



INCINERATION AND HEALTH

Pat Costner, Madrid, Nov. 26-27, 2001

GREENPEACE

INCINERATOR RELEASES WITH POTENTIAL FOR HEALTH IMPACTS

- STACK GAS
- FLY ASH
- BOTTOM ASH OR SLAG
- SCRUBBER WATER
- OTHER RESIDUES
- FUGITIVE EMISSIONS



MOST WIDELY KNOWN INCINERATOR POLLUTANTS OF CONCERN

- DIOXINS
- PARTICULATE MATTER
- ARSENIC
- BERYLLIUM
- CADMIUM
- CHROMIUM
- LEAD
- MERCURY
- ACIDIC GASES

Source: National Research Council, 2000. Waste Incineration and Public Health, Washington, DC: National Academy Press

OTHER POLLUTANTS OF CONCERN RELEASED IN INCINERATOR RESIDUES

METALS: In addition to the six metals previously listed, 19 other metals have been identified in the wastes sent to incinerators or in incinerator stack gas and/or ash.

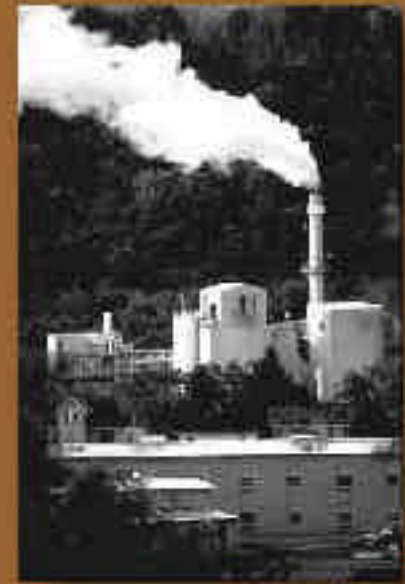
ORGANIC CHEMICALS: In addition to dioxins, scientists have detected innumerable organic chemicals in incinerator outputs. Among these so-called products of incomplete combustion (PICs) are hundreds of other semi-volatile chemicals of which only 10-14 percent have been completely identified. Semi-volatile PICs are likely to be persistent in the environment and lipophilic (fat-loving).

TOXIC PROPERTIES OF INCINERATOR RELEASES

The following incinerator releases are mutagenic*

- stack gas,
- fly ash
- bottom ash
- airborne particles

* Mutagenic substances have the ability to damage DNA in cells. In turn, DNA damage can lead to mutations that may be important factors in the development of cancers.:



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TOXIC PROPERTIES OF CHEMICALS IN INCINERATOR RELEASES

Individual pollutants found in incinerator outputs include known carcinogens:

- arsenic
- cadmium
- dioxin
- PCBs



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**PEOPLE MOST LIKELY TO SUFFER
HEALTH IMPACTS FROM INCINERATOR
POLLUTANTS:**

>>WORKERS,

>> LOCAL POPULATIONS,

**>> REGIONAL OR SUPRA-REGIONAL
POPULATIONS**

METHODS TO EVALUATE THE IMPACTS OF INCINERATORS ON HUMAN HEALTH

Exposure studies

Epidemiological studies

Risk assessments

RISK ASSESSMENT

Risk assessments are estimates of the probability that some actions, such as operating an incinerator, will cause harm.

“Defining risk is ... an exercise in power.”

Source: MacGregor et al., 1999. How exposed is exposed enough? Lay inferences about chemical exposure. Risk Analysis 19: 649-659.

RISK ASSESSMENT

"...[L]arge variabilities and uncertainties associated with risk assessment predictions often limit the ability to define risks posed by incinerators. ... Emission data needed to fully characterize environmental concentrations for health-effects assessments are not readily available for most incineration facilities. Such information is lacking especially for dioxins and furans, heavy metals ..., and particulate matter. ... Generally, data are not collected during startup, shutdowns, and upset conditions -- when the greatest emissions are expected to occur. Furthermore, such data are typically based on a few stack samples for each pollutant. Thus, the adequacy of such emissions data to characterize fully the contribution of incineration to ambient pollutant concentrations for health-effects assessments is uncertain."

Source: National Research Council, 2000. Waste Incineration and Public Health, Washington, DC: National Academy Press

After evaluating six studies of exposures and/or health effects among incinerator workers and ten such studies of populations near incinerators, the National Research Council concluded:

“The studies of which the committee is aware that did report finding health effects had shortcomings and failed to provide convincing evidence. That result is not surprising given the small populations typically available for study and the fact that such effects, if any, might occur only infrequently or take many years to appear. Also, factors such as emissions from other pollution sources and variations in human activity patterns often decrease the likelihood of determining a relationship between small contributions of pollutants from incinerators and observed health effects. Lack of evidence of such relationships might mean that adverse health effects did not occur, but it could also mean that such relationships might not be detectable using available methods and data sources.”

Source: National Research Council, 2000. Waste Incineration and Public Health, Washington, DC: National Academy Press

INCINERATOR WORKERS

“..incinerator workers have been exposed to high concentrations of dioxins and toxic metals, particularly lead, cadmium, and mercury.”

“Incinerator operators and maintenance workers, and those involved in the collection, transport, and disposal of fly ash and emission control equipment residues, have the potential to be most exposed to toxic substances associated with incineration.”

