

Office of the Medical Health Officer

Vancouver Coastal Health 5th Floor, 132 West Esplanade Ave. North Vancouver, BC V7M 1A2 Telephone: 604-983-6701 Facsimile: 604-983-6839

August 15, 2018

Dear community member,

Following inquiries into the health implications of crematorium emissions at Devlin Funeral Home in Gibsons, BC, a review of the situation and existing literature was performed, including communication with the facility operator, regulator (Consumer Protection BC), BC Centre for Disease Control, and BC Ministry of Environment.

Air emissions and Crematoria: Review of the Evidence

Various airborne pollutants have been attributed to emissions from crematoria, including particulate matter, heavy metals, and dioxins/furans. In particular, the possible emission of mercury and dioxins/furans has generated public and regulatory attention; however, the evidence regarding risk of exposure to these pollutants is limited. Emissions will be influenced by characteristics of the cremation process, including the volume of flue gas released, the number/frequency of cremations, and the type/operation of equipment, such as operating temperature, residence time, and use of additional mechanisms to reduce emissions (Ex. secondary chamber, filters etc.).

Estimates of mercury emissions from crematories have varied considerably in the literature, from high estimates in Europe, to lower levels in Japan (Mari & Domingo, 2010; Takaoka, Oshita, Takeda, & Morisawa, 2010). The amount of mercury released from crematories may be related to the presence of dental amalgam fillings and other characteristics of the cremation process (OSPAR Commission, 2003).

Studies of crematoriums similar to the one operated by Devlin Funeral Home are limited, particularly those related to exposure within surrounding neighbourhoods. The most applicable study was published by Green *et al.*, who reported on a risk assessment of a crematorium proposal for a mixed-residential area (Green, Crouch, & Zemba, 2014). Focusing on several pollutants of concern (dioxins/furans and mercury), the authors estimated the amount produced through emissions and the potential levels of exposure to neighbours, comparing these levels to the EPA reference thresholds for health effects. This assumed a facility operating in a flat, rural area, from 8:00AM-9:00PM, with a 26.75 ft stack height and an exit temperature of 1100°F (approximately 600°C). All estimates of short and long-term exposure at a distance of 20 m from the stack suggested dioxins/furan and mercury levels would be well below the reference values. The authors therefore concluded the health risks from these potential emissions would be negligible.

BC does not regulate airborne emissions from crematoria. Specific Canada Wide Standards (CWS) have been developed for mercury waste from dental amalgams; however, these do not specify

waste from crematoria (Canadian Council of Ministers of the Environment, 2001). While crematoria were identified in a 2003 report entitled Status of Activities Related to Dioxins and Furans Canada-wide Standards, the authors suggested this sector required further investigation and concluded that crematoria should adhere to good combustion practices (CCME Dioxins and Furans CWS Development Committee, 2004).

Devlin Funeral Home Crematorium

At capacity, the crematorium at Devlin Funeral Home operates Monday to Friday from 9AM to 5PM; however, levels of operation may fluctuate below capacity given the rural setting. Although not specifically related to emissions, the equipment must meet operational standards set by the regulator under the Cremation, Interment and Funeral Services Act (CIFSA), which includes an initial engineering report to support operation of the equipment (Government of BC, 2004). The CIFSA regulations also prohibit the use of the following materials in the containers that enclose human remains: plastic, fiberglass, foam or Styrofoam, rubber, polyvinyl chloride, and zinc (Government of BC, 2016). After recently reported malfunctions resulting in the "black smoke" events, the equipment was reportedly quickly repaired. According to the regulator, Devlin Funeral Home has been compliant with the requirements for licensure (Correspondence with Consumer Protection BC, 2018).

The facility appears to have taken steps to ensure good combustion practices. Following an onsite tour by a VCH Environmental Health Officer, the facility appeared to be well run and in excellent sanitary condition. The natural gas-powered retort installed at Devlin's Funeral Home burns at a high temperature (1600°C) and is monitored via digital readout. Containers are mainly made of cardboard or pine, with no varnish. While decedents are clothed at the time of cremation, operators ensure that items containing plastic, rubber, and leather are not burned. Smoke is detected in the stack by a photometric sensor that alarms and throttles back the system when necessary. Occasional puffs of smoke have been reported during normal operations, attributed to large body size or small collections of residual ash/debris.

Given the available information, under normal operations, the risk to human health posed by the emissions from the Devlin Funeral Home crematorium appears to be low. Nonetheless, we have engaged the municipality and provided information to Devlin Funeral Home regarding emission reduction. While future research may inform any decision to regulate crematorium emissions provincially, there is not enough evidence to support additional action from local public health at this time.

For any further operational concerns, please contact the provincial regulator of crematoria in BC, Consumer Protection BC. Any comments related to changes to the regulation of air emissions from crematoriums in BC should be directed to provincial authorities.

Regards,

Geoff McKee, MD, MPH Medical Health Officer Vancouver Coastal Health

References:

- Canadian Council of Ministers of the Environment. (2001). *Canada-wide Standard on Mercury for Dental Amalgam Waste*. Retrieved from https://www.ccme.ca/files/Resources/air/mercury/cws_merc_amalgam_e.pdf
- CCME Dioxins and Furans CWS Development Committee. (2004). *Status of Activities Related to Dioxins and Furans Canada-wide Standards*. Retrieved from https://www.ccme.ca/files/Resources/air/dioxins_furans/d_f_2004_sector_status_rpt_e.pdf
- Government of BC. (2004). *Cremation, Interment and Funeral Services Act*. Victoria, British Columbia, Canada. Retrieved from http://www.bclaws.ca/civix/document/id/consol20/consol20/00_04035_01
- Government of BC. (2016). *Cremation, Interment and Funeral Services Regulations*. Retrieved from http://www.bclaws.ca/civix/document/id/complete/statreg/298_2004
- Green, L. C., Crouch, E. A. C., & Zemba, S. G. (2014). Cremation, Air Pollution, and Special Use Permitting: A Case Study. *Human and Ecological Risk Assessment: An International Journal*, 20(2), 559–565. http://doi.org/10.1080/10807039.2012.719391
- Mari, M., & Domingo, J. L. (2010). Toxic emissions from crematories: A review. *Environment* International, 36(1), 131–137. http://doi.org/10.1016/J.ENVINT.2009.09.006
- OSPAR Commission. (2003). Mercury emissions from crematoria and their control in the OSPAR Convention Area.
- Takaoka, M., Oshita, K., Takeda, N., & Morisawa, S. (2010). Mercury emission from crematories in Japan. Atmospheric Chemistry and Physics, 10(8), 3665–3671. http://doi.org/10.5194/acp-10-3665-2010