Guidance for *R309-525. Facility Design and Operation: Conventional Surface Water Treatment.*

R309-525-11. Chemical Addition.

Quality of Chemicals - ANSI/NSF Standard 60.

- *Blending and re-packaging of one or more certified chemicals by other than the original chemical supplier may void any laboratory certification and the Director may require re-certification of such products before allowing their use.*

Feeder Design, Location, and Control.

- *Facilities should be such that chemicals can be located in a room separate from the main plant in order to reduce hazards and dust problems.*
- *If a common feeder is used for compatible chemicals such as alum and ferric, provisions should be made for flushing the lines and pumps prior to changing chemical.*

Feeder Appurtenances - Solution Tanks.

- *Two solution tanks of adequate volume may be required for a chemical to assure continuity of supply while servicing a solution tank.*

Make up Water Supply and Protection – Hardness.

- *High calcium content in waters to be treated may interfere with the proposed treatment processes. In these instances, proper treatment for hardness should be provided.*

Design for Specific Chemicals – Chlorine Gas.

- *Precautions regarding chlorine gas are given in Sections R309-520-10 and R309-520-15.*

R309-525-12. Mixing - Flocculation.

Floc Basin Superstructure.

- *If there is significant potential for intercepting wind-blown sediment or debris in the floc basin, a superstructure should be considered.*

R309-525-13. Sedimentation.

General Design Requirements - Safety.

- *Permanent ladders or handholds should be provided on the inside walls of basins above the water level.*

General Design Requirements - Removal of Floating Material.

- *If there is significant potential for intercepting wind-blown sediment or debris in the sedimentation basin, a superstructure should be considered.*

General Design Requirements - Sedimentation with Tube 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.*
- *A cover or enclosure is strongly recommended.*

R309-525-14. Solids Contact Units.

General – Solids Contact Units for Combined Softening and Clarification.

- *Solids contact units are generally acceptable for combined softening and clarification where water characteristics, especially temperature, do not fluctuate rapidly, flow rates are uniform and operation is continuous. Before such units are considered as clarifiers without softening, specific approval of the Director shall be obtained. A minimum of two units are required for surface water treatment.*
- *Clarifiers should be designed for the maximum uniform rate and should be adjustable to changes in flow which are less than the design rate and for changes in water characteristics.*

R309-525-15. Filtration.

Media Design - Dual Media, Rapid Rate Gravity Filters.

- *Due to increased media storage capacity the use of dual media filters may allow a reduction of detention time within sedimentation basins. Refer to R309-525-13(2)(a). Allowable reduction of sedimentation time will be determined by the Director.*

Media Design - Tri-Media, Rapid Rate Gravity Filters.

- *Due to increased media storage capacity, the use of Tri-media filters may allow a*

reduction of detention time within sedimentation basins. Refer to R309-525-13(2)(a). Allowable reduction of sedimentation time will be determined by the Director.

Support Media, Filter Bottoms and Strainer Systems - Support Media.

- *Guidelines for two types of support media commonly used are as follows:*
    1) *Torpedo Sand- A three-inch layer of torpedo sand should be used as a supporting media for the filter sand in single media filters and should have: (A) Effective size of 0.3 mm to 2.0 mm, and (B) Uniformity coefficient not greater than 1.7.*

    2) *Gravel- Gravel, when used as the supporting media, should consist of hard, rounded particles and should not include flat or elongated particles. The coarsest gravel should be 2.5 inches in size when the gravel rests directly on the strainer system, and should extend above the top of the perforated laterals. Not less than four layers of gravel should be provided in accordance with the following size and depth distribution when used with perforated laterals:*

Support Gravel	
Size	*Depth*
2-1/2 to 1-1/2 inches	*5 to 8 inches*
1-1/2 to 3/4 inches	*3 to 5 inches*
3/4 to ½ inches	*3 to 5 inches*
½ to 3/16 inches	*2 to 3 inches*
3/16 to 3/32 inches	*2 to 3 inches*

    3) *When proprietary filter bottoms are specified a reduction of gravel depths may be considered if such a reduction can be justified to the satisfaction of the Director.*

Backwash - Water Backwash Without Air.

- *A rate of 20 gpm/sf or a rate necessary to provide for a 50 percent expansion of the filter bed is recommended.*

Appurtenances – Filters.

- *The following should be provided for every filter:*
    1) *Wall sleeves providing access to the filter interior at several locations for sampling or pressure sensing,*
    2) *A 1.0 inch to 1.5 inch diameter pressure hose and storage rack at the operating floor for washing filter walls.*

R309-525-25. Operation and Maintenance.

Filter to Waste.

- *Water should not be introduced into the system immediately after backwashing. Rather, water should be filtered to waste. A "dirty filter" should not be started and immediately introduced into the system. If the filter has sat idle for an extended period, or if the filter is sufficiently "dirty", backwash and filter to waste before introducing the water.*