

SECTION 12.0 NUTRIENT REMOVAL

12.1 GENERAL

Phosphorus and nitrogen are major essential nutrients for the growth of algae and other biological organisms. In many natural surface freshwaters, phosphorus is the limiting factor for the growth and proliferation of algae and aquatic microorganisms due to its lower concentration than other nutrients such as carbon, oxygen and nitrogen. However, discharges of domestic and industrial wastewater and the run-off from agricultural lands to the rivers and lakes can eliminate this limitation and create an ideal condition for enhancement of eutrophication, a degrading process caused mostly by an increase in phosphorus concentration. As a result in many locations, the control of phosphorus discharges (rather than nitrogen) is key to minimizing the impact of nutrients on surface waters.

In addition, with specific respect to the City of Winnipeg's situation, the Ammonia Study team postulated that a reduction in phosphorus discharges could have some beneficial impact on the ammonia conditions in the rivers. If the degree of algae production in the rivers was reduced, CO₂ consumption would be reduced, causing a lowering of the pH. Consequently, the un-ionized ammonia fraction would be less.

For the foregoing reasons, it was decided to conduct a cursory review phosphorus removal alternatives for each of the City's Water Pollution Control Centres (WPCCs).

The removal of phosphorus from wastewater involves the incorporation of phosphorus into suspended solids and the subsequent removal of these solids. Phosphorus can be incorporated into either chemical precipitates or biological solids. In Sections 13.0 and 14.0 that follow, Chemical Phosphorus Removal Alternatives and Biological Nutrient Removal are discussed.