The portions of the rule below are selected excerpts from the rest of the rule. The selected sections are further proposed edits for review and comment following the initial round of public comments received. The update to source isolation zones in Section 3.3.1.2 was inadvertently left out of the proposed draft. The related parts of the rule not included below are still under consideration and will be addressed separately. The Section 7.10 portion is completely new, being added to the main body of the rule, the remaining aspects are additional changes to source isolation zones or technical specifications as indicated. Changes are reflected in "track changes" below. ~~Deletions are struck out~~, additions are underlined.

Subchapter 7 – Facility and Operation Requirements

7.10 Operation of PFAS Treatment System

Online and stand-by treatment is required for PFAS treatment. The Water System shall operate one unit online for treatment at all times until break-through is detected. Once breakthrough occurs, the Water System shall valve-off the expired unit and valve-on their stand-by unit. Approved start-up procedures shall be followed as necessary, including a filter-to-waste step. Meter reading reporting during PFAS sampling is required.

Appendix A Vermont Standards for Water System Design, Construction, and Protection

3.3.1.2 Source Isolation Zones

Permittees with systems permitted after 1992 are responsible for ensuring prohibited activities under this section do not occur within the source isolation zone. The prohibited acts included in this section apply only to the Permittee, as the Secretary does not have the authority to enforce against actions taken by private landowners beyond the Permittee. The source isolation zone shall be a water system controlled 200' radius around the proposed source unless approved otherwise based on site specific considerations as follows.

(a) The isolation zone may be increased at the discretion of the Secretary to insure reasonable protection of water system sources.

(b) source isolation zone reductions to a minimum of 125', may be allowed if the following can be shown:

  (1) An impeding layer of soil is present and located at least 200' around the source, with no significant hydraulic connection to the proposed aquifer. Hydraulic connection, or lack thereof, between aquifers must be determined by standard pumping test methods including:

    i) stressing the production well or proposed aquifer,

    ii) monitoring the aquifer's response in multi-level piezometers, and

    iii) mapping areas of influence of the source in overlying unconfined aquifers.

  or:

  (2) Undevelopable land surrounds the source site such as rock cliffs.

(c) Spring isolation zones may be reduced in a down slope direction provided that the area down slope of the spring is below the bottom elevation of the spring. This area must be large enough to include space for maintenance of the spring. In no cases shall a spring isolation zone be reduced to less than 50 feet in the down slope direction.

(d) All proposed groundwater sources shall be evaluated for direct influence by surface water as per Appendix A Part 3.

(e) Permitted and prohibited land uses in the source isolation zone are as follows:

(1) Permitted land uses will be restricted to:

(i) source operation and maintenance;
(ii) playgrounds, ball fields, tennis courts;
(iii) seasonal light duty roads;
(iv) conservation zones;
(v) controlled use of potassium and phosphorous fertilizers; and
(vi) other uses which have the approval of the Secretary.

(2) Prohibited land uses include:

(i) application of nitrogen or pesticides;
(ii) buildings other than those required for the water system;
(iii) parking of motor vehicles;
(iv) chemical or fuel storage except natural gas or propane and other chemicals that are required by the water system;
(v) swimming pools;
(vi) driveways, roadways, parking lots;
(vii) septic tanks, leach fields, sewer lines, wastewater disposal spray area and lagoons and wastewater tanks;
(viii) use of preservative treated wood;
(ix) transformers containing PCBs;
(x) cemeteries;
(xi) salvage yards;
(xii) c~~C~~oncentrated grazing or holding of animals and silage and manure storage systems;
(xiii) ~~Stormwater~~ stormwater conveyance, treatment, or control practices and storm sewers;
(xiv) ~~Commercial~~ commercial or agricultural composting sites;
(xv) ~~Flood~~ flood ways;
(xvi) ~~Non~~non-sewage wastewater disposal field;
(xvii) solid waste transfer facilities;
~~(xvii)~~(xviii) solar power systems and battery energy storage systems and associated components and appurtenances, ~~And~~and;
~~(xviii)~~(xix) any other activity which may contaminate the water source.

