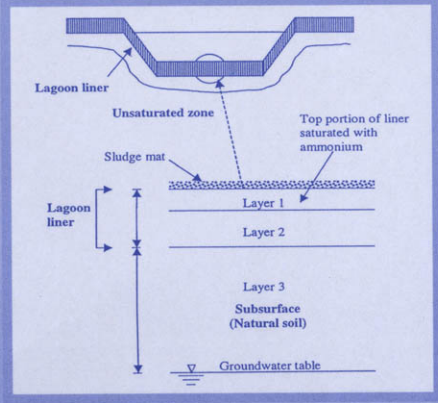
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Animal Waste Containment in Lagoons



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Animal Waste Containment in Lagoons

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Chapter 1
INTRODUCTION

Frank Humenik

Historically, animal waste was considered a valuable fertilizer and thus land was applied for sustainable on-farm production of crops and animals. However, with the shift to large production units that relied on grain imports and that had insufficient land for waste application at fertilizer rates, treatment processes that would increase flexibility and reduce amounts of nitrogen and phosphorus became necessary.

1.1 OXIDATION POND

Oxidation ponds, which had been commonly used for municipal wastewater treatment in rural areas, were considered for the treatment of swine waste. Oxidation ponds are shallow basins excavated in the ground for the purpose of storing and treating settled sewage or other wastewater under climatic conditions that favor the growth of algae, namely warmth and sunshine. Bacterial decomposition of the waste produces carbon dioxide, which stimulates growth of algae, which take up ammonia and other plant growth substances. Oxygen is produced during photosynthetic conditions, but during dark periods oxygen is consumed, resulting in a diurnal effect for dissolved oxygen in oxidation ponds. The driving force for this type of treatment is photosynthesis supported by a symbiosis between saprophytic bacteria and algae.

If oxidation ponds are made 3 to 4 ft deep, not overloaded with oxygen-demanding wastes, and hold the sewage for 3 to 4 weeks, a substantial reduction in coliform organisms and biochemical oxygen demand is obtained. The effluent is high in dissolved oxygen, often supersaturated during the daytime. The pond waters are so rich in algal cells that efforts have been made to harvest these cells as a source of protein for animal feed. Five-day biochemical oxygen demand loadings of about 45 lb per acre are generally employed. Oxidation ponds must be