

HAZARDS OF MEDICAL WASTE INCINERATION

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I'm here to talk about the hazards of medical waste incineration.

We like to think that when trash is fed into an incinerator, the trash somehow just disappears....poof! It's all gone and we have generated electricity to boot – what a deal!

The reality is that incinerators don't eliminate toxic substances, they concentrate them. The saying is: toxics in/toxics out. The heavy metals, mercury, lead and cadmium, don't just disappear; they are basic elements not destroyed by burning. They are still present after incineration, only concentrated in the ash and released to the air from the stack. Of all the trash that enters the incinerator, 30% remains as ash at the end of the process. That's a great deal of very toxic ash which you see in huge piles along I-5 just north of Woodburn.

The primary hazard with incineration is the toxic chemicals in the emissions leaving the stack. According to the EPA, medical waste is the third leading source of dioxin emissions in the US (1) and the fourth leading source of mercury emissions. (2) Heavy metals and dioxin may be dispersed over a wide area, settling on the food we eat and the water we drink. According to the Oregon DEQ, the Brooks Covanta facility emits an estimated 17 pounds of mercury per year, based on source test data. (3) Even very small amounts of mercury can do significant damage. One gram of mercury per year (that's just 1/28th of an ounce) is enough to contaminate all the fish in a lake with surface area of 20 acres so that the fish are unsafe to eat. (4)

According to the EPA, up to 15% of women of childbearing age are exposed to mercury levels high enough to put their newborns at risk of irreversible neurological and developmental damage. Fetal exposure to mercury can cause mental retardation, learning disabilities, attention deficit, gait disturbances and impairments of language and memory. (5) There is so much mercury contamination in our environment that pregnant and nursing mothers and children are advised to severely limit their fish consumption. (6) (7)

Many Oregon hospitals have done an exemplary job phasing out mercury. To their credit Salem Hospital hasn't used mercury thermometers or mercury blood pressure gauges in years. There are, however, less obvious uses of mercury in health care facilities. For example, many Oregon hospitals are still using laboratory chemicals, gastrointestinal tubes, pharmaceutical supplies, and equipment switches that contain mercury.

Arsenic, lead, cadmium, sulfur dioxide, ammonia and benzene, are just some of the many other hazardous pollutants in emissions from medical waste incinerators. (8) The heavy metals, cadmium and lead, are common PVC additives, and like mercury are neurotoxic, especially to fetuses, infants and young children.

I want to take a few minutes to talk about dioxins because unlike heavy metals, dioxins are not part of the medical waste stream when it arrives at the Covanta incinerator. Dioxins are a class of 75 chemicals which are created by heating organic material, such as paper products, in the presence of chlorine. In other words incinerators generate dioxin; they are dioxin factories.

Medical waste contains 14% plastics, whereas municipal waste contains half that, or 7% plastics. More importantly, medical waste contains a much higher percentage of polyvinyl chloride, since PVCs are used in IV bags, IV tubing, blood bags, collection and specimen bags, anesthesia masks, examination gloves, catheters, feeding tubes, dialysis tubing, sharp containers, bed pans, inflatable splints, and many other uses right down to patient I.D. bracelets.

PVC is 59% chlorine by weight. (9) While municipal waste contains only 0.5% PVC by weight, hospital red-bag waste contains an estimated 9-15% PVC. (9)

So we have PVC being burned in the incinerator in the presence of paper and other organic material, and dioxin is produced. How much? According to Russ Johnston, manager of the Covanta facility, 560 mg of dioxin are generated by the Brooks burner unit 1 each year. (10) That's a lot of dioxin, even if you figure most of it is trapped by scrubbers in the fly ash. How much of it is released into the air? An average of .67 ng/dscm @ 7% O₂ (nanogram/dry standard cubic meter of air at 7% oxygen) is released from each of the two burners (data from 1998-2004). I could see your eyes glaze over. What does that figure mean? It means a small, but measurable quantity.

Dioxins are among the most toxic chemicals on earth, the contaminant in Agent Orange used in the Vietnam War. Dioxins are Class 1 human carcinogens and according to the EPA, the average American's cancer risk is increased 1000-fold because of dioxin stored in our bodies. Dioxins also cause multiple reproductive and developmental abnormalities. (11) They have been linked to disrupted sexual development, birth defects and damage to the immune system.

The EPA has concluded there appears to be no "safe" level of exposure to dioxin. (12)

Dioxins are extraordinarily persistent in the environment, resisting physical, chemical and biological degradation for decades and longer. Because they are oil soluble, they bioaccumulate in fatty tissue and are found in highest concentrations in dairy products, eggs, meat and fish. Humans are particularly contaminated because of eating at the apex of the food chain. The highest concentrations of dioxins are in human breast milk,... imagine that...., and nursing infants take in 10-20 times as much dioxin daily as does the average adult. (13) Worse yet, a nursing mother rids herself of half her body burden of dioxin during six months of breast feeding.

While a health analysis of the incinerator's impact on Marion County residents has not been done, other communities with incinerators have experienced negative health

impacts. To cite just a couple of examples: Residents living <1 km from municipal waste incinerators in England were found to have higher rates of stomach, colon, liver and lung cancer than those living further away. (14) Another study in England showed greater rates of stillbirths, spina bifida and heart defects in babies born to mothers that lived near incinerators. (15) In Columbus, OH, children who had lived near an incinerator for at least two years were found to have significantly higher cadmium levels in their hair and increased learning and behavioral problems. (16) Several studies in Japan and Korea have shown that incinerator workers and nearby residents had much higher levels of dioxin in their blood than citizens who worked or lived elsewhere. (17) Unfortunately, similar studies have not been undertaken here.

Currently the Covanta incinerator imports medical waste from Oregon and Washington. It burns about 650 tons of medical waste a year. The charge for medical waste is \$200. per ton, vs. \$67. per ton for municipal waste. So you see the issue: the charge is three times more for medical waste than for municipal waste. Medical waste is a money maker for both Covanta and the county.

The county says that they will use these additional revenues for citizen education to stop backyard burning of plastics and other toxic materials. This seems like an interesting trade-off: the county will use the proceeds from burning more toxic wastes to educate citizens not to burn toxic wastes. “Do as I say, not as I do.”

So what are we to do with medical waste if we don't burn it? Oregon law requires pathological waste (organs, biopsies, autopsies, etc.) to be incinerated. That's fine. But pathologic waste is only 2% of medical waste; the other 98% consists of biological waste, sharps, and cultures, and contains large quantities of plastics, especially PVCs, and a host of other toxic substances. The worst way to deal with PVC waste is to burn it; the resulting dioxins end up in our backyards and on our dinner tables. I don't think we should be burning any of the 98% of medical waste not required by law.

There are safer and more cost effective alternatives for disposing of medical waste. The other technologies are beyond the scope of this talk, and quite frankly are beyond the scope of this speaker's expertise. Suffice it to say, non-incineration medical waste technologies (18) include:

- steam-based thermal processes
- microwave technology
- dry-heat processes, using radiant heaters
- pyrolysis, using high heat and chemical reactions
- chemical technologies, using acids, ozone gas and other chemicals
- electron beam technology
- biological processes

The point is that incineration of medical waste is the worst way to treat it because of the creation of dioxins and the release of dioxins and heavy metals into the air.

If Covanta accepts additional out of state medical waste, will they really have any idea how much mercury or PVC is being imported in the waste? Not likely. The medical waste arrives in sealed containers and for safety reasons, the containers are not inspected.

I don't have time to discuss problems with the ash landfill in Woodburn or with emissions testing at the incinerator. Perhaps someone can ask about those issues during the Q&A.

In conclusion, for the health of our communities, and especially our children, we should be doing everything possible to reduce, not increase, the quantity of PVC, mercury, cadmium, and lead burned at Brooks. I don't think it is our responsibility to take care of every hospital's PVC problems. The County Commissioners should vote no on importing additional medical waste, which will only further pollute our valley and endanger the health of all of us, for the sake of a few bucks.

References:

(1) Inventory of Sources of Dioxin in the United States (EPA/600/ P-98/002Aa), National Center for Environmental Assessment, USEPA, April 1998, p. 2-13.

(2) Mercury Study Report to Congress, Volume I: Executive Summary, USEPA Office of Air, December 1997, pp 3-6

(3) This report can be found at
<http://www.deq.state.or.us/programs/consumercorner/mercury/MercuryReport.pdf>

(4) EPA- <http://www.epa.gov/glnpo/bnsdocs/hg/thermfaq.html>

(5) In Harm's Way: Toxic Threats to Child Development, A Report by Greater Boston Physicians for Social Responsibility, Jan. 2001, p. 61

(6) EPA, Region 5 [Air Toxics and the Great Lake, What is Wrong With Incineration?](#)

(7) [Location of Waterbodies Under Consumption Advisory](#)- EPA [Oregon Fish Advisories](#)

(8) Draft Technical Support Document To Proposed Dioxins And Cadmium Control Measure For Medical Waste Incinerators, California Air Resources Board, 1990, pg.51, as cited in "Medical Incinerators Emit Dangerous Metals And Dioxin, New Study Says," Rachel's Environment & Health Weekly #179, May 2, 1990.

(9) Public Health Reports, Hospitals and Plastics: Dioxin Prevention and Medical Waste Incinerators, Vol. 3, July/Aug. 1996

(10) Minutes of SWMAC meeting 4/27/04

(11) "Toxicology of dioxins and related chemicals." In Dioxins And Health, Arnold Schecter, ed., NY: Plenum Press, 139-62, as cited in Dying From Dioxin: A Citizen's

Guide To Reclaiming Our Health And Rebuilding Democracy, Gibbs, L M and the Citizens Clearinghouse for Hazardous Waste, Boston: South End Press, 1994, pp. 138-139.

(12) Estimating Exposure To Dioxin-Like Compounds, Volume I: Executive Summary, USEPA, Office of Research and Development, EPA/600/6-88/005Ca. June 1994 review draft, p. 36.

(13) Public Health Reports, Hospitals and Plastics: Dioxin Prevention and Medical Waste Incinerators, Vol. 3, July/Aug. 1996

(14) Elliott P. et al. (1996) Cancer incidence near municipal solid waste incinerators in Great Britain. British Journal of Cancer. 1996 Mar; 73(5):702-10

(15) Dummer TJ, Dickinson HO, Parker L (2003) Adverse pregnancy outcomes around incinerators and crematoriums in Cumbria, north west England, 1956-93. Journal of Epidemiology and Community Health. 2003 Jun;57(6):456-61

(16) Stewart-Pinkham SM. (1989) The effect of ambient cadmium air pollution on the hair mineral content of children. The Science of the Total Environment. 1989 Jan;78:289-96

(17) Takata T. (2003) Survey on the health effects of chronic exposure to dioxins and its accumulation on workers of a municipal solid waste incinerator, rural part of Osaka Prefecture, and the results of extended survey afterwards. Industrial Health. 2003 Jul;41(3):189-96

(18) [Non-Incineration Medical Waste Treatment Technologies](#), an August 2001 report from Health Care Without Harm, is the most comprehensive information available to date on the pros and cons of alternatives to medical waste incineration. The report explores the environmental and economic impacts, among other considerations, of about 50 specific technologies.

(19) Health Care Without Harm [Going Green: A Resource Kit for Pollution Prevention in Health Care.](#)

Useful Links:

[What is Wrong with Incineration?](#)

[Dioxin, PVC and Healthcare Institutions](#)

[The Mercury Problem Fact sheet](#)

[Non-Incineration Medical Waste Treatment Technologies](#)

[Health Care Without Harm](#)

[Hospitals for a Healthy Environment](#)

[American Society of Mechanical Engineers \(ASME\) Report \(Rigo et al\), 1995](#)
[\(You can download Adobe Acrobat Reader here\)](#)