

## **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

# ISSUES: Innovative Sustainable Systems Utilizing Economical Solutions

This project has become known by the acronym ISSUES, which stands for Innovative Sustainable Systems Utilizing Economical Solutions. It involves three different technologies located on three different farms, while a fourth technology, the microturbine generator, is being evaluated as an element of one of the three ISSUES technologies.

The three farms on which ISSUES technologies are being evaluated are all owned by Murphy-Brown and are all in Duplin County.

### **1. RENEW (Recycling of Nutrient, Energy and Water) System**

Located at Vestal Farms, the RENEW System employs a mesophilic digester as well as aeration and a wastewater filtering and disinfection systems. This project also incorporates the microturbine generator.

Waste flows from pig barns first to equalization and concentrator tanks, which serve to produce a thickened liquid. This liquid then flows to a mesophilic digester. The digester, which operates at a temperature of 95 degrees F, produces biogas, which is used to fuel the microturbine generator. The generator produces electricity, which is sold and used on the electric power grid.

The waste stream then flows to a polishing storage basin, then to an aerobic digester, also called a nitrification pond. A portion of the waste stream then flows back to the polishing storage basin, where it is used to flush the pig barns and is sprayed on crop land if necessary. The remaining portion of the waste stream flows through a filtration system. The filtration system consists of sand carbon filters and reverse osmosis. The water is then disinfected using ozonation and ultraviolet light. Filtered and disinfected water is returned to the pig barns, where it is used as drinking water for the pigs.

### **2. Permeable Lagoon Cover**

This project is located on Harrells Farm. Waste flows first to a lagoon fitted with a permeable cover. The cover is designed to reduce ammonia emissions and odor. The lagoon is anaerobic. Waste then flows to a nitrification pond, which is aerated, then to a denitrification/irrigation storage pond. The liquid in the denitrification pond is returned to the pig houses and used to flush waste to the covered lagoon and sprayed on cropland as necessary.

### **3. Aerobic Blanket**

This project is located at Carroll's Foods Farm #2529 near Turkey. Waste flows first to what is described as a covered anaerobic pond; however, the cover is a layer of aerated water sprayed over the top of the pond. This aerated layer is designed to reduce ammonia emissions and odor. Wastewater then flows to an aerated nitrification pond and finally to a denitfication/irrigation storage pond. Liquid from the last pond is returned to the pig houses and used to flush manure and sprayed on cropland as necessary.

## **ISSUES (continued)**

### **Technology Providers**

The RENEW System, Permeable Cover, and part of the Aerobic Blanket systems are provided by Smithfield Foods, led by Prince Dugba, while part of the Aerobic Blanket is provided by IESS, Inc., led by Gordon Pearson. The microturbine generator system was designed by Bob Hoffland, P.E. of Hoffland Environmental Inc.

### **Technology Evaluation**

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