Source: National Research Council, 2000. Waste Incineration and Public Health, Washington, DC: National Academy Press

INCINERATOR WORKERS:

- **Biomarkers of contamination -hydroxypyrene, mutagens and thioethers -- in workers' urine with increased frequency and at elevated levels; Ma et al. (1992); Angerer et al. (1992); Scarlett et al. (1990); Van Doorn et al. (1981)**
- **Chemical contaminants in workers' urine and blood at elevated concentrations -- dioxins, PCBs, hexachlorobenzene, chlorophenols, benzene, toluene, xylene, arsenic, lead, mercury, and nickel; Kitamura et al.(2000); Schechter et al. (1999); Kurttio et al. (1998); Van den Hazel and Frankort (1996); Wrbitzky et al. (1995); Papke et al. (1993); Malkin et al. (1992); Angerer et al. (1992); Schechter et al. (1991).**
- **Increased death rates from cancer of the stomach, lungs and oesophagus; Rapiti et al. (1997); Gustavsson et al. (1993); Gustavsson et al. (1989)**
- **Increased death rates from ischemic heart disease; Gustavsson (1989)**
- **Chloracne, hyperlipidemia, decreased liver function, altered immune functions, altered sex ratio of offspring, hypertension, urinary abnormalities, small airway obstruction of the lungs, and abnormal blood chemistry. Kitamura et al. (2000); Schechter et al. (1999); Bresnitz et al. (1992).**

PEOPLE WHO LIVE NEAR INCINERATORS

- **Biomarkers of toxic exposure - thioethers-- were elevated in the urine of children living near a recently built incinerator; Ardevol et al. (1999)**
- **Dioxin levels in blood increased by 10-25 percent during the two years following the startup of a new incinerator; Gonzalez et al. (2000);**
- **PCB levels in the blood of children living near a German hazardous waste incinerator were elevated; Holdke et al. (1998)**
- **Mercury levels in the hair of people living near a waste incinerator increased by 44-56% over 10 years and with greater proximity to the facility; Kurttio et al. (1998);**
- **Elevated dioxin levels in blood were found in communities near incinerators in three studies, but dioxins were not elevated in two other studies; Miyata (1998); Deml et al. (1996); Van den Hazel and Frankort (1996); Startin et al. (1994)**

PEOPLE WHO LIVE NEAR INCINERATORS, cont.

- **Clusters of two cancers associated with dioxin exposure -- soft-tissue sarcomas and non-Hodgkin's lymphomas -- were found in one intricate study; Viel et al. (2000);**
- **Increased rates of deaths from childhood cancer, all cancers combined, cancer of the larynx, liver, stomach, rectum, and lung were found in a series of studies, but one study found no increase in death rates from larynx or lung cancer; Elliot et al. (2000); Knox (2000); Knox and Gilman (1998); Michelozzi et al. (1998); Elliot et al. (1996); Biggeri et al. (1996); Babone et al. (1994); Elliot et al. (1992); Diggle et al. (1990)**
- **Six studies found elevated occurrence of various respiratory effects near incinerators, while one study found asthma in children was not elevated; Lee and Shy (1999); Legator et al. (1998); Shy et al. (1995); Gray et al. (1994); ATSDR (1993); Wang et al. (1992); Zmirou et al. (1984).**

PEOPLE WHO LIVE NEAR INCINERATORS, cont.

- **Elevated rates of congenital anomalies were reported in two studies, while one study found eye malformations were not increased; Ten Tusscher et al. (2000); Aelvoet et al. (1998); Gattrell and Lovett (1989)**
- **Increased frequency of multiple births was reported in one study, while another found no evidence of increased incidence of twin births; Van Larebeke (2000); Rhydhstroem (1998)**
- **Altered sex ratios of births -- a deficit of male births -- was found in one study; Williams et al. (1992)**
- **Lower levels of thyroid hormones were reported among children near a toxic waste incinerator. Osius and Karmaus (1998)**

Incinerators are not the solution to the waste problem. They are symptoms of non-existent and/or ill-conceived policies for the management of material resources. In a world of shrinking resources, it is irrational to let valuable resources "go up in smoke," and doubly so when the smoke is known to carry persistent poisons.

People who work at waste incinerators and who live near incinerators have suffered from extraordinary rates of diseases and other effects that diminish the quality of their lives and the lives of their children. Moreover, a prestigious scientific body has recently expressed "*substantial*" concern about the impacts of incinerator-derived dioxin releases on the health and well-being of broader populations, regardless of the implementation of maximum achievable control technology.

According to the World Health Organisation, dioxin levels are such that *“subtle effects might already be occurring in the general population in developed countries at current background levels of exposure to dioxins and dioxin-like compounds.”*

Continuing to operate known dioxin sources, such as waste incinerators, much less building more, in such circumstances would seem to be either delusional or self-destructive. Furthermore, dioxins are only one of a variety of so-called ‘ultratoxins’ that have been identified in incinerator wastes.



BAN INCINERATORS
REDUCE, RE-USE, RECYCLE

GREENPEACE: South Africa, Nov. 30-Dec. 1, 2000



**THIS IS THE
MOMENT
WHEN
YOUR
CHILD'S
DIOXIN
EXPOSURE
BEGINS**

ELIMINATE DIOXIN SOURCES

