

Rachel's Environment & Health News

#179 - Medical Incinerators Emit Dangerous Metals And Dioxin, New Study Says

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Medical waste incinerators are a major source of toxic air emissions, especially dioxin and cadmium, according to a lengthy study just released by the California Air Resources Board (CARB), a state agency. [Page numbers in our text (below) refer to pages in this new study, which is cited in our next-to-last paragraph.] The study says the public health risks from breathing these emissions are unacceptably high. On May 23, the CARB will propose new air pollution controls on California's medical incinerators; CARB predicts the new rules will force 129 of the state's 142 incinerators to cease operation because compliance will be too costly.

Dioxin

The CARB studied dioxin in 1986 and declared it "highly toxic" in experimental animals. Toxic effects in animals include severe weight loss, liver necrosis [death of tissue] and hypertrophy [enlargement], skin lesions, immunosuppression, reproductive toxicity, teratogenesis [birth defects], carcinogenesis [cancer] and death. The CARB concluded that dioxin is an animal carcinogen and a "potential human carcinogen." They also reported that both acute (short-term) and chronic (long-term) exposure to dioxin has caused liver damage in humans (pg. 10).

Cadmium

Chronic exposure to cadmium, a toxic metal, causes a wide range of adverse effects in humans, including "cardiovascular [heart, arteries], endocrine [hormone], hepatic [liver], bone, hematological [blood], immunological [immune system], respiratory [lung], renal [kidney], reproductive and teratogenic [birth defect] effects." Furthermore, "There is strong evidence of an association between cadmium exposure and an increased risk of respiratory [lung] cancer," says the CARB report (pg. 18).

California has 142 medical waste incinerators operating today. Together, they burn 20,050 tons of wastes per year, so they are not large. (For example, a big municipal waste incinerator burns this much waste every 10 days.) Medical waste includes paper, cardboard, plastic, rubber, food wastes, cans, bottles, animal carcasses, sharps [hypodermic needles, scalpels, etc.], chemotherapy wastes, diapers, bandages, solvents, and pathological wastes [body parts, bed pan residues, and so forth]. Medical waste also contains metals such as lead, cadmium, mercury, and zinc; it can also contain low-level radioactivity (pg. 34).

Despite their relatively small size, California's 142 medwaste incinerators emit substantial quantities of dioxins and cadmium: 16 grams of dioxin each year (pg. 31) and 30 to 40 pounds of cadmium (pg. 33) each year.

To gather emissions data, the CARB monitored eight medwaste incinerators. The report notes that, "Although the emissions tests were not conducted for compliance purposes, we observed that many of the facilities tested could not meet the particulate limitations in their permits. In addition, the hydrochloric acid emissions were elevated...." (pg. 48)

The eight emissions tests revealed many other air contaminants emitted by one or more of the incinerators. Here is a list of pollutants emitted, followed by the number (1 to 8) of incinerators, out of 8 tested, found to be emitting each pollutant: arsenic (7); ammonia (1); benzene (8); bromodichloromethane (2); cadmium (8); carbon tetrachloride (6); chromium (7); chlorodibromomethane (3); chloroform (4); cumene (5); 1,2-dibromoethane (5); dichloromethane (6); dichloroethane (3); dioxins and furans (8); ethyl benzene (7); lead (8); mercury (5); mesitylene (7); nickel (3); particulate matter (8); naphthalene (5); tetrachloroethane (4); toluene (7); trichloroethane (3); 1,1,1-trichloroethane (6); trichloroethylene (6); trichloromethane (5); vinyl chloride (2); xylenes (7) (pg. 51).

The CARB study indicates that it will cost from \$383,000 to \$479,000 to put best available control air pollution control

technology (BACT) (a spray dryer [also called a dry scrubber] and baghouse filter) on an existing large, regional medwaste incinerator (pg. 115), of which California has 12.

According to the CARB's data, small medwaste incinerators serving an individual institution will not be able to afford to install air pollution equipment that would allow continued operation of the incinerator after the new dioxin and cadmium regulations become effective this summer. For these 129 incinerators, the available alternatives include (a) shut down and use a large, regional medwaste incinerator; (b) shut down and use off-site steam sterilization; (c) shut down and use onsite steam sterilization.

Steam sterilization (also called autoclaving) means heating the wastes in a metal chamber by filling the chamber with saturated steam and holding the temperature at 250 degrees Fahrenheit for 30 minutes. It effectively sterilizes wastes, killing viruses and bacteria. The wastes then go to a landfill. Of these three options, the cheapest is offsite sterilization; this option would increase medwaste disposal costs 10 cents per pound, and would increase patient costs 16 cents per hospital bed per day, compared to present costs of onsite incineration. The use of offsite, regional incineration would increase disposal costs 16 cents per pound and would increase average patient costs 41 cents per bed per day. Onsite steam sterilization would increase disposal costs 16 cents per pound and would increase patient costs 42 cents per bed per day. Thus, shutting down its incinerator and sending wastes out for regional steam sterilization is the cheapest way for a hospital to come into compliance with the proposed California air regulations for cadmium and dioxin (pg. 118).

A different study of medical wastes, by members of the Civil Engineering Department of University of California at Davis (cited below in our last paragraph), points out that, in a typical hospital, infectious waste makes up only about 15% of the total waste stream. Infectious waste by itself will burn, but the volume is usually not sufficient to allow heat recovery. Therefore, the decision to install an incinerator for infectious waste encourages the burning of other non-infectious wastes. In effect, a medwaste incinerator is a municipal solid waste incinerator with 15% of the waste being infectious.

There are, however, a few differences between municipal wastes and infectious wastes. Plastics make up 3% to 7% of municipal waste, but 14% to 30% of infectious waste. Because plastics are the major sources of cadmium and lead, medical waste incinerators emit more of these toxic metals, per pound of burned waste, than do municipal incinerators.

Lead is present as a pigment and as a stiffening and strengthening agent in many plastic items, especially those made of PVC (polyvinyl chloride). For example, the red bags themselves, in which "red bag" medical wastes are packaged, is colored red by a lead compound. Lead is also present in yellow bags for collecting soiled linens, yellow bedpans, and yellow tops of urine containers. In plastics, a bright color (yellow, orange, red, purple) is often an indication of a toxic metal (cadmium or lead).

The Davis researchers didn't say so, but hospitals could refuse to purchase medical supplies made with toxic metals, thus minimizing problems.

Get: DRAFT TECHNICAL SUPPORT DOCUMENT TO PROPOSED DIOXINS AND CADMIUM CONTROL MEASURE FOR MEDICAL WASTE INCINERATORS (Sacramento, CA: Air Resources Board [1102 Q St., P.O. Box 2815, Sacramento, CA 95812], 1990. Phone Information Officer Jerry Martin at (916) 322-2990. This document is about 500 pages long, contains a great deal of useful information on medical waste incineration, and is free while supplies last.

Also get: D.C. Hickman, D.P.Y. Chang, and H. Glasser, "Cadmium,

and Lead in Bio-Medical Waste Incinerators," a paper presented at the 82nd Annual Meeting of the Air and Waste Management Association at Anaheim, CA, June 25-30, 1989; available free from Dan Chang, Department of Civil Engineering, Mail ID# 1855, University of California at Davis, Davis, CA.

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