



Statement

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on Environment and Hazardous
Materials

ATSDR's Public Health Activities on Concentrated Animal Feeding Operations (CAFOs)

Statement of

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Mr. Chairman and Members of the Committee, thank you for inviting me to testify today. My name is Mark Johnson. I am the Assistant Director for Science, in the Division of Regional Operations at the Agency for Toxic Substances and Disease Registry (ATSDR). ATSDR is a federal agency within the United States Department of Health and Human Services. The mission of ATSDR is to serve the public by using the best science, taking responsive public health actions, and providing trusted health information to prevent harmful exposures and disease related to toxic substances.

In this testimony, I will provide the committee with information regarding the current and past actions of ATSDR in evaluating potential health risks posed by Concentrated Animal Feeding Operations (CAFOs); describe what is known about emissions from this type of operation; describe the toxicity of and potential health effects from exposure to the primary constituents of CAFO emissions; provide a summary of ATSDR's on-going public health activities and findings; and summarize our recommendations to protect the health of residents living around the Excel Dairy in Thief River Falls, Minnesota.

Concentrated Animal Feeding Operations (CAFOs)

EPA estimates that animal feeding operations produce about 500 million tons of manure per year from over 250,000 feeding operations.¹ Individuals who work at or live in close proximity to some CAFOs may face health concerns.

Emissions from animal waste are comprised of a complex mixture of chemicals and gases such as hydrogen sulfide and ammonia.² Some residents who live in areas surrounding CAFOs report odors, respiratory symptoms, and neurological effects. Given the multiple pathways for release of contaminants from CAFOs, people may be exposed to these chemicals through inhalation of air or dust, direct contact with soil, ingestion of drinking water, or dermal contact with surface water.

At CAFOs where ATSDR has conducted assessments, irritant contaminants such as hydrogen sulfide, ammonia, and reduced sulfides (known as mercaptans) have been detected in air emissions. In a recent assessment at a CAFO facility in southwest Minnesota, the Minnesota Department of Health and ATSDR concluded that exposure to hydrogen sulfide at the site was a public health hazard. Among the chemicals that are emitted from the storage, handling, and decomposition of animal wastes, hydrogen sulfide is of great concern for potential exposure.³ This is due to the volume of hydrogen sulfide emissions from some CAFOs, the physical properties of hydrogen sulfide, and the toxicity associated with hydrogen sulfide exposure.

Effects of Hydrogen Sulfide Exposure

Hydrogen sulfide is a colorless, flammable gas that is heavier than air and has the potential to accumulate close to the ground surface where people can be exposed. People can smell hydrogen sulfide at levels as low as 0.5 parts per

billion (ppb). The odor is usually characterized as smelling like “rotten eggs” or “sewage.” Natural sources account for approximately 90 percent of the hydrogen sulfide in the atmosphere. Background concentrations of hydrogen sulfide in outdoor air are typically less than 1 ppb.

Information about the health effects of chemical exposure is summarized in the ATSDR Toxicological Profile for a specific chemical (website: <http://www.atsdr.cdc.gov/toxpro2.html>). Based on a review of the known toxicity of a chemical, a critical study is selected to represent the health effect that could occur at the lowest level of exposure or a level that is not associated with an effect. That information, in conjunction with the application of uncertainty factors, is used to determine a Minimum Risk Level (MRL), defined as an exposure level that is estimated to be without a health effect for any individual for a specific period of exposure. ATSDR develops MRLs for exposures that are of an acute duration (up to 14 days), intermediate duration (14 days to 1 year) and chronic duration (greater than 1 year). For hydrogen sulfide, the acute MRL of 70 ppb is based on the effect of airway constriction among asthmatic individuals who were exposed to 2,000 ppb hydrogen sulfide for 30 minutes. The intermediate MRL of 20 ppb is based on toxicity to olfactory neurons in exposed laboratory animals. This information is presented in ATSDR’s Hydrogen Sulfide Toxicological Profile, which was updated in 2006 (<http://www.atsdr.cdc.gov/toxprofiles/tp114.pdf>).

Adverse health effects associated with short-term exposures to hydrogen sulfide concentrations above the MRL include airway constriction in individuals who have asthma, decreased lung function, eye irritation, dizziness, nausea, and headache. Acute exposures to high concentrations (greater than 100,000 ppb) may result in pulmonary edema and physical collapse.⁴

The state of Minnesota has a health-based Ambient Air Quality Standard under their State Implementation Plan (SIP) that requires that there be no more than two 30-minute periods of hydrogen sulfide above 30 ppb in 5 days, or no more than two periods of hydrogen sulfide above 50 ppb in any year.

Summary of ATSDR Investigation at the Excel Dairy

The Excel Dairy is a dairy farm, operating outside Thief River Falls in Marshall County in northwest Minnesota, which has a capacity for over 1,500 animals. The Minnesota Pollution Control Agency (MPCA) and the Minnesota Department of Health (MDH) received complaints in the past and most recently in early May 2008 about odors and health effects from residents living near Excel Dairy farm. The health effects mentioned by residents included upper respiratory effects (such as nasal congestion and sore throats), itchy eyes, trouble breathing, headaches, and nausea. In early June 2008, the MDH received data from concerned citizens that included measurements of elevated levels of hydrogen sulfide in the ambient air in their community. The residents had rented a portable monitor to measure hydrogen sulfide at a residence near the Excel Dairy facility.

They reported many periods of hydrogen sulfide readings in the hundreds of ppb, and some readings over 1,000 ppb.

