

Abstract of Thesis

This project was commenced to research problems observed with a large piggery near Mandurah, Western Australia. These problems were caused by the deposition of a bio-mineral magnesium salt, struvite ($\text{MgNH}_4\text{PO}_4 \cdot 6\text{H}_2\text{O}$), within the waste treatment system of the piggery.

A review of previous research on struvite properties relevant to this project was firstly conducted, indicating the need for determination of more appropriate solubility data for struvite formation in solution.

Experiments to monitor conditions at the piggery were the next stage in research.

Laboratory solubility experiments were then commenced. These were at a temperature of 30°C and pH values between 6.5 and 8.5. Data were analysed as the conditional solubility constant P_m defined as below,

$$P_m = [\text{Mg}]_c \times [\text{NH}_4]_c \times [\text{PO}_4]_c .$$

A qualitative comparison of field and laboratory solubility data indicates struvite may precipitate from the third and fourth lagoons in the treatment systems, and possibly the second lagoon.

These inferences are by no means conclusive, and further P_m data over differing experimental conditions are required to fully explain the problem and its solution.