

Revised Lagoon Standard Decreases Sludge Storage Requirement

Doug Hamilton
Extension Waste Management Specialist

The American Society of Agricultural and Biological Engineers (ASABE) recently revised Standard ANSI/ASAE EP403.4 -- Design of Anaerobic Lagoons for Animal Waste Management. The most important change for pork producers is the rate at which sludge accumulates in the lagoon. The sludge accumulation factor for swine was reduced by 55%. This means lagoons in the future could be a little smaller than they are today.

Why? Let's step back and look at how lagoons work.

A lagoon is a large, earthen basin used to treat and store organic liquids and slurries. Lagoons are divided into three volumes stacked on top of each other -- sludge storage, treatment, and effluent storage (Figure 1). Freeboard (empty storage space) above the effluent storage protects the lagoon embankments from overtopping during storms.

Organic solids settle to the bottom of the lagoon, and are digested at the top of the sludge layer. Further treatment takes place in the liquid portion of the treatment volume. The treatment volume is sized using a volumetric organic loading rate -- the daily amount of organic matter fed to the lagoon, divided by the treatment volume. The design rate depends on a number of factors -- chiefly the desired level of treatment and climate.

When a lagoon is brand new, the liquid volume available for treatment is equal to the treatment volume plus the sludge storage volume. But as solids break down and become sludge, the sludge layer grows and the liquid volume above it shrinks. The liquid treatment volume should shrink to its design loading rate in 15 to 20 years. How large a volume is set aside for sludge storage is determined by the sludge accumulation factor. So, reducing the accumulation factor reduces the required sludge storage volume.

How will the change affect Oklahoma Pork Producers? For the time being, not an awful lot. ASABE standards are voluntary. Oklahoma LMFO and CAFO regulations are tied to NRCS guidelines. Changes to the ASABE standard may eventually make their way into NRCS practice standards.

Also, many lagoons in Oklahoma have undersized sludge storage volumes. Some designers did not trust the old accumulation rate. They only provided a small sludge storage space at the bottom of the lagoon. These makeshift storage volumes may not be large enough to store sludge for 20 years -- even at the reduced accumulation rate.

To read more about lagoon function and design, check out the revised OSU Factsheet F-1736, *Lagoons for Livestock Waste Treatment*. A copy can be found at the Waste Management Engineering Website: <http://osuwastemanage.bae.okstate.edu>.

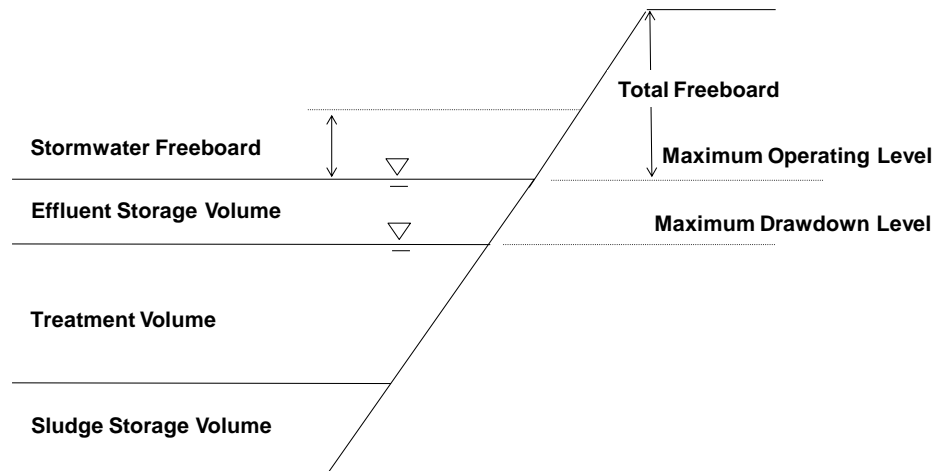


Figure 1. Parts of a Treatment Lagoon (from F-1738, Lagoons for Livestock Waste Treatment. Oklahoma Cooperative Extension Service).