

## Earthen Lagoon Management Demonstration Project

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#### Introduction

The earthen storage and odor management demonstration project has been conducted for the past 3 years at the Iowa Lakes Community College teaching and demonstration farm. Proper management of the physical structure, proper analyzation and utilization of the nutrients within the structure, and odor control practices were studied. Procedures were implemented to maintain the nutrient value of the swine manure while trying to minimize odor.

#### Materials and Methods

The nutrient addition to the earthen structure was an average daily input excreted by 77 sows and boars, 180 finishing pigs, and 220 nursery pigs. Nutrient dilution came from rainfall and snowfall and powerwasher water. The gestation room is washed twice annually, 14 farrowing crates are washed

monthly, three nursery rooms are washed monthly and finishing is washed every 4 months. Nutrient removal is done every 3 hours in the finishing and gestation pens by recirculating earthen storage water through the flush gutter. The farrowing nutrient removal is done by a pull-plug draining every 2 weeks. Nursery removal is by a pull-plug and scraper system with weekly removal.

Annual pumping of the earthen lagoon was accomplished by trailpump agitation to give a uniform nutrient mix before pumping through an umbilical hose attached to a knife-in toolbar. Applications were done in prechiseled cornfields. The prechiseling is done to help minimize field odors by allowing a better ground seal.

#### Results and Discussion

Table 1 shows the annual gallons and analysis of the nutrients injected into the soil it also shows the pumping and injection cost per gallon of manure.

During the fall 1997 agitation and pumping a sniff test panel was conducted with students from Iowa Lakes Community College. The sniffing survey was done prior to agitation at the distances of 12 ft, 25 ft, 50 ft, 100 ft, and 200 ft, from the lagoon berm. After agitation and during pumping the same procedure was followed at the same geographic locations for comparison of the pumping system to the general daily odor emission. The results of this survey are shown in Table 2.

**Table 1. Annual Gallons and Analysis of Nutrients Injected into the Soil**

Year	1994	1995 Spring	1995 Fall	1996	1997
Pumping Date	8-2-94	5-18-95	10-25-95	11-1-96	11-7-97
Total Gallons	350,000	312,318	157,880	210,100	254,264
Gallons/AC	8,000	8,000	8,000	8,080	9,417
Analysis					
N-P205-K20/gal.	10-14.7-6.9	14-10-8	9.5-27.3-4.2	8-13.1-8.9 7.5-12.1-6.2	6-13.7-8.5 6-12.6-9.10 6.5-13.7-8.1
Pumping Cost	\$0.0065	\$0.0065	\$0.0095	\$0.0075	\$0.0075

**Table 2. Sniff Panel Survey Results**

**Prior to Agitation**

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Feet from Berm of Earthen Lagoon					
12 ft	25 ft	50 ft	100 ft	200 ft	
Noticeable Odor	Noticeable Odor	Noticeable Odor	Barely Detectable Odor	No Detectable Odor	

**During Agitation and Pumping**

Average Results

Feet from Berm of Earthen Lagoon					
12'	25'	50'	100'	220'	
Strong Odor	Strong Odor	Strong Odor	Noticeable Odor	Noticeable Odor	

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Footnote: The categories the panel used to evaluate the odor were: 0 – No Detectable Odor; 1 – Barely Detectable Odor; 2 – Noticeable Odor; and 3 – Strong Odor.

**Further Results**

Following the lagoon site survey, participants proceeded approximately one-fourth mile into the field to which nutrients from earthen lagoon were being applied. The method was the use of an umbilical hose attached to a knife-in toolbar. No noticeable odor was emitted for this application.

In addition to the above practices, the earthen lagoon is surrounded by trees on the north and west, hog buildings on the east and two-thirds of the south side. We believe this

location has helped to channel odors emitted upward, thus helping dilution by dispersion into a larger air volume.

Weed control around the lagoon continues to be a problem. Spraying is done three times per summer with 2,4-D. This has given favorable results. The plan is to seed Reed's canary grass on the banks since it is adaptable to growing in wet soils. The weed cover has been an impediment to grass establishments.