsequent station users (see Figure 255); and
3. any and all portable hoses used for filling of water containers or other acceptable water vessels:
    a. shall be fitted with a metal disk at the nozzle of the hose to prevent contact of nozzle with ground or floors.
    b. shall be protected from dirt and contamination by storage in a tightly enclosed cabinet or acceptable storage container when not in use, and
    c. shall be disinfected prior to use.

**Figure 255. Acceptable Filling Device for Water Loading Station**




AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:341 (February 2018), effective August 1, 2018.

## Subchapter F. Waste Residuals

### §257. General

A. All waste discharges shall be in accordance with all federal, state and/or local laws and ordinances. The requirements provided here shall, therefore, be considered minimum requirements as federal, state, and/or local water pollution control authorities may have more stringent requirements.

B. Provisions shall be made for proper disposal of water treatment plant wastes such as:

1. sanitary and laboratory wastes;
2. clarification sludge;
3. softening sludge;
4. iron sludge;
5. filter backwash water;
6. backwash sludge; and
7. brines, including softener and ion exchange regeneration wastes and membrane wastes.

C. Some regulatory agencies consider discharge from overflow pipes/outlets as discharge wastes. In locating sewer lines and waste disposal facilities, consideration shall be given to preventing potential contamination of the water supply.

D. Alternative methods of water treatment and chemical use should be considered as a means of reducing waste volumes and the associated handling and disposal problems.

E. Appropriate backflow prevention measures shall be provided on waste discharge piping as needed to protect the public water supply.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:341 (February 2018), effective August 1, 2018.

### §259. Sanitary Waste

A. The sanitary waste from water treatment plants, pumping stations, and other waterworks installations shall receive treatment.

B. Waste from these facilities shall be discharged directly to a sanitary sewer system, when available and feasible, or to an adequate on-site waste treatment facility approved by the state health officer.

C. The appropriate federal, state, and local officials should be notified when designing treatment facilities to ensure that the local sanitary sewer system can accept the anticipated wastes.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:342 (February 2018), effective August 1, 2018.

### §261. Brine Wastes

A. Waste from ion exchange, demineralization, and membrane plants, or other plants which produce a brine, may be disposed of by controlled discharge to a stream if adequate dilution is available. The Louisiana Department of Environmental Quality (hereinafter, LDEQ) may establish surface water quality requirements including rate of discharge and discharge parameters.

B. Except when discharging to large waterways, a surge tank of sufficient size should be provided to allow the brine to be discharged over a 24-hour period.

C. Where discharging to a sanitary sewer, a holding tank may be required to prevent the overloading of the sewer and/or interference with the waste treatment processes. The effect of brine discharge to sewage lagoons may depend on the rate of evaporation from the lagoons.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:342 (February 2018), effective August 1, 2018.

### §263. Precipitative Softening Sludge

A. Sludge from plants using precipitative softening varies in quantity and in chemical characteristics depending on the softening process and the chemical characteristics of the water being softened. Recent studies show that the quantity of sludge produced is much larger than indicated by stoichiometric calculations. Sludge from plants using precipitative softening shall be treated and disposed of as follows.

1. Lagoons. The use of lagoons shall comply with the following.

a. Short term storage lagoons should be designed on the basis of 0.7 acres per million gallons per day per 100 mg/L of hardness removed based on a usable lagoon depth of 5 feet. This should provide about 2 1/2 years storage. At least 2 but preferably more lagoons shall be provided in order to give flexibility in operation. An acceptable means of final sludge disposal shall be provided. Provisions shall be made for convenient cleaning.

b. Long term lagoons should have a volume of at least four times that for short term storage lagoons.

c. The design of both short term and long term lagoons should provide for:

i. location free from flooding;

ii. when necessary, dikes, deflecting gutters or other means of diverting surface water so that it does not flow into the lagoons;

iii. a minimum usable depth of 5 feet;

iv. adequate freeboard of at least 2 feet;

v. adjustable decanting device;

vi. effluent sampling point;

vii. adequate safety provisions,

viii. parallel operation; and

ix. subsurface infiltration may be acceptable if approved by the appropriate reviewing authority/authorities.

