Hello everyone!

This month's topic is gas monitors in agriculture with particular attention being given to swine workers and manure management. Proper monitoring and management is essential to avoid potentially life-threatening situations. We also want to let you all know that the Midwest Rural Agricultural Safety and Health Conference is coming up in November, registration is open until November 5th. Click the link for more information. https://icash.public-health.uiowa.edu/programs/mrash-conference/2019-mrash/ We'd love to see you all there. Please reach out with questions, comments or requests for full articles.

Thank you,
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November 2019 Update from the Field: Gas Monitors in Agriculture

Occupational Exposure Risk for Swine Workers in Confined Housing Facilities. (2019). Alvarado, A.C. and Predicala, B.Z. *Journal of Agricultural Safety and Health.* 25(1): 37-50

Extended exposure of swine barn workers to noise and airborne contaminants has been reported to be associated with various health problems. In this study, the actual exposure of workers to respirable dust, gases (ammonia and hydrogen sulfide), and noise in swine production operations was monitored in order to determine the contribution of specific activities in the barn to potential adverse health impacts to swine workers. Selected workers in a swine barn facility were outfitted with a personal monitoring system that included a respirable dust sampler, ammonia (NH3) and hydrogen sulfide (H2S) gas monitors, and a noise dosimeter as they performed their regular duties during their workday. From a total of 50 monitoring days spanning winter and summer months, results showed that the occupational exposure of swine workers to respirable dust, NH3, H2S, and noise while performing their daily assigned tasks was generally below the respective timeweighted average exposure limits for each hazard. However, a number of tasks showed high likelihood for elevated occupational exposure risk. Respirable dust concentrations exceeded the time-weighted average limit of 3 mg m-3 while feeding and weighing pigs. These activities also exceeded the short-term exposure limit (35 ppm) for NH3. Dangerous levels of H2S were generated when draining manure from manure collection pits in the production rooms. Noise levels exceeded the recommended 15 min exposure limit (100 dBA) when weighing and loading pigs for market. The occupational exposure risks for workers to barn contaminants can be reduced through measures that control the generation of contaminants at their source, by removing generated contaminants from the work environment, as well as by outfitting the workers with protective devices that prevent personal exposure to contaminants.

Odorous compounds sources and transport from a swine deep-pit finishing operation: A case study. (2019). Trabue, S., et al. *Journal of Environmental Management.* 233: 12-23

Odor emissions from swine finishing operations are an air quality issue that affects residents at the local level. A study was conducted at a commercial swine deep-pit finishing operation in central Iowa to monitor odorous compounds emitted and transported offsite. Gaseous compounds were sampled using either sorbent tubes or canisters with GC/MS analysis, and particulates matter (PM10) were sampled with high volume samplers and thermally extracted onto sorbent tubes for GC/MS analysis. Major odorous chemical classes detected at the swine facility included volatile sulfur compounds (VSC), volatile fatty acids (VFA), phenol and indole compounds. Manure storage was the main source of odorous compounds of which hydrogen sulfide (H2S), methanethiol, 4- methylphenol, and 3-methylindole were key offenders. Only H2S and 4-methylphenol were detected above odor threshold values (OTV) at all locations around the facility and both 4-methylphenol and 3-methylindole were detected above their OTV 1.5 km downwind from the swine facility. Odorous compounds generated during agitation and pumping of the deep pits was mainly H2S. Odorants were mainly transported in the gas phase with less than 0.1% being associated with PM10. Odor mitigation efforts should focus on gaseous compounds emitted from deep-pits and especially during manure agitation and deep-pit pumping.

Investigation of a Worker Death While Agitating Manure in a Non-enclosed Storage. (2018). Shutske, J., et al. *Journal of Agromedicine.* 23:1, 10-19.

An in-depth investigation of an unusual, non-enclosed manure storage hydrogen sulfide-induced fatality on a Holstein beef production operation is presented. The case involved several factors that likely played a role in the young farmer's death. These included zero wind movement, a reported temperature inversion in the area, relatively cool late summer outdoor temperatures on the morning of the incident, higher outdoor temperatures the week prior, and a high by-product steer ration containing ingredients that contributed significant sulfur content to the stored manure. Recommendations are offered for future research to determine the combinations of conditions and inputs that have potential to increase human and animal risk around manure storage structures. Based on this case and others recently documented showing unsafe levels of hydrogen sulfide being released from similar outdoor storages, it is critical that agricultural industry experts and input suppliers continue to analyze risk and consequences associated with new management practices, processes, inputs (including feed ingredients and animal bedding), machines, and other technology developed to support animal agriculture. Production practice and educational guidance are also offered based on this case and published literature.