

Crematorium **June 19, 2006**

On Friday, June 9, 2006, a resident of Cartersville, GA contacted the Georgia Division of Public Health (GDPH) regarding health concerns about emissions from a crematory near her residence. The crematory is permitted to be built across the street from her home, within a residential neighborhood, and within immediate proximity of homes, apartments, parks, schools, and the Etowah River. The proposed site is situated on a hill between the resident and the river. The resident is concerned about the health effects from air emissions of a crematory operating adjacently to a residential neighborhood. She specifically asked about mercury, carbon monoxide, dioxins, particulate matter, and prions.

Although GDPH cannot make a definitive health call based on available information and emissions data, GDPH does not expect adverse health effects from exposure to chemicals from crematory emissions, including consideration of chemical combinations. Exposure to chemical emissions may occur; however, chemical emissions from crematoria are very low compared with other private and industry sources of emissions. Therefore, GDPH considers living next to a crematory to be a potential environmental issue but not a health issue.

Regarding prions, the resident mentioned that she had already spoken to an employee in Epidemiology at GDPH. After speaking with the on-call epidemiologist, it was confirmed that crematories destroy prions due to the temperature of combustion. For questions regarding prions, bacteria and viruses, the resident can speak to GDPH, Epidemiology Branch.

GDPH also looked into crematory regulation, inspection, operations and emissions. A crematory is a funeral facility designed to incinerate human corporeal remains. There are no environmental regulations for crematories, and studies done by the U.S. Environmental Protection Agency (EPA) show that emissions are below Clean Air Act standards. Crematories are required to be inspected annually according to the Official Code of Georgia through the office of the Secretary of State. According to the Crematory Association of North America (CANA),

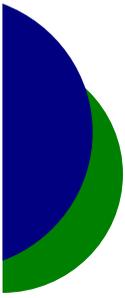
Georgia has 52 crematories as of 2004, and each crematory averages 255 cremations per year.

The cremation process includes body preparation (jewelry, pacemaker, prosthesis, or any other mechanical or radioactive devices or implants are removed from the body, and the body may be embalmed); the body is then placed in a casket and incinerated. Average cremation temperatures range from 1400° to 1800° F. Crematory emissions include a variety of chemicals plus particulate matter, including the body burden of chemicals stored in fat and tissue. The actual process of cremation itself normally takes about two hours. The ashes are then put into an approved memorial container to give to the family, or disposed of, as per state requirements. Depending on specific facility operations, crematories may emit in relatively short bursts, or over a typical workday time period.

Through research, GDPH noted that the chemicals emitted by crematories that may impose a health risk include mercury and hydrochloric acid, according to the U.S. EPA and other state environmental health departments. Emissions also include various particulate matter, which GDPH could not address. The resident was referred to the U.S. EPA website and to the Georgia Environmental Protection Division (GEPD) to assist her with concerns about particulate matter.

In general, chemicals released into the air pose the highest risk in confined spaces, such as in the home or workplace. Chemicals released into outdoor air are diluted and dispersed by the wind, which dilutes them further, and then broken down in the atmosphere.

Health effects related to emissions from incineration facilities and crematories are primarily respiratory problems. Respiratory problems can be largely attributed to particulate matter. In some states in the U.S., crematory regulations include a range of standard setbacks for crematories to reduce exposure to particulate matter and odors, which can vary from 500 feet or more.



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Health effects can also result from inhalation of mercury. Elemental mercury is used in dental fillings, and can be a source of emissions from crematoria. When elemental mercury is heated in a crematory, it vaporizes and becomes a gas. As a gas, elemental mercury can travel long distances in outdoor air and eventually fall to the ground with precipitation. In studies conducted in the 1990's, the U.S. EPA determined that on average, the amount of mercury released from cremation is similar to the amount of mercury released from sewage sludge combustion, whereas mercury released from medical incineration is 14 times higher. To address the concerned resident's questions about mercury, GDPH faxed to her the Agency for Toxic Substance and Disease Registry fact sheet for mercury.

Hydrochloric acid is released into outdoor air during cremation from the combustion of chlorinated plastics present in the body or used for cremation. Chronic occupational exposure to hydrochloric acid in air at concentrations greater than 5 parts acid per million parts air has been reported to cause inflammation of the respiratory system, skin irritation, and sensitivity to light in workers. However, hydrochloric acid produced by crematories is released into outdoor air and then dispersed by the wind.

Other chemicals emitted include carbon monoxide and dioxins. If released into confined spaces, carbon monoxide can build up; however, carbon monoxide released during cremation into outdoor air is dispersed by the wind and changed to carbon dioxide. Emission sources also include cars, buses, trucks, gas ovens, lawnmowers, and industrial machinery.

Dioxins are emitted into outdoor air from cremation in very small amounts. The term "dioxin" refers to a group of chemicals, however the most toxic is 2, 3, 7, 8-tetrachlorodibenzo-p-dioxin, or TCDD. Because TCDD is the most toxic, health risks associated with dioxins are discussed in terms of TCDD. In a study conducted with the California Air Resources Board in the 1990's, the

U.S. EPA determined that TCDD emitted from all crematories throughout the United States was 0.000000183 lbs. per year, which is less than what is released from motor vehicles. To address her questions about dioxins, GDPH faxed the resident the Agency for Toxic Substance and Disease Registry fact sheet for dioxins.

Studies conducted jointly by CANA and U.S. EPA show that lower temperatures (such as 1400°-1600° F) decrease crematories emissions, and higher temperatures (1800° F) greatly increase them.

GDPH recommends that the resident and her neighbors contact the people or agencies to which they have been referred.

References

- Crematory Association of North America © 2000-2006
www.cremationassociation.org/html/test_results.html.
- U.S. Environmental Protection Agency L&E, *Locating and Estimating Air Emissions from Sources of Mercury and Mercury Compounds*, EPA-454/R-97-012, Dec1997.
- U.S. Environmental Protection Agency L&E, *Locating and Estimating Air Emissions from Sources of Dioxins and Furans*, EPA-454/R-97-003, May 1997.
- Justin Berton, *Burning Issues*, Metro Weekly Newspaper, Metro Publishing, Inc. San Jose/Silicon Valley, CA; Aug 30-Sept 5, 2001.
- U.S. Environmental Protection Agency, TTN Air Toxics Website, *Hydrochloric Acid (Hydrogen Chloride)*
www.epa.gov/ttn/atw/hlthef/hydrochl.html.
- Center for Disease Control and Prevention, Carbon Monoxide Poisoning Fact Sheet
www.cdc.gov/co/faqs.html.