2. The application of liquid lime or dewatered sludge to farm land should be considered as a method of ultimate disposal. Approval from the LDEQ shall be obtained if required.

3. Mixing of lime sludge with activated sludge waste as a means of co-disposal.

4. Disposal at a landfill either as a solid or liquid if the landfill can accept such waste, depending on LDEQ requirements.

5. Mechanical dewatering of sludge may be considered. Pilot studies on a particular plant waste are recommended. Mechanical dewatering should be preceded by sludge concentration and chemical pre-treatment.

6. Calcination of sludge may be considered. Pilot studies on a particular plant waste are recommended.

7. Discharge of lime sludge to sanitary sewers should be avoided since it may cause both liquid volume and sludge volume problems at the sewage treatment plant. This method shall be used only when the sewerage system has the capability to adequately handle the lime sludge.

B. Lime sludge drying beds shall not be used as a method of treating and/or disposing of sludge.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:342 (February 2018), effective August 1, 2018.

### §265. Alum Sludge

A. Alum sludge can be discharged to a sanitary sewer. However, initiation of this practice shall depend on obtaining approval from the owner of the sanitary sewerage system as well as from the state health officer before final designs are made.

B. Mechanical concentration may be considered. A pilot study is recommended before the design of a mechanical dewatering installation.

C. Freezing changes the nature of alum sludge so that it can be used for fill. Acid treatment of sludge for alum recovery may be a possible alternative.

D. Lagoons. Lagooning may be used as a method of handling alum sludge. Lagoon size can be calculated using total chemicals used plus a factor for turbidity. Lagoons shall be designed to produce an effluent satisfactory to the LDEQ.

1. Lagoons, in addition, should provide for:

a. a location free from flooding;

b. where necessary, dikes, deflecting gutters or other means of diverting surface water so that it does not flow into the lagoon;

c. a minimum usable depth of 5 feet;

d. adequate freeboard of at least 2 feet;

e. adjustable decanting device;

f. effluent sampling point;

g. adequate safety provisions, and

h. a minimum of two cells, each with appropriate inlet/outlet structures to facilitate independent filling/dewatering operations.

E. Mechanical dewatering may be used as a method of handling alum sludge.

1. The successful use of mechanical dewatering depends on the characteristics of the alum sludge produced, as determined by site specific studies.

2. Mechanical dewatering shall be preceded by sludge concentration and chemical pre- treatment.

F. Alum sludge may be disposed of by land application either alone, or in combination with other wastes where an agronomic value has been determined, and disposal has been approved by the LDEQ if required.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:342 (February 2018), effective August 1, 2018.

### §267. "Red Water" Waste

A. Waste filter wash water from iron and manganese removal plants shall be properly disposed of in accordance with one of the following methods:

1. Sand Filters. The sand filters should have the following features:

a. Total filter area shall be sufficient to adequately dewater applied solids. Unless the filter is small enough to be cleaned and returned to service in 1 day, two or more cells are required.

b. The "red water" filter shall have sufficient capacity to contain, above the level of the sand, the entire volume of wash water produced by washing all of the production filters in the plant, unless the production filters are washed on a rotating schedule and the flow through the production filters is regulated by true rate of flow controllers. Then sufficient volume shall be provided to properly dispose of the wash water involved.

c. Sufficient filter surface area should be provided so that, during any one filtration cycle, no more than 2 feet of backwash water will accumulate over the sand surface.

d. The filter shall not be subject to flooding by surface runoff or flood waters. Finished grade elevation shall be established to facilitate maintenance, cleaning and removal of surface sand as required. Flash boards or other non-watertight devices shall not be used in the construction of filter side walls.

e. The filter media should consist of a minimum of 12 inches of sand, 3 to 4 inches of supporting small gravel or torpedo sand, and 9 inches of gravel in graded layers. All sand and gravel should be washed to remove fines.

