

Environmental issues associated with cremation

Table 1: Pollutants, sources and effect of an increase in temperature

| Pollutant | Source | Effect of an increase in temperature in the secondary combustion chamber |
|---|--|---|
| Particulates (visible as smoke) | Incomplete combustion | Reduction in particulates |
| Odour | Incomplete combustion | Reduction in odour |
| Carbon monoxide | Incomplete combustion | Reduction in carbon monoxide |
| Volatile organic compounds | Incomplete combustion | Reduction in volatile organic compounds |
| Dioxins Note: organochlorins as inputs are controlled via Cremation Regulations | Dioxins in feed material (eg coffin) not destroyed during cremation De novo synthesis from products of incomplete combustion | Reduction in dioxins (provided that the temperature is not in the range 200 to 450 deg C ¹) Reduction in dioxins if complete combustion occurs (as de novo synthesis requires products of incomplete combustion) |
| Nitrogen oxides | Combustion of fuel and remains (including natural gas) | Increase in nitrogen oxides |
| Carbon dioxide | Combustion of fuel and remains | Increase in carbon dioxide |
| Heavy metals including mercury Note: metal coffin handles are removed before cremation | Trace heavy metals present in remains Mercury in amalgam used for tooth restoration Note: mercury amalgam is being phased out by dentists ² | Increase in heavy metals ³ |

Most of these pollutants can be controlled by ensuring complete combustion at high temperatures and adequate residence time. However, combustion at too high

¹ De novo synthesis of dioxins occurs in the range 200 to 450 deg C

² Mercury emissions are expected to increase in the short term, followed by a decrease in industrialized countries as the next generation has less cavities and an increase in non-mercury tooth restorations. Based on this, the fact that interstate crematoria are regulated by local government and a study that found soils around a large crematorium was uncontaminated regarding mercury levels (Rahill 2005), the SA EPA has decided that short term control of mercury emissions is not warranted in South Australia.

³ More heavy metals are vaporised at higher temperatures and emitted in the exhaust gases; at lower temperatures, more heavy metals remain in the ash residue.

temperature would result in an increase in greenhouse gases, nitrogen oxides and heavy metals. It would also consume additional natural resources in the form of natural gas.

Thus, ensuring no visible smoke emissions while using the minimum amount of fuel and adequate residence time, provided the temperature in the secondary combustion chamber is above 450 deg C⁴ to prevent de novo formation of dioxins, would adequately control emissions from cremation.

In practice, this is controlled by controlling the temperature and residence time in the secondary combustion chamber.

⁴ A low temperature of 450 deg C would require a longer residence time than a temperature of 850 deg C.