Since early May 2008, the Minnesota Pollution Control Agency (MPCA) has been monitoring the levels of hydrogen sulfide at locations near the Excel Dairy property line. MPCA has been using stationary monitors for the measurement of hydrogen sulfide concentrations in ambient air. The concentration of hydrogen sulfide has frequently exceeded the Minnesota Ambient Air Quality Standard of 30 ppb over 30 minute periods, and frequently exceeded 90 ppb. Since the MPCA instruments only quantified the hydrogen sulfide concentrations in the air up to 90 ppb, the actual peak concentrations are not known.

The Region 5 Office of the U.S. Environmental Protection Agency (USEPA) also received health and odor complaints from citizens, beginning in the second week of June 2008. USEPA requested assistance from the ATSDR Regional Office to interpret this data and to provide an evaluation of potential hazards posed by inhalation exposure to hydrogen sulfide for residents living near the Excel Dairy.

At the request of MDH, ATSDR agreed to conduct an Exposure Investigation to evaluate the exposures that nearby residents were experiencing. An exposure investigation is one approach ATSDR uses to develop better characterization of past, current, and possible future human exposures to hazardous substances in the environment and to evaluate existing and possible health effects related to

those exposures more thoroughly. ATSDR exposure investigations are not meant to substitute for a monitoring program that would be conducted for regulatory or operational management purposes.

In July 2008, ATSDR staff initiated continuous sampling for hydrogen sulfide levels at three residential locations in close proximity to the Excel Dairy. Stationary monitors were placed at both outdoor and indoor locations at two of these locations. The monitors detected a maximum hydrogen sulfide concentration in outdoor air of 480 ppb. Over a three-week period, the 30-minute average concentrations of hydrogen sulfide in ambient air exceeded the ATSDR acute minimum risk level (70 ppb) for a cumulative total of 6-8 hours at the residences closest to the facility (0.2-0.3 miles from the nearest lagoon).

On June 20, 2008, the Minnesota Attorney General and the MPCA filed a complaint seeking a temporary injunction against the Excel Dairy owner to address operational shortfalls contributing to these ambient releases of hydrogen sulfide. On July 18, 2008, the USEPA issued a Notice of Violation to the owner of the Excel Dairy farm for exceeding the state standard.

The ATSDR evaluation is limited to the measurement of hydrogen sulfide in ambient and indoor air at only 3 locations, during a limited time period. Although ATSDR did not conduct a formal health study to evaluate the health of people living on or near Excel Dairy, the symptoms described by the residents to ATSDR

and MDH staff were not inconsistent with the known acute health effects of hydrogen sulfide exposure. Based on the fact that the concentrations of hydrogen sulfide detected by ATSDR and MPCA frequently exceeded state air quality standards and ATSDR's acute MRL, ATSDR and MDH concluded that these conditions pose a public health hazard to citizens living in the vicinity of Excel Dairy. ATSDR uses the "public health hazard" conclusion for sites at which long-term exposures to hazardous substances or conditions could result in harmful health effects. No data have been provided to ATSDR or MDH to determine the concentration of hydrogen sulfide exposure that individuals who work or live on the Excel Dairy property may experience.

Based on this assessment, ATSDR recommended that Excel Dairy should take action immediately to implement improved emission control measures that will significantly reduce the levels of exposure to hydrogen sulfide gas released from onsite operations. To verify the effectiveness of these emission control measures in reducing the release of hydrogen sulfide gas, MPCA and Excel Dairy should coordinate to implement an air monitoring program. Finally, Excel Dairy should restrict access to lagoons to reduce direct exposures to trespassers and children living on-site.

Conclusions

In conclusion, chemicals emitted from CAFOs can result in public exposure and the potential for adverse health effects. Hydrogen sulfide is among the chemicals

that pose the greatest concern for exposure. In the case of Excel Dairy, after receiving reports of health concerns from local residents, ATSDR and the state of Minnesota Pollution Control Agency conducted air sampling and found that levels of hydrogen sulfide in the air exceeded the ATSDR acute MRLs and the Minnesota Air Quality Standards. ATSDR communicated recommendations to the state, to USEPA, and to Excel Dairy owners to reduce exposures to hydrogen sulfide and to monitor the effectiveness of measures taken to reduce emissions.

Thank you for the opportunity to testify on this important public health issue.

¹ NPDES Permit Writers' Guidance Manual and Example NPDES Permit for Concentrated Animal Feeding Operations. United State Environmental Protection Agency, Office of Water, Office of Water Management, Water Permits Division, DPA 833-B-04-001, December 31, 2003. www.epa.gov/npdes/pubs/cafo_permit_guidance_entirepub.pdf (accessed 9/23/2008).

² Centers for Disease Control and Prevention, Concentrated Animal Feeding Operations (CAFOs): Background and Public Health Concerns. March 2004. <http://www.cdc.gov/cafos/about.htm> (accessed 9/23/2008).

³ Iowa Concentrated Animal Feeding Operations Air Quality Study—Final Report. Iowa State University and The University of Iowa Study Group, February 2002. <http://www.public-health.uiowa.edu/ehsrc/cafostudy.htm> (accessed 9/23/2008).

⁴ Collins, James and Lewis, David. Hydrogen Sulfide: Evaluation of Current California Air Quality Standards with Respect to Protection of Children. California Air Resources Board, California Office of Environmental Health Hazard Assessment, September 1, 2000. <http://www.oehha.ca.gov/air/pdf/oehha2s.pdf> (accessed 9/23/2008).