4720.3955 DIRECT FILTRATION PLANTS.

Subpart 1. **Studies.** A full scale direct filtration plant must not be constructed without a pilot study acceptable to the commissioner. An in-plant demonstration study shall be appropriate where conventional treatment plants are converted to direct filtration. Where direct filtration is proposed, the supplier must submit an engineering report to the commissioner. The commissioner must approve the report before the supplier conducts a pilot plant or in-plant demonstration study.

Subp. 2. **Engineering report.** The engineering report must 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 must be evaluated in the report:

A. color;

B. turbidity;

C. bacterial concentration;

D. microscopic biological organisms;

E. temperature;

F. total solids;

G. general inorganic chemical characteristics; and

H. additional parameters as required by the reviewing authority.

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

Subp. 3. **Pilot plant or in-plant demonstration studies.** After approval of the engineering report, a pilot study or, for existing plants where conventional treatment is being converted to direct filtration, an 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 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; and

H. a description of the adverse impact of recycling backwash water due to solids, algae, trihalomethane formation and similar problems.

Before initiation of design plans and specifications, the supplier shall submit a final report including the engineer's design recommendations. The study must demonstrate the minimum contact time necessary for optimum filtration for each coagulant proposed.

Subp. 4. **Pretreatment - rapid mix and flocculation.** The final rapid mix and flocculation basin design shall be based on the pilot plant or in-plant demonstration studies augmented with applicable portions of parts 4720.3930, subpart 3, and 4720.3932.

Subp. 5. **Filtration.** Filters must be rapid rate gravity filters, with dual or mixed media. The final filter design must be based on the pilot plant or in-plant demonstration studies augmented by applicable portions of part 4720.3945, subparts 1 to 7. Pressure filters or single media sand filters must not be used.

A. Surface wash, subsurface wash, or air scour must be provided for the filters according to part 4720.3945, subpart 8.

B. Provisions for filtration to waste must be provided with measures for backflow prevention according to chapter 4714.

Subp. 6. **Siting requirements.** The plant design and land ownership surrounding the plant must allow for the installation of conventional sedimentation basins should the commissioner find that the installation of the direct filtration methods specified in this part do not achieve the water quality standard indicated in Code of Federal Regulations, title 40, part 141.73(a)(1), as amended through June 29, 1989.

Statutory Authority: *MS s 144.383*

History: *15 SR 1842; 40 SR 71*

Published Electronically: *April 1, 2016*