Part 4 WATER SUPPLY TREATMENT

Introduction

This Part applies to:
(a) **Public Community** water systems;
(b) **Public Non-transient** water systems;
(c) **Public Transient** water systems; and
(b) **Domestic Bottled** water systems.

4.0 General

The design of treatment processes and devices shall depend on evaluation of the nature and quality of the particular water to be treated and the desired quality of the finished water.

(a) All filtration facilities must be capable of producing finished water meeting the MCLs in Subchapter 21-6, and the *Giardia* and viral standards at 40 CFR, §141.70.
(b) Public Community and Non-Transient Non-Community treatment facilities required to produce finished water meeting the primary MCLs and/or the Manganese health advisory must be capable of treating peak demand flows with the largest treatment unit offline except ~~for~~ when specifically approved by the Secretary ~~non-backwashing treatment processes using single-use media not including slow-sand filters~~.
(c) Pilot studies are required on all non-conventional water treatment systems, where data on similar facilities in use on Vermont waters is not available.
(d) Pilot studies must address water qualities expected throughout the year including spring runoff and winter cold water.
(e) Pilot studies may not be required for conventional flocculation, sedimentation, filtration facilities.
(f) Best Available Technologies (BAT) shall be considered when a treatment technology is required under 40 CFR Parts 141 and 142.
(g) Pilot studies may be required by the Secretary for proposed applications of Granular Activated Carbon (GAC) treatment when other compounds in the water may interfere with effective GAC treatment.

4.4.2.19 Housing

Bagged salt and dry bulk salt storage ~~shall~~ should be enclosed and separated from other operating areas in order to prevent damage to equipment.

4.11 Granular Carbon Filtration

Granular activated carbon (GAC) filtration of contaminants in drinking water that exceed the maximum contaminant levels shall meet the following specifications.

4.11.1 Engineer's report requirements

Every construction permit application that proposes installation of GAC treatment at a Public Water System shall include an Engineer's Report that meets the Requirements of Appendix A, Part 1 of the Rule. The Engineer's Report shall describe the design basis for the proposed treatment, which shall include the following technical information:

(a) Water quality characteristics of the water to be treated by the proposed GAC units. Report must include characterization of the contaminants that the proposed treatment is designed to remove, characterization of water quality constituents that may interfere with GAC treatment (including, at a minimum, hardness, iron, manganese, nitrate, pH, alkalinity, turbidity, total organic carbon), discussion of pilot study results (if a pilot study is performed), and discussion of expected treated water quality characteristics. This water quality characterization shall be developed based on laboratory data obtained from representative sample locations in the water system within the past four years, obtained by samples collected and analyzed in accordance with requirements of Subchapter 21-6.

(b) Empty bed contact time for each carbon unit, including justification for the selected value.

(c) Expected useful life of the carbon media, including breakthrough curve for proposed carbon media and contaminants to be treated.

(d) Description of filter to waste and backwash provisions

(e) Description of provisions for carbon media replacement.

(f) Description of the expected pressure loss across each unit.

(g) Equipment manufacturer's specifications, including:

(1) volume of media contained in each unit;

(2) unit dimensions;

(3) arrangement of piping, including lateral header and drain pipes installed within units; and

(4) material specifications for units, including maximum operating pressures and operating temperature ranges

(5) type of GAC used

(h) Evaluation of existing public water system disinfection treatment infrastructure (if applicable), including discussion of any improvements that are necessary to ensure disinfection treatment will meet requirements of Appendix A, Subpart 4.3 and 40 CFR Part 141.

(i) Discussion of the hydraulic loading rate designed for each unit.

(j) Discussion of the provisions to protect equipment from weather elements and provide freeze protection.

(k) Discussion of provisions to precondition new carbon media in accordance with manufacturer recommendations.

(l) <u>When treatment is proposed for removal of PFAS, d</u>~~D~~iscussion of treatment alternatives, including anion exchange.

