RESEARCH ABSTRACT

ENVIRONMENT

Title: Alternative Biofilter Media Testing- **NPB #07-034**

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Date submitted: 31 October 2008

Scientific Abstract

Gas phase biofilters are a proven method for reducing odor and other gaseous emissions from swine facilities. Widespread adoption of biofiltration is stalled due to four issues: 1) the relatively large footprint needed to manage the media pressure drop; 2) concerns about the biofilter media harboring rats; and 3) long term biofilter media compaction. The purpose of this project was to identify and evaluate alternative biofilter media that would mitigate these issues. Six media were evaluated in phase 1. The media were: bag mulch, lava rock, cedar chips, pine bark nuggets, western pine bark and wood shreds. Media sieve analysis, porosity and unit pressure drop versus unit airflow relations were determined. Phase 1 testing was conducted in a biofilter media testing unit with six columns with individually controlled airflow rates and moisture control. In phase 1 the air cleaning performance and pressure drop characteristics of each media were evaluated based on hydrogen sulfide (H_2S) and ammonia (NH_3) removal. In phase 2, three media, wood shreds, pine bark nuggets and lava rock were placed in duplicate columns and evaluated for pressure drop and H_2S and NH_3 reductions. In phase 3, pine bark nuggets were used in all six columns with two empty bed contact times (EBCT) (i.e., 1 s and 5 s). The percent H_2S, NH_3 and odor removal were evaluated. Gas concentrations and odor threshold detection levels were very low and variable making consistent reduction measurement difficult. Pine bark nuggets and lava rock had the lowest unit pressure drops versus unit airflow rates. In phase 1, all of six media supported microbial growth if seeded and were effective reducing H_2S concentrations from between 21 and 75% and NH_3 concentrations from between 43 to 80%. In phase 2, all three media performed well using an average EBCT of 5 s. In phase 3, the biofilters with pine nuggets as media and 1 s EBCT reduced hydrogen sulfide emissions by between 8 and 90% and those with 5 s EBCT can reduce emissions by between 77 to 100%.