f. Filter sand should have an effective size of 0.3 to 0.5 mm and a uniformity coefficient not to exceed 3.5. The use of larger sized sands shall be justified by the designing engineer to the satisfaction of the state health officer.

g. The filter should be provided with an adequate under-drainage collection system to permit satisfactory discharge of filtrate.

h. Provision shall be made for the sampling of the filter effluent.

i. Overflow devices from "red water" filters shall not be permitted.

j. Where freezing is a problem, provisions should be made for freeze protection for the filters during the winter months.

k. "Red water" filters shall comply with the common wall provisions contained in §177 of this Part, which pertain to the possibility of contaminating treated water with unsafe water.

l. The state health officer shall be contacted for approval of any arrangement wherein a separate structure is not provided.

2. Lagoons. The lagoons shall have the following features:

a. be designed with a volume 10 times the total quantity of wash water discharged during any 24-hour period;

b. have a minimum usable depth of 3 feet;

c. have a length 4 times width, and the width at least 3 times the depth, as measured at the operating water level;

d. be designed such that the outlet is located at the end opposite the inlet;

e. have a weir overflow device at the outlet end with weir length equal to or greater than depth;

f. have provisions for the velocity to be dissipated at the inlet end; and

g. subsurface infiltration lagoons shall be acceptable only if approved by the appropriate reviewing authority/authorities.

3. Red water can be discharged to a community sewer. Approval of this method will depend on obtaining approval from the owner of the sewerage system as well as from the state health officer before final designs are made.

a. A surge tank is recommended to prevent overloading of the sewers.

b. Design shall prevent cross connections.

c. There shall be no common walls between potable and non-potable water compartments.

4. Red water may be discharged into surface water. However, the plant must have an NPDES (National Pollutant Discharge Elimination System) permit or other applicable discharge permit from the appropriate regulatory authority/authorities to dispose of backwash water into surface water.

5. Recycling of supernatant or filtrate from "red water" waste treatment facilities to the head end of an iron removal plant shall not be allowed except as approved by the state health officer.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:343 (February 2018), effective August 1, 2018.

### §269. Waste Filter Wash Water

A. Backwash water from surface water treatment and lime softening plants should have suspended solids reduced to a level acceptable to the state health officer before being discharged to a backwash reclaim tank and recycled to the head of the plant.

1. The backwash reclaim holding tank shall:

a. contain the anticipated volume of waste water produced by the plant when operating at design capacity;

b. for plants having two filters, have a holding tank that will contain the total waste wash water from both filters calculated by using a 15 minute wash at 20 gallons per minute per square foot;

c. for plants having more than two filters, size the holding tank appropriately depending on the anticipated hours of operation.

B. Spent filter backwash water, thickener supernatant and liquids processes may be allowed by the state health officer to be recycled into the head of the plant, provided that:

1. compliance is achieved under the requirements of Subchapter G (Filter Backwash Recycling) of Chapter 11 (Surface Water Treatment Rule) of Part XII of this code;

2. the recycled water should be returned at a rate of less 10 percent of the instantaneous raw water flow rate entering the plant;

3. the recycled water should not be recycled when the raw water contains excessive algae, when finished water taste and odor problems are encountered, or when disinfection byproduct levels in the distribution system may exceed allowable levels. Particular attention shall be given to the presence of protozoans such as *Giardia* and *Cryptosporidium* concentrating in the waste water stream; and

4. water utilities may need to treat filter waste water prior to recycling to reduce pathogen population and improve coagulation or avoid reclaiming filter wash water given the increased risk to treated water quality.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:344 (February 2018), effective August 1, 2018.

### §271. Radioactive Materials

A. Radioactive materials include, but are not limited to:

1. granulated activated carbon (GAC) used for radon removal;

2. radium adsorptive filter media;

3. ion-exchange regeneration waste from radium removal;

4. manganese greensand backwash solids from manganese removal systems,

5. precipitative softening sludges; and

6. reverse osmosis concentrates where radiological constituents are present.