4.11.2 Technical Standards for GAC filters

(a) For Public Community, **Non-Community, and Domestic Bottled** water systems, at least ~~one train of~~ two GAC filters ~~plumbed in series~~ shall be provided.
(b) GAC filters shall be provided with piping and valves as necessary to facilitate ease of operational adjustments to allow the units to operate either in series or in parallel with one train offline, and to modify the configuration of primary (lead) and secondary (lag) carbon filters.
(c) Pressure gauges in the appropriate range shall be located to monitor pressure loss across each filter. Manufacturer specifications shall be provided.
(d) Sample ports shall be provided for the inlet and outlet of each filter.
(e) GAC media shall meet AWWA B604, Standard for GAC.
(f) All wetted components and materials shall be approved by the National Sanitation Foundation for use in drinking water.
(g) Hydraulic loading rate for each unit shall be within the minimum and maximum as specified by the media manufacturer,.
(h) Empty Bed Contact Time for each filter shall be at least 10 minutes. The Secretary must explicitly approve a modified design that includes a proposed empty bed contact time less than a total of 20 minutes.
~~(i) The depth of GAC media shall be sufficient to preclude premature breakthrough.~~
~~(j)~~(i) GAC filters shall be housed in enclosures that provide for adequate room for routine operation and maintenance and protection from weather elements (control of condensation, ventilation, and freeze protection shall be provided). Filters shall not be located in a confined space.
~~(k)~~(j) Design shall include provisions to add a chemical before the carbon filters.
~~(l)~~(k) Disinfection Treatment that meets the requirements of Appendix A Part 4.3 and 40 CFR Part 141 shall be provided to treat all water treated by GAC. This disinfection treatment shall be provided prior to the entry point to the distribution system.
~~(m)~~(l) Pretreatment shall be provided for the presence of any water quality constituent that will prevent successful performance of the proposed carbon treatment. Pretreatment shall be provided in the proposed design as necessary to ensure that iron and manganese concentrations are consistently and reliably less than the Secondary Maximum Contaminant Levels established in 21-6 and within the manufacturer's specified water quality parameters.
~~(n)~~(m) Manufacturer specifications for start-up of the equipment shall be followed.
~~(o)~~(n) Discharge pipes shall be installed with an air gap between the discharge and the disposal point to prevent back-siphonage. The air gap shall be a minimum of six inches or twice the discharge pipe diameter, whichever is greater.
~~(p)~~(o) Suitable disposal of all waste shall be provided.

4.12 Anion Exchange for PFAS removal

Anion exchange to remove PFAS in drinking water that exceed the maximum contaminant levels shall meet the following specifications.

4.12.1 Engineer's report requirements

Every construction permit application that proposes installation of anion exchange treatment to remove

PFAS at a Public Water System shall include an Engineer's Report that meets the Requirements of Appendix A, Part 1 of the Rule. The Engineer's Report shall describe the design basis for the proposed treatment, which shall include the following technical information:

a. Water quality characteristics of the water to be treated by the proposed anion exchange units. Report must include characterization of the contaminants that the proposed treatment is designed to remove, characterization of water quality constituents that may interfere with anion exchange treatment (including, at minimum, hardness, iron, manganese, nitrate, pH, alkalinity, turbidity, total organic carbon), discussion of pilot study results (if a pilot study is performed), and discussion of expected treated water quality characteristics. This water quality characterization shall be developed based on laboratory data obtained from representative sample locations in the water system within the past four years, obtained by samples collected and analyzed in accordance with requirements of Subchapter 21-6.
b. Empty bed contact time for each anion exchange unit, including justification for the selected value.
c. Expected useful life of the anion exchange resin.
d. Description of filter to waste provisions.
e. Description of regeneration, and backwash or backfill provisions if required by the resin manufacturer.
f. Description of provisions for anion exchange resin replacement.
g. Description of the expected pressure loss across each unit.
h. Equipment manufacturer's specifications, including:
    1. volume of media contained in each unit;
    2. unit dimensions;
    3. arrangement of piping, including lateral header and drain pipes installed within units; and
    4. material specifications for units, including maximum operating pressures and operating temperature ranges
    5. material specifications for the resin, including the resin's preferential list. Only single-use, PFAS-selective resin shall be used.
i. Evaluation of existing public water system disinfection treatment infrastructure (if applicable), including discussion of any improvements that are necessary to ensure disinfection treatment will meet requirements of Appendix A, Subpart 4.3 and 40 CFR Part 141. The design should include provisions to prevent chlorine from degrading the anion exchange resin when the applied water contains a chlorine residual.
j. Discussion of the hydraulic loading rate designed for each unit.
k. Discussion of the provisions to protect equipment from weather elements and provide freeze protection.
l. Discussion of provisions to precondition new anion exchange resin in accordance with manufacturer recommendations.
m. When treatment is proposed for removal of PFAS, ~~Discussion~~ discussion of treatment alternatives, including the use of GAC.
n. Discussion of provisions to maintain acceptable finished water pH. Stabilization may be required by the Secretary.

