**Section 604.420 Packed Tower Aeration**

a) Packed tower aeration (PTA) may be used for removing compounds with a Henry's Constant greater than 100 atm mol/mol at 120°C. Compounds with a Henry's Constant less than 10 may not be removed by PTA. For Henry's Constant values between 10 and 100, PTA may be used upon completion of a pilot study and approval by the Agency.

b) Process Design

1) Construction Permit Applications and Pilot Study

A) Before installing PTA, the community water supply must submit a construction permit application that includes Henry's Constant for the contaminant, the mass transfer coefficient, air pressure drop and stripping factor, height and diameter of unit, air to water ratio, packing depth, and surface loading rate.

B) Pilot testing is required for PTA used for compounds with Henry's Constant greater than 100 unless there is considerable past performance data on the contaminant to be treated, there is a concentration level similar to previous projects, and the Agency has approved the process design based on use of appropriate calculations without pilot testing. Proposals of this type must be discussed with the Agency prior to submission of any construction permit applications.

C) When a pilot test is required, the pilot test must:

i) evaluate a variety of loading rates and air to water ratios at the peak contaminant concentration; and

ii) give special consideration to removal efficiencies when multiple contaminations occur.

2) The tower must be designed to reduce contaminants to below the maximum contaminant level (MCL) and to the lowest practical level.

3) The water loading rates are typically in the range from 15 gpm/ft2 to 30 gpm/ft2.

4) The ratio of the column diameter to packing diameter must be at least 10:1 for the full-scale tower. The pilot test can have a ratio of 7:1. The type and size of the packing used in the full-scale unit must be the same as that used in the pilot unit.

5) The minimum volumetric air to water ratio at peak water flow must be in the range of 25:1 and to 80:1, unless otherwise demonstrated by a pilot study and approved by the Agency under Section 604.145(b).

6) The design must consider providing pretreatment if potential fouling problems are likely to occur. Fouling problems can occur from calcium carbonate and iron precipitation and from bacterial growth.

7) Disinfection capability must be provided prior to and after PTA.

8) The effects of temperature must be considered since a drop in water temperature can result in a drop in contaminant removal efficiency.

c) Materials of Construction

1) The tower may be constructed of stainless steel, concrete, aluminum, fiberglass, or plastic, but the tower must not be constructed of uncoated carbon steel.

2) Towers must be protected against damage from wind.

3) Towers must have adequate structural support.

d) Water Flow System

1) Water must be distributed uniformly at the top of the tower when using spray nozzles or orifice type distributor trays that prevent short-circuiting.

2) A mist eliminator must be provided above the water distributor system.

3) A side wiper redistribution ring must be provided at least every 10 feet to prevent water channeling along the tower wall and short-circuiting.

4) Sample taps must be provided in the influent and effluent piping.

5) If an effluent sump is provided, it must be accessible to allow for cleaning and must be equipped with a drain valve in compliance with Section 604.1500.

6) The effluent piping must have a means to discharge to waste.

7) The design must prevent freezing of the influent riser and effluent piping when the unit is not operating.

8) If piping is buried, it must be maintained under positive pressure.

9) An overflow line must be provided that discharges 12 to 24 inches above the ground surface.

e) Air Flow System

1) The air inlet to the blower and the tower discharge vent must be down turned and protected with a noncorrodible 24 mesh screen to prevent contamination from extraneous matter.

2) A positive airflow sensing device and a pressure gauge must be installed on the air influent line. The positive airflow-sensing device must be a part of an automatic control system that will turn off the influent water if positive airflow is not detected. The pressure gauge will serve as an indicator of fouling buildup.

f) Other Required Features

1) Access ports with a minimum diameter of 24 inches to facilitate inspection, media replacement, media cleaning and maintenance of the interior must be provided.

2) Disinfection application points ahead of the tower must be provided.

3) Adequate packing support to allow free flow of water and to prevent deformation of the media with deep packing heights must be provided.

4) An access ladder must be provided.

5) The blower, disinfectant feeder and well pump must have an electrical interconnection.