B. The buildup of radioactive decay products of radon shall be considered and adequate shielding, ventilation, and other safeguards shall be provided for operators and visitors.

C. These materials may require disposal as radioactive waste in accordance with Nuclear Regulatory Commission regulations. Necessary approval shall be obtained from the LDEQ prior to disposal of all radioactive wastes if required.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:344 (February 2018), effective August 1, 2018.

### §273. Arsenic Waste Residuals

A. Arsenic-bearing wastes, including but not limited to, filter backwash water and sludge, and adsorptive filter media from arsenic treatment facilities may be considered hazardous.

B. Necessary approval from LDEQ must be obtained prior to disposal of arsenic residual wastes if required.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:344 (February 2018), effective August 1, 2018.

### §275. Other Approved Methods of Handling Waste

A. LDH, in coordination with other regulatory agencies may review and approve other methods of handling waste that are not specifically discussed in this Subchapter.

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:344 (February 2018), effective August 1, 2018.

### §277. Standards Reference Table

A. This Section contains the particular volume of standards or the specific standard with the designation, name and the edition of the standards cited within Chapters 1 and 2 of this Part. The particular designation/edition of the standards listed below shall be applied in relation to the citation within Chapter 1 and 2 of this Part.

| Standard Designation | Section/Table |
|---|---|
| ACI 350-06, Code Requirements for Environmental Engineering Concrete Structures | 179.H.4.a.iv |
| ASME Boiler & Pressure Vessel Code - Section VIII - Pressure Vessels - 2017 | 229.A |
| ASTM Volume 01.01 Steel—Piping, Tubing, Fittings - June 2017 | 235.B.1 |
| ASTM Volume 01.02 Ferrous Castings, Ferroalloys - June 2017 | 235.B.1 |
| ASTM Volume 04.05 Chemical-Resistant Nonmetallic Materials; Vitrified Clay Pipe; Concrete Pipe; Fiber-Reinforced Cement Products; Mortars and Grouts; Masonry; Precast Concrete - June 2017 | 235.B.1 |
| ASTM Volume 08.04 Plastic Piping Systems - June 2017 | 235.B.1 |
| AWWA Full Set Standards – June 2017 | |
| Chemicals | 205.B, 209.G |
| Disinfection of Wells | 151.A, 169.E.9.c |
| Disinfection of Water-Storage Facilities | 151.A, 225.T, 225.T.2, 225.T3 |
| Disinfecting Water Mains | 151.A, 245.C |
| Granular Activated Carbon | 177.A.6.c.iv, 177.A.6.c.iv.d |
| Granular Filter Material | 177.A.6 |
| Pipe and Accessories | 235.B.1, 245, 247.C.2 |

| Standard Designation | Section/Table |
|---|---|
| Water Storage Tanks | 225.B |
| Water Wells | 169.F.2 |
| EPA Alternative Disinfectants and Oxidants Guidance Manual - 1999 | 179.I.1 |
| EPA Ultraviolet Disinfection Guidance Manual - 2006 | 179.H |
| NIOSH | 207.B.1, 207.D.1 |
| NSF/ANSI 60, Drinking Water Treatment Chemicals - Health Effects | 169.H.3.c.i, 201.A, 201.E.1, 205.B, 209.G, 223.H |
| NSF/ANSI 61, Drinking Water System Components - Health Effects | 169.H.1.c, 169.H.3.c.i, 179.I.1.a, 185.A, 225.O.1, 225.S.1, 235.B.1 |
| NSF/ANSI 372, Drinking Water System Components - Lead Content | 235.B.1 |
| Standard Methods for the Examination of Water and Wastewater, 19th edition | 179.A, 245.C.1, 245.C.2 |

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:344 (February 2018), effective August 1, 2018.