4.12.2 Technical Standards for anion exchange units

a. For **Public Community, Non-Community and Domestic Bottled** water systems, at least ~~one~~

~~train of~~ two anion exchange units ~~plumbed in series~~ shall be provided.

b. Anion exchange units shall be provided with piping and valves as necessary to facilitate ease of operational adjustments to allow the units to operate either in series or in parallel with one train offline, and to modify the configuration of primary (lead) and secondary (lag) anion exchange units.
c. Anion exchange units are typically of the pressure type, downflow design. Automatic regeneration shall not be used. A manual override shall be provided on all automatic controls.
d. A bypass for the purpose of blending shall not be provided.
e. Pressure gauges in the appropriate range shall be located to monitor pressure loss across each unit. Manufacturer specifications shall be provided.
f. Sample ports shall be provided for the inlet and outlet of each unit. Sample taps shall comply with the requirements of Appendix A, Part 4.4.2.12 as applicable.
g. Brine and salt storage, salt and brine storage capacity, and brine pump or eductor shall comply with the requirements of Appendix A, Part 4.4 if required by the manufacturer. If proposed, bagged salt and dry bulk salt storage ~~shall~~ should be enclosed and separated from other operating areas in order to prevent damage to equipment.
h. The treatment equipment shall be designed to include an adequate underdrain and support system and brine distribution system if required by the manufacturer.
i. Unless otherwise approved by the ~~reviewing authority~~Secretary, the anion exchange resin must be selective~~have high selectivity~~ for the contaminant of concern.
j. All wetted components and materials shall be approved by the National Sanitation Foundation for use in drinking water.
k. Hydraulic loading rate for each unit shall be- between 6 and 16 gallons per minute per square foot, or as specified by the resin manufacturer.~~within the minimum and maximum as specified by the resin manufacturer~~.
l. Empty Bed Contact Time for each unit shall- be at least 2 minutes unless otherwise technically justified by the resin manufacturer or by a pilot study~~meet or exceed manufacturer's recommendations~~.

~~m. The depth of the exchange resin shall be sufficient to preclude premature breakthrough.~~

m. Anion exchange units shall be housed in enclosures that provide for adequate room for routine operation and maintenance and protection from weather elements (control of condensation, ventilation, and freeze protection shall be provided). Anion exchange units shall not be located in a confined space.
n. No oxidant shall be applied to the anion exchange resin unless technically justified by the resin manufacturer or by a pilot study.
o. Pretreatment shall be provided for the presence of any water quality constituent that will prevent successful performance of the proposed treatment. Pretreatment shall be provided in the proposed design as necessary to ensure that iron and manganese concentrations are consistently and reliably less than the Secondary Maximum Contaminant Levels established in 21-6 and within the manufacturer's specified water quality parameters.
p. Discharge pipes shall be installed with an air gap between the discharge and the disposal point to prevent back-siphonage. The air gap shall be a minimum of six inches or twice the pipe diameter, whichever is greater.
q. Manufacturer specifications for start-up of the equipment, including but not limited to filter-to-waste requirements, shall be followed.
r. Suitable disposal of all waste shall be provided.

s. Appropriate test equipment shall be provided to measure pH.