HEALTH CARE
WITHOUT
HARM

THE CAMPAIGN FOR
ENVIRONMENTALLY
RESPONSIBLE
HEALTH CARE

ENVIRONMENTAL
WORKING GROUP™

FIRST, DO NO HARM

REDUCING THE MEDICAL WASTE THREAT TO PUBLIC HEALTH AND THE ENVIRONMENT

ACKNOWLEDGMENTS

EWG analyst Jackie Savitz is the principal author of *First, Do No Harm.* EWG information technology director Chris Campbell conducted the database analyses for both the national overview and state editions of the study, and built the initial website for Health Care Without Harm <www.ewg.org/medwaste.html>. Ken Cook of EWG wrote sections of the report and provided overall editorial and analytical direction.

Molly Evans of EWG designed the report and coordinated all production. Thanks to Ron Blalock for his cover art. For their work in the nationwide release of the study we are grateful to Allison Daly, EWG grassroots coordinator; Charlotte Brody of the Citizens Clearinghouse for Hazardous Waste; Laurie Valeriano of the Washington Toxics Coalition; Jackie Hunt Christensen of the Institute for Agriculture and Trade Policy; Susan Claymon of the Breast Cancer Coalition; Karen Perry of Physicians for Social Responsibility; and Margie Alt of U.S. PIRG. We also want to thank the steering committee for Health Care Without Harm and other assorted friends of the order for their support throughout the preparation of this publication.

EWG would like to thank the following people who provided facts, data, articles, advice and other information or gave us helpful comments on the report: Charlotte Brody, Jackie Hunt Christensen, Susan Claymon, Gary Cohen, Paul Connett, Peter DeFur, Michael Drescher, Robert Eleff, Lois Gibbs, Catherine Hill, Rick Hind, Michael Lerner, Steven Lester, Michael McCally, Mark Muff, Karen Perry, Hollie Shaner, Bill Walker, Richard Wiles, Laurie Valeriano and Jane Williams. Needless to say, any errors of fact or interpretation in this report are the sole responsibility of EWG.

Finally, we would like to thank all of the hard working activists and organizations who participate in the HCWH campaign and who helped in the release of this report. Most of all we are grateful to Michael Lerner for the vision and support that made the report and the Campaign itself possible.

First, Do No Harm was made possible by grants from the StarFire Fund, the Jenifer Altman Foundation, W. Alton Jones Foundation (through support of CCHW) and the Joyce Foundation. The opinions expressed in this report are those of the authors and do not necessarily reflect the views of the supporters listed above.

Manufactured in the United States of America. Printed on chlorine-free paper.

ENVIRONMENTAL WORKING GROUP

The Environmental Working Group is a nonprofit environmental research organization based in Washington, D.C. The Environmental Working Group is a project of the Tides Center, a California Public Benefit Corporation based in San Francisco that provides administrative and program support services to nonprofit programs and projects. This and many other reports are available on the World Wide Web at <www.ewg.org>.
Kenneth A. Cook, President
Mark B. Childress, Vice President for Policy
Richard Wiles, Vice President for Research

TO ORDER A COPY

Copies of this report are available at no charge from:

Health Care Without Harm
c/o Citizens Clearinghouse for Hazardous Waste
P.O. Box 6806
Falls Church, VA 22040
703-237-2249 (phone) • cchw@essential.org (e-mail)

HEALTH CARE WITHOUT HARM PARTICIPATING ORGANIZATIONS

Action for Women's Health, Albuquerque NM
AFL-CIO, Washington DC
Breast Cancer Action, San Francisco CA
Breast Cancer Fund, San Francisco CA
California Communities Against Toxics, Rosamond CA
Center for the Biology of Natural Systems, Flushing NY
CGH Environmental Strategies, Burlington VT
Citizens for a Better Environment, Madison WI
CCHW Center for Health, Environment and Justice, Falls Church VA
Chemical Impact Project, Kentfield CA
Clean North, Sault Ste. Marie ON
Commonweal, Bolinas CA
EarthSave, Santa Cruz CA
Ecology Center, Ann Arbor MI
Endometriosis Association, Milwaukee WI
Environmental Working Group, Washington DC
Environmental Stewardship Concepts, Richmond VA
Greenpeace, Washington DC, Chicago IL, and San Francisco CA
Human Action Community Organization, Harvey IL
Indigenous Environmental Network, Hackensack MN
Institute for Agriculture and Trade Policy, Minneapolis MN
Jenifer Altman Foundation, Bolinas CA
Learning Alliance, New York NY
Learning Disabilities Association, Pittsburgh PA
Minnesota Center for Environmental Advocacy, St. Paul MN
Mt. Sinai School of Medicine, New York NY
Multinational and Development Clearinghouse, Washington DC
National Environmental Law Center, Boston MA and Davis CA
1199, the National Health & Human Service Employees Union, New York, NY
National Women's Health Network, Washington DC
Pollution Probe, Toronto ON
Physicians for Social Responsibility, Washington DC, Boston MA, and San Francisco CA
Science and Environmental Health Network, Windsor ND
South Bronx Clean Air Coalition, Bronx NY
Toxics Action Center, Boston MA
United Citizens and Neighbors, Urbana IL
Washington Toxics Coalition, Seattle WA
Work on Waste, Canton NY

