

STATE OF CONNECTICUT

DEPARTMENT OF PUBLIC HEALTH

Manisha Juthani, MD
Commissioner



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Environmental Health Section

Date: March 31, 2023

To: File

From: Meg Harvey, Epidemiologist 4 *MLH*

Thru: Jim Vannoy, Section Chief

Subject: Data Evaluation and Technical Assistance regarding Air Monitoring at the Fairfield Water Pollution Control Facility

Background

In the fall of 2022, the Water Pollution Control Facility (WPCF), owned by the Town of Fairfield, had an equipment failure that caused their sewage digestors to malfunction, and more odors than usual were generated. There are residences located very close to the WPCF. These residents noticed the odors and complained to the Town of Fairfield Health Department. The WPCF makes biosolids out of their sewage sludge and the composting process has a long history of intermittent odors, so the equipment failure and unusually strong odors generated a high level of concern among residents. The Town of Fairfield held a neighborhood meeting and the community demanded air testing. In response, the town hired a consultant (HRP) to conduct air testing. HRP tested air inside the buildings (to assess worker exposures which would be the worst case scenario) and ambient air at various points outside the buildings and along the property line of the WPCF. Eight-hour indoor air samples were collected and tested for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and hydrogen sulfide. An eight-hour sample of outside air was tested for particulates less than 10 microns. Outdoor air was also screened for hydrogen sulfide, total VOCs, carbon monoxide, oxygen and combustibles. The Town of Fairfield Health Department requested assistance from CT's Agency for Toxic Substance and Disease Registry (ATSDR) unit staff in interpreting the results of the air tests and communicating the findings to the neighborhood.



Phone: (860) 509-7101 • Fax: (860) 509-7111
Telecommunications Relay Service 7-1-1
410 Capitol Avenue, P.O. Box 340308
Hartford, Connecticut 06134-0308
www.ct.gov/dph
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Environmental Data and Exposure Potential

Outdoor Air Results:

Results for the outside air testing showed that particulate concentrations were well below the (United States Environmental Protection Agency (EPA) National Ambient Air Quality Standard of 150 ug/m³ for PM₁₀. Screening results of outdoor air did not exceed detection limits of the screening instrument.

Indoor Air Results:

VOCs and SVOCs

Low levels of several VOCs and SVOCs were detected in indoor air of several buildings, but all detected concentrations were well below federal occupational health standards.

Hydrogen Sulfide

Indoor air results showed hydrogen sulfide concentrations as high as 150 parts per billion (ppb). This concentration is well within the odor threshold, but is below the level at which eye, nose and throat irritation can occur (1,000 ppb) (ATSDR Toxicological Profile for Hydrogen Sulfide and Carbonyl Sulfide, November 2016).

Nitrosodimethylamine (NDMA)

There were detections of NDMA inside the dewatering and compost buildings. The WPCF uses no products that contain NDMA. However, NDMA can be formed during disinfection of water when chloramines are used as the disinfectant and there are nitrogen rich precursors and can be present in sewage sludge (ATSDR Toxicological Profile for Nitrosodimethylamine, draft 2022). HRP noted that NDMA is a probable human carcinogen, with no occupational health standard. They recommended that the Fairfield WPCF follow Occupational Safety and Health Administration (OSHA) requirements to test source material containing NDMA to determine whether concentrations are elevated enough to warrant a workplace respiratory protection program. The WPCF tested the sewage sludge (because it is concentrated and thus would likely have higher concentrations than the wastewater) and the NDMA concentration was well below the 1% threshold that would necessitate a worker respiratory protection program.

The Fairfield Health Department expressed concern that the nearby residents might question whether there could be harmful levels of NDMA in ambient air that they could be exposed to and requested our assistance with answering this question. Rather than conducting ambient air testing for NDMA at the WPCF property line, we evaluated exposure to the maximum concentration of NDMA detected in indoor air of the WPCF and compared it with the average daily background exposure to NMDA. Typically, the largest source of NDMA comes from endogenous production from precursors. This is the process by which the human body converts nitrite from food and water to NDMA. External sources of NDMA exposure include foods and malt beverages, water, cigarette smoke, and to a lesser extent rubber products, toiletry and cosmetic products, and pesticides (ATSDR 2022). NDMA is considered a probable human carcinogen. Studies of workers exposed to NDMA have a greater risk of liver, stomach, bladder

and prostate cancer. Studies of people exposed to high levels of NDMA indicate that NDMA exposure was associated with liver damage (ATSDR 2022).

ATSDR estimates background exposures from endogenous NDMA production to range from 0.174 mg to 1 mg per day (ATSDR 2022). This background exposure can increase significantly if nitrite-rich foods are consumed or with exposure to tobacco smoke. Using the maximum NDMA concentration detected in indoor air of the WPCF (1.76 ug/m³) and an inhalation rate of 20 m³/day, the daily exposure to NDMA from the WPCF is estimated to be 0.035 mg per day. This estimated exposure is well below (5 times to almost 30 times below) the background daily exposure range. The estimated exposure from the WPCF is very conservative because we used the NDMA concentration detected inside the WPCF, not a concentration in ambient air at the property line. NDMA concentrations from the WPCF would be greatly diluted by the time they reached the property line and would likely not be detectable.

Conclusions

Results of ambient air testing around the WPCF and at the property line showed that particulate concentrations are well below the EPA National Ambient Air Quality Standard and screening results were below detectable limits.

Maximum hydrogen sulfide levels detected inside the WPCF were 150 ppb. This concentration is well within the odor threshold but is below the level at which eye, nose and throat irritation can occur.

Low levels of several VOCs and SVOCs were detected in indoor air of the WPCF, but were well below occupational health standards.

NDMA was detected in indoor air in two WPCF buildings. Concentrations of NDMA in the potential source material for the NDMA (sewage sludge) did not trigger an OSHA required worker respiratory protection program.

If nearby residents were exposed to the maximum concentration of NDMA measured inside the WPCF buildings, the exposure would be well below the average daily background exposure to NDMA.

Based on the results of the air monitoring, there are no exposures of concern to the WPCF workers or to nearby residents. It is possible that residents and workers will continue to notice hydrogen sulfide odors, but concentrations are not elevated enough to cause health symptoms.

Recommendations

CT DPH recommended that the Town of Fairfield Health Department communicate these conclusions to the nearby residents. We assisted with drafting a public statement which was posted on the Town of Fairfield website in late December 2022.

REPORT PREPARATION

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Author:

Margaret Harvey, MPH
Epidemiologist 4
Unit Supervisor, Toxic Hazards Health Assessment
Environmental Health Section
CT Department of Public Health

CT Department of Public Health Reviewers:

Jim Vannoy, Section Chief, Environmental Health Section
Sharee Rusnak, MSPH, ScD, Epidemiologist 3, Toxic Hazards Health Assessment