

## **COST OF REMEDIATION OF NITROGEN-CONTAMINATED SOILS UNDER CAFO IMPOUNDMENTS**

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### **Abstract**

Wastewater in manure storage basins or anaerobic treatment lagoons at confined animal feeding operations (CAFOs) may contain high levels of nitrogen, primarily in the form of ammonia. Kansas law allows this wastewater to seep from such impoundments at a rate of 1/9 to 1/4 Inch per day. Kansas State University researchers have characterized an ammonia plume at a depth of 10 feet or more at one swine CAFO and have modeled the potential for deeper penetrations in sandy subsoils. If the plume is not removed or contained after wastewater is removed from the impoundment, then oxygen from air or dissolved in precipitation can access and transform the ammonia to nitrate, which is mobile in the vadose zone. Kansas law requires a closure plan and financial assurance only for very large swine CAFOS. The authors discuss remediation options, cleanup standards, nutrient and salinity content of the contaminated material, and the amount of land that would be needed for spreading. The authors then estimate the cost of remediation of several example CAFOS. The number of medium- and large-sized contaminated CAFO sites in Kansas is estimated, and measures are outlined that would limit future problems.

**Key words:** lagoons, liners, ammonia, closure, costs