### §279. Organization Reference Table

A. The following is a list by name and address of those agencies, associations, institutes and other entities that are referenced within Chapters 1 and 2 of this Part by name, initials or symbols. Further, other organizations may be listed, for convenience, whose technical and other services are made available as they may relate to the provisions contained within Chapters 1 and 2 of this Part.

| | |
|---|---|
| ANSI | American National Standards Institute, Inc.<br>25 West 43rd Street, 4th Floor<br>New York, New York 10036<br>Tel. (212) 642-4900; Fax (212) 398-0023<br>www.ansi.org |
| ASME | American Society of Mechanical Engineers<br>Information Central - Orders/Inquiries<br>P.O. Box 2300<br>Fairfield, New Jersey 07007-2300<br>Tel. (800) 843-2763<br>www.asme.org |
| ASTM International | American Society for Testing and Materials International<br>100 Barr Harbor Drive<br>West Conshohocken, Pennsylvania 19428-2959<br>Tel. (610) 832-9500; Fax (610) 832-9555<br>www.astm.org |
| AWWA | American Water Works Association<br>6666 West Quincy Avenue<br>Denver, Colorado 80235-3098<br>Tel. (303) 794-7711 or (800) 926-7337;<br>Fax (303) 347-0804 |
| NFPA | National Fire Protection Association<br>1 Batterymarch Park<br>Quincy, Massachusetts 02169-9101<br>Tel. (617) 770-3000 or (800) 344-3555;<br>Fax (800) 593-6372<br>www.nfpa.org |
| NSF | NSF International<br>789 N. Dixboro Road<br>P.O. Box 130140<br>Ann Arbor, Michigan 48113-0140<br>Tel. (734) 769-8010 or (800) 673-6275;<br>Fax (734) 769-0109<br>www.nsf.org |

AUTHORITY NOTE: Promulgated in accordance with the provisions of R.S. 40:4.A.(8), 40:4.13.D.(1)(2) and 40:5.A.(2)(3)(5)(6)(7)(17).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 44:345 (February 2018), effective August 1, 2018.

## Chapter 3. Water Quality Standards

### §319. Significant Deficiencies Identified in Sanitary Surveys

A. - C. …

D. For all public water systems, the following have been determined by the state health officer to be significant deficiencies and shall be corrected in accordance with §319.B of this Part:

1. §105.A, 105.B or 105.D of this Part;

2. - 14. …

15. For fluoride only, day tanks shall be provided where bulk storage of liquid chemical is provided, meet all the requirements of §203.J, hold no more than a 30-hour supply, and be scale mounted or have a calibrated gauge painted or mounted on the side if liquid levels can be observed in a gauge tube or through translucent sidewalls of the tank. In opaque tanks, a gauge rod extending above a reference point at the top of the tank, attached to a float can be used. The ratio of the area of the tank to its height shall be such that unit readings are meaningful in relation to the total amount of chemical fed during a day;

16. - 23. …

AUTHORITY NOTE: Promulgated in accordance with R.S. 40:4(A)(8), 40:13.D.(1)(2) and R.S. 40:5.A.(2)(3)(5)(6)(17)(20).

HISTORICAL NOTE: Promulgated by the Department of Health, Office of Public Health, LR 43:85 (January 2017), amended LR 44:345 (February 2018), effective August 1, 2018.

Jimmy Guidry, MD
State Health Officer
and
Rebekah E. Gee, MD, MPH
Secretary

1802#027

~~**RULE**~~

~~**Department of Natural Resources**~~
~~**Office of the Secretary**~~

~~Debts Owed to the Department of Natural Resources~~
~~(LAC 43:I.133)~~

~~The Department of Natural Resources, Office of the Secretary has promulgated LAC 43:I.133 in accordance with the provisions of the Administrative Procedure Act, R.S. 49:950 et seq., and pursuant to the power delegated under R.S. 36:353 and the laws of the state of Louisiana. The Rule sets forth the process by which the Department of Natural Resources invoices applicable debts owed to it. Further, the Rule establishes a due date for applicable debts and the time delays in which a person may challenge such debts by requesting a public hearing before the Division of Administrative Law. Finally, the Rule establishes when an applicable debt owed to the Department of Natural Resources becomes "final" for purposes of R.S. 47:1676 and~~