**Section 604.520 Solids Contact Unit**

a) Adequate piping with sampling taps must be provided to allow for the collection of samples from various depths of the units.

b) Chemical Feed. Chemicals must be satisfactorily mixed in accordance with Section 604.1100(b).

c) The Agency may require a rapid mix device or chamber ahead of solids contact units to assure proper mixing of the chemicals applied. If required by the Agency, the mixing devices must be constructed to:

1) provide good mixing of the raw water with previously formed sludge particles; and

2) prevent deposition of solids in the mixing zone.

d) Flocculation equipment:

1) must be adjustable (speed and/or pitch);

2) must provide for coagulation in a separate chamber or baffled zone within the unit; and

3) should provide that the flocculation and mixing period will not be less than 30 minutes.

e) Sludge removal design must:

1) require sludge pipes be not less than 3 inches in diameter and arranged to facilitate cleaning;

2) prevent clogging at the entrance to sludge withdrawal piping;

3) locate valves outside the tank for accessibility; and

4) allow the operator to observe and sample sludge being withdrawn from the unit.

f) Cross Connections

1) Blow-off outlets and drains must terminate in a location with an air gap of 6 inches for backflow protection.

2) Cross connection control must be included for the potable water lines used to back flush sludge lines.

g) Detention Period. Detention period must be established on the basis of the raw water characteristics and other local conditions that affect the operation of the unit.

1) When treating surface water with upflow clarifiers using mechanical mixing, detention times must be based on design flow rates and should be two to four hours;

2) When softening groundwater with upflow clarifiers using mechanical mixing, detention times must be based on design flow rates and should be one to two hours;

3) When treating surface water using cone shaped, helical upflow, solids contact clarifiers or softeners, the detention time must be a minimum of 60 minutes; and

4) When treating groundwater using cone shaped, helical upflow, solids contact softeners, the detention time must be a minimum of 45 minutes.

h) Water Losses

1) Solids contact units must be provided with controls to allow adjusting the rate or frequency of sludge withdrawal.

2) Total water losses must not exceed:

A) five percent for clarifiers; and

B) three percent for softening units.

3) Solids concentration of wasted sludge to waste must be:

A) three percent by weight for clarifiers; and

B) five percent by weight for softeners.

i) Weirs or Orifices

1) Upflow Clarifiers Using Mechanical Mixing

A) The units must 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.

B) Weirs must be adjustable, at least equivalent in length to the perimeter of the tank.

C) Weir loading must not exceed:

i) 10 gpm per foot of weir length for units used as clarifiers; and

ii) 20 gpm per foot of weir length for units used as softeners.

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

2) Cone Shaped, Helical Upflow, Solids Contact Clarifiers or Softeners

A) Weir loadings on cone shaped, helical upflow, solids contact units that utilize reversing flow weirs must not exceed:

i) 100 gpm per lineal foot of weir length for cone shaped, helical upflow, solids contact units; or

ii) 200 gpm per foot of weir length for units used as softeners.

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

j) Upflow Rates. Unless otherwise approved by the Agency under Section 604.145(b), the upflow rates must not exceed:

1) 1.0 gpm per square foot of area at the sludge separation line for units used as clarifiers; and

2) 1.75 gpm per square foot of area at the slurry separation line, for units used as softeners.

k) Cone shaped, helical upflow, solids contact units must be equipped with one or more tangentially oriented inlets that introduce flow into the bottom cylindrical section of the unit. The inlets must be equipped with a means for controlling the velocity of the water flowing into the unit.