

Animal and Poultry Waste Management Center

A candidate technology of the North Carolina Agreements Project:
Development of Environmentally Superior Technologies per
Agreements Between the Attorney General of North Carolina and
Smithfield Foods, Premium Standard Farms and Frontline Farmers

Sequencing Batch Reactor

This project is located at the Andrews Hunt Farm near Bailey, N.C. The farm is a 10,800 head finishing facility, with the sequencing batch reactor designed to treat waste produced by 2,700 animals. Alternative Natural Technologies is the technology provider.

The sequencing batch reactor is a large, open-top concrete tank or basin that is equipped with aerators and mixers. Waste is

pumped into the reactor once each day. In the reactor, the waste cycles between aerated conditions, when the aeration and mixing equipment in running, and anoxic conditions, when the waste is not aerated.

Nitrification, the conversion by microbes of ammonia to nitrate, occurs during aeration, while denitrification, the

conversion of nitrate to nitrogen gas, occurs during the anoxic cycle. Much of the nitrogen in the waste is converted to nitrogen gas, which is released harmlessly into the atmosphere. At the same time, cycling between an aerated and anoxic environment creates conditions favorable for microbes to concentrate phosphorus in the waste stream into microbial cell mass.

Waste flows from the pig houses to a homogenization tank, where it is held before being pumped to the sequencing batch reactor. The homogenization tank is necessary because the pig houses are flushed repeatedly during the day, while the sequencing batch reactor is loaded only once a day.

At this site, waste is pumped from the sequencing batch reactor to an existing lagoon. However, if this technology were used as the primary method of treating waste from a hog farm, a solids separation process would probably be used to remove the solid portion of the waste stream leaving the reactor. The remaining liquid



Sequencing Batch Reactor



Homogenization Tank

Sequencing Batch Reactor (continued)

would have to be sprayed on cropland, but the liquid would be relatively low in nutrients, and significantly less land would be needed than is the case with a lagoon. The solids would be rich in phosphorus and would have value as fertilizer or a soil amendment.

This project was originally to have been located at another site. Relocation to the Hunt farm required a significant redesign of the system. As a result, construction did not begin until March 2003, and the system did not begin operating until later in the year.

Technology Evaluation

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Reactor during loading and aeration