FOREWORD

If you have to be hospitalized in the United States it's going to run you (or your insurance company) about 930 bucks a day, on average. Would you be willing to pay 93 cents more—that's right, 93 cents, not much more than you'd pay for a candy bar down at the gift shop—so that the hospital you're in could "afford" to stop polluting the air with one of the most potent toxic substances known to science? Would you pay those pennies so that your hospital could avoid fouling the environment with an astonishingly toxic chemical that already taints virtually all of the milk and meat you and your children eat—a toxic substance that, once in the environment or the human body, stays indefinitely and can't be cleaned up?

Of course you would. Who wouldn't? Especially since that 93-cent per patient investment would all but halt the burning of the hospital's wastes and pay for itself within a few short years at most. After that, your hospital will *save* money on waste disposal. Even more compelling, for a tiny fraction of your hospital bill you'd help eliminate one of the nation's top sources of the pollutant in question: Dioxin. It has been drifting out of smokestacks for decades, wherever medical waste was burned, along with mercury, cadmium, lead and other pollutants.

No responsible health care professional could be comfortable with the irony that prevailing methods of handling hospital waste are in effect increasing the risk of diseases like cancer. Indeed, doctors, nurses and other health care providers around the country are working even now to reduce the impacts of medical waste on the environment and human health. They're doing it out of concern for their community, their patients *and* their bottom lines.

Which brings us to the curious position that the American Hospital Association has been pursuing so aggressively for the past few years. The AHA, the leading trade association for the hospital industry, has pushed extremely hard to *weaken* pending air pollution rules from the Environmental Protection Agency for

No responsible health care professional could be comfortable with the irony that prevailing methods of handling hospital waste are in effect increasing the risk of diseases like cancer.

medwaste incinerators. Properly devised rules would eliminate emissions of dioxins and other pollutants from hundreds of medwaste incinerators around the country. For example, the EPA has full authority to eliminate from the medwaste stream materials that lead to the formation of dioxins and cause pollution from mercury and other toxins in the first place. Tough new rules would also lend encouragement to a wide range of anti-pollution efforts underway within and outside the health care industry, and as documented in this study, make hospitals and other institutions more environmentally responsible.

The Clinton EPA would allow hundreds of medwaste incinerators to continue operation with no pollution control equipment whatsoever.

The Clinton Administration, sorry to say, appears poised to capitulate to the AHA. After initially proposing some fairly tough standards the Administration now seems to be beating a fast and full scale retreat. Under its revised rules the Clinton EPA would allow hundreds of medwaste incinerators to continue operation with no pollution control equipment whatsoever. Incinerators would be monitored for pollutants less thoroughly and less often, and the people who run the incinerators would need only the most meager training. The AHA's lead expert on medical waste, seeming pleased with all this, has dubbed the Administration's proposed rules "painless" for hospitals.

Clearly the American Hospital Association is badly out of step with the American public when it defends retrograde trash burners and continued dioxin contamination. We can't help wondering if the AHA isn't also out of step with its own membership. It 's hard to conclude otherwise, based on the anti-pollution efforts underway at hospitals described in this report, and from the many doctors, nurses and other health care experts who have joined Health Care Without Harm: The Campaign for Environmentally Responsible Health Care.

While this report, *First, Do No Harm*, is intended as the campaign's debut, it is in equal measure a testimonial to a great many community organizers, nurses, doctors, and public interest advocates whose work has made this report possible. Their research has elucidated the many facets of the medwaste threat. Their powers of persuasion have moved the American Public Health Association, among other prestigious bodies, to join in efforts to solve the problem. And their passion and activism have snuffed out thousands of incinerators over the years. We hope we've done justice to their case and cause with this study.

KENNETH A. COOK
PRESIDENT
ENVIRONMENTAL WORKING GROUP

EXECUTIVE SUMMARY

"First, do no harm" is the credo of every health care professional. But for decades that vow has been insidiously violated through the emission of toxic pollution from thousands of incinerators operating at hospitals and other health care institutions throughout the United States. Medical waste incinerators recently have been identified as a top source of the notorious environmental contaminant dioxin, one of the most potent toxic chemicals known to humankind. In mid-February, 1997, a group of 25 scientists from 11 countries, convened by the prestigious International Agency for Research on Cancer (IARC), classified dioxin (2,3,7,8 TCDD) as a proven human carcinogen. In animal studies, dioxin is 300,000 times more potent a carcinogen than the pesticide DDT (NRC 1996), which was banned in 1972.

In a dramatic retreat from an initial 1995 proposal—which had been issued under court order—the Clinton Administration in June, 1996 proposed exceedingly weak air pollution safeguards for medical waste incinerators. In contrast to the Administration's recent high profile rules for tougher new standards on particulate air pollution and ground level ozone, the proposed medical waste incinerator rule will do next to nothing to halt emissions of dioxin, mercury and other pollutants into the environment. Moreover, by failing to restrain medwaste incineration the Administration's regulations are almost certain to discourage fledgling efforts at many healthcare institutions to reduce the impact of medical waste on public health while saving money on waste disposal.

First, Do No Harm, a series of state-level reports with a national overview, is the product of a collaborative public education effort by members of *Health Care without Harm: The Campaign for Environmentally Responsible Health Care*. The campaign is a nationwide coalition of more than three dozen organizations, including community groups, environmental justice organizations, scientists, physicians, nurses and nursing organizations, other health care professionals, national labor unions, religious organizations, and environmentalists.

In a dramatic retreat the Clinton Administration proposed exceedingly weak air pollution safeguards for medical waste incinerators.

Few chemicals cause such a wide variety of effects, and none exhibit dioxin's astonishing toxicity.

MAJOR FINDINGS

Medwaste and Dioxin. Dioxin is created as a by-product in many industrial processes including waste incineration. EPA has determined that medical waste incinerators are among the top two or three sources of dioxin contamination. Peer-reviewed research has documented that dioxin causes cancer, affects the immune system, causes birth defects—including fetal death—decreases fertility, causes female and male reproductive dysfunction, and adversely affects a variety of hormonal processes involving insulin, thyroid hormones, and steroid hormones. Few chemicals cause such a wide variety of effects, and none exhibit dioxin's astonishing toxicity—the ability to cause damage at doses almost too low to measure. There is no safe level of exposure to dioxin.

Our bodies already are contaminated with levels of dioxin that are at or near levels that have been observed to cause health effects in humans and laboratory animals.

Dioxin is highly persistent in the environment and concentrates in animal fat, with meat, milk products and fish being primary sources of human intake. EPA's current draft assessment of dioxin shows that while about 1 trillionth of a gram of dioxin may be a "virtually safe" daily dose, humans routinely and inadvertently consume 300 to 600 times that amount every day. Nursing infants take in 50 times the amount of dioxins that adults consume daily, and can accumulate the "safe" maximum lifetime dose in just 6 months of breast feeding. Because the average person in the United States consumes hundreds of times the "safe" level every day, our bodies already are contaminated with levels of dioxin that are at or near levels that have been observed to cause health effects in humans and laboratory animals.

Once the environment or a human body has been contaminated by dioxin, it cannot be "cleaned up." The only solution to dioxin pollution is to prevent it from being formed and dispersed in the first place.

Waste generation. This study estimates that the nation's 6,000 hospitals generate about 4 billion pounds (2 million tons) of waste per year. The hospital waste stream contains twice as much plastic as household waste, making it a disproportionate contributor to environmental dioxin contamination. The vast majority of this waste can and should be managed and reduced with the same techniques as households use—sorting, recycling, and environmentally sound purchasing. Only a small portion of hospital waste, an estimated 295,000 tons (15 percent), is infectious waste that requires special treatment, and according to the Centers for Disease Control, very little of this infectious waste needs to be burned. Our case studies profile hospitals that have used waste management programs to dramatically reduce their waste stream and slash their disposal costs. With waste minimization programs most hospitals could eliminate all but a fraction of the waste they now burn on-site or haul off for burning elsewhere, allowing many to shut down

their incinerators. Hospitals can shift to more benign materials, eliminating supplies made from polyvinyl chloride for example, and to alternative waste treatment methods like autoclaving. The American Public Health Association recently adopted a resolution (Appendix A) to encourage the reduction of dioxin releases from medical facilities through reduced use of items made of poly vinyl chloride (PVC), one of the main materials that creates dioxin when incinerated.

Medical Waste Incinerators. EPA is proceeding with weak medwaste incineration regulations in the absence of a comprehensive inventory of medical waste incinerators. The agency also has neglected to incorporate "right to know" measures that will inform the public of the location and characteristics of the facilities that burn medical waste. Our analysis of EPA data on recently permitted medwaste incinerators found:

- A total of 2,036 facilities held incinerator permits in recent years, with a combined incinerating capacity of nearly 900,000 pounds *per hour* nationwide. Thousands of hospitals and other facilities have shut down incinerators in recent years, but much of this waste is being burned elsewhere, in cement kilns, regional incinerators or other facilities. Even so, EPA data identify permitted medwaste incinerators in 1,032 counties in 42 states.

- About 69 percent of the permitted medwaste incinerators had no pollution control technologies whatsoever. These facilities account for 56 percent of total incineration capacity. Many of these uncontrolled incinerators are in rural areas, where emissions may more readily contaminate the food supply (meat and dairy products.)

- Only about 1 percent of permitted medical waste incinerators operate with state-of-the-art air pollution control technologies (dry scrubbers with carbon injection or fabric filter/packed bed controls). These "high tech" incinerators, capable of reducing dioxin emissions by more than 90 percent (but not eliminating dioxin emissions) account for a minute fraction (2 percent) of total U.S. medwaste incinerator capacity.

Implications for Children, Poor People, People of Color. Pollutants emitted by medwaste incinerators have been shown to contaminate the environment at great distances from the source. Less is known about health risks that incinerator pollutants like mercury and cadmium may pose to populations living in close proximity to medwaste incinerators. EPA has not determined if children, people of color or low

The American Public Health Association recently adopted a resolution to encourage the reduction of dioxin releases from medical facilities.

69 percent of the permitted medwaste incinerators had no pollution control technologies whatsoever.

EPA has neglected to incorporate "right to know" measures that will inform the public of the location and characteristics of the facilities that burn medical waste.

Over 5.6 million American children under the age of 16 live within 2 miles of a permitted medical waste incinerator.

income Americans may be at special risk by virtue of living near medwaste incinerators. We were able to develop a precise geographic location for 1,348 health care institutions that have recently been issued incineration permits according to the EPA. When we analyzed these locations against 1990 U.S. Census data we found:

- Over 5.6 million American children under the age of 16 live within 2 miles of a permitted medical waste incinerator.

- Over 7.1 million people of color—15 percent of the minority population— live within 2 miles of a permitted medical waste incinerator. By comparison, 9 percent of white Americans live within 2 miles of medwaste burners.

- Nearly one American in seven (14%) who is living below the poverty line also lives within 2 miles of a medical waste incinerator.

Alternatives to Incineration Cost Pennies Per Day. By segregating out ordinary waste and treating the infectious portion that remains through autoclaving or other methods, health care institutions can almost eliminate the need to incinerate—and in the process eliminate emissions of dioxin and other pollutants. Based on EPA's own cost analysis, our study found that the near term cost for the average U.S. hospital to make this switch would be just 93 cents per patient per day, compared to $930 per day for the average hospital stay.

The Clinton Administration's Weak Medwaste Rules. Pollution control standards now being proposed by the Clinton Administration have been described as "painless" by the American Hospital Association's top expert on the issue. But these rules will mean continued, unacceptable pollution of the environment with dioxin, mercury and other toxins.

The new rules may drop requirements for any air pollution control devices whatsoever on hundreds of small incinerators, which are often the dirtiest.

- *Weaker standards.* The Administration's initial rule contained a single, fairly stringent standard for all medwaste incinerators; the new rule will likely make standards contingent on size. The new rules may drop requirements for any air pollution control devices whatsoever on hundreds of small incinerators, which are often the dirtiest and account for a substantial amount of total dioxin generated by medwaste incinerators. The most stringent Administration proposal for dioxin emissions, which applies only to the largest medwaste incinerators, is still ten times weaker than the dioxin emission standards being proposed for hazardous waste incinerators, cement kilns and other waste burners.

- *Weaker monitoring.* Under the Administration's proposal, EPA will require "initial testing" for regulated pollutants at incinerator start up with *no* subsequent testing for facilities that rely only on good combustion practices to control emissions. The original rule called for initial and annual testing for at least three years. For facilities with scrubbers the EPA will require initial testing and skip testing for the first three years. This means that the facilities with no pollution controls will have to test their emissions *less* than those with scrubbers. EPA's initial rule required that tests would consist of three test runs of four hours each. Now EPA will require only three test runs of one hour each, reducing the reliability of the monitoring data.

- *Less training for operators, less accountability for incinerators.* EPA significantly weakens requirements for operator training and eliminates the requirement for a trained and qualified operator to be on duty when the incinerator is burning, despite the reliance on "good combustion practices" as the sole pollution control measure for hundreds of smaller incinerators.

The facilities with no pollution controls will have to test their emissions *less* than those with scrubbers.

CHAPTER ONE

FIRST, DO NO HARM THE MEDICAL WASTE THREAT TO PUBLIC HEALTH

In 1994, the EPA concluded that incinerators at medical facilities were the number one source of dioxin in the human environment (EPA 1994a). EPA's subsequent revision of that estimate indicates a lower amount of dioxin is being produced by medical waste incinerators. Nevertheless, those facilities still remain the second largest source of this extraordinarily potent poison (Cleverly 1996).

There are several reasons for the poignant irony that medical facilities are a principal source of what may well be the most toxic compound known to humankind. First, medical facilities as a group, and particularly hospitals, generate huge volumes of waste. The amount of medical waste generated per hospital patient more than doubled since 1955 (Figure 1) (MHHA 1996), roughly the same pace at which per capita household waste increased over a comparable period (Franklin Associates 1994).

Second, this waste contains higher than average amounts of chlorinated plastics, which contribute to the formation of dioxin upon incineration. Third, medical waste incinerators have less advanced pollution control technology than other classes of combusters which burn similar waste.

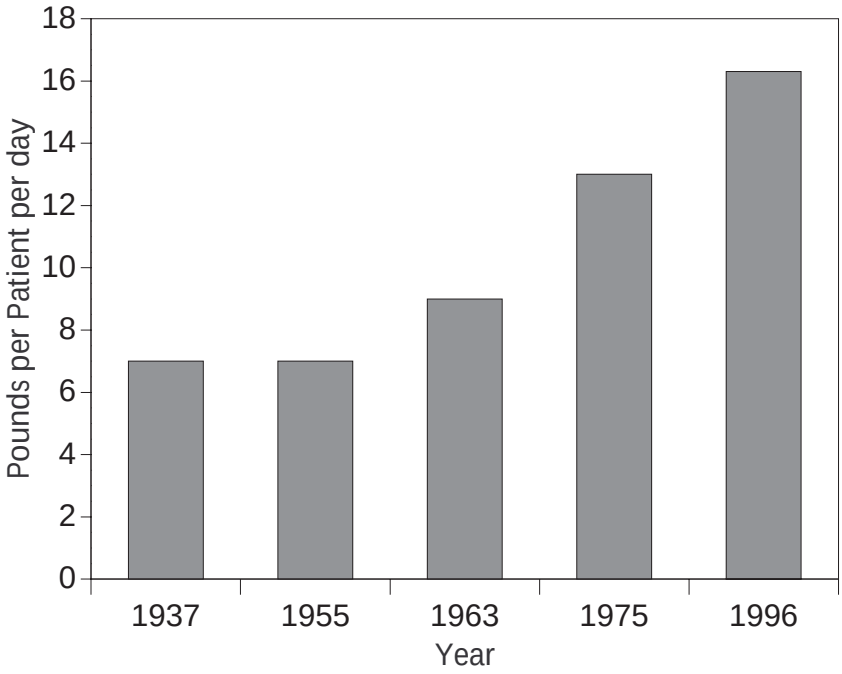
Changing medical technology clearly has played a role in the rise of the medical waste mountain, due, in part, to the use of more plastic and more disposable products. Experts also point to other factors, such as inefficiencies in hospital waste management, excessive use of disposables, unnecessary red bag disposal of waste, and the scarcity of storage space in hospitals.

Hospital waste is much like household waste, as it includes trash from offices, and cafeterias. A fraction of the waste generated by hospitals, used in the treatment and diagnosis of patients, is referred to as medical waste (Sidebar 1). Only a small portion of that medical waste is so-called infectious waste, which by regulatory definition must be disposed of according to special criteria. These special criteria do not necessarily specify incineration; how-

The amount of medical waste generated per hospital patient more than doubled since 1955.

Only infectious waste must be disposed of according to special criteria...not necessarily incineration.

Figure 1. Hospital waste has doubled since the 1960's.



Source: Environmental Working Group. Data provided for the state of Michigan in: Michigan Health and Hospital Association. 1996.

The majority of hospital waste is not particularly infectious.

ever, prior lack of testing and knowledge about the contributions of mercury and dioxins from medical waste incineration made burning the easiest, least costly and most common disposal technique for many health care facilities.

The unregulated portion of hospital waste is roughly equivalent in composition to household garbage with one exception: The overall plastic content of hospital waste is between 15 and 30 percent (EPA 1987, Rutala et al. 1989, ATSDR 1990), about twice the level found in household waste (Leach Bisson et al. 1993). This dissimilarity arises from the routine use of such disposable items as plastic gloves, IV and blood bags, plastic eating utensils and the excessive plastic packaging of medical supplies. The high plastic content in hospital waste contributes to the high dioxin emissions that are linked to medical waste incineration (Sidebar 2).

About 15 percent of hospital waste is regulated as "infectious waste" (Rutala and Mayhall 1992). Some infectious "red bag" waste is composed of chlorinated plastic materials that will produce dioxin when burned. Most plastics, however, are not contaminated with infectious agents that require incineration, and thus do not need to be placed in red bags. Frequently, however, non-infectious waste is disposed of in red bags unnecessarily.

In spite of popular fears to the contrary, the *majority* of hospital waste is not particularly infectious. According to the Society for Hospital Epidemiology of America, "Household waste contains more microorganisms with pathogenic potential for humans on average than medical waste" (Rutala and Mayhall 1992). According to the Centers for Disease Control, only pathological waste (Sidebar 1), which includes about 2% of the facility's total waste must be burned (Rutala and Mayhall, 1992). Thus, despite many unique characteristics of health care facilities, and enormous variability among those facilities, the preponderance of unregulated hospital waste is amenable

SIDEBAR 1. MOST HOSPITAL WASTE IS NOT INFECTIOUS

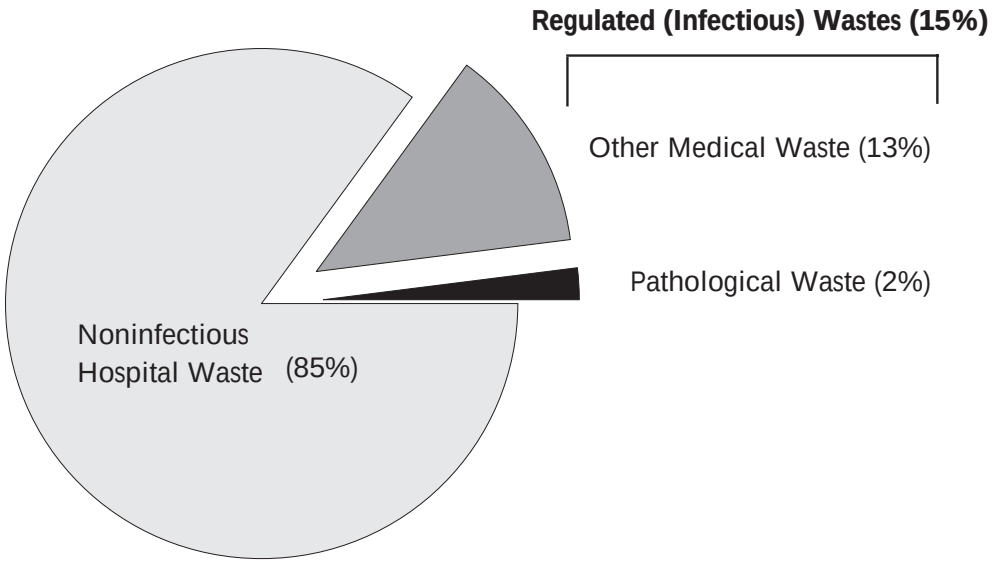
Hospital Waste: All waste discarded by hospitals, nursing homes or other health care facilities that is not recycled or otherwise re-used. Includes disposable food service items and office waste, as well as medical waste which includes infectious and pathological waste.

Medical Waste: Waste generated while actually diagnosing or treating a patient. Includes IV bags, gauze dressings, syringes, and bed pans as well as infectious waste.

Infectious Waste: The portion of medical waste that can transmit an infectious disease. Generally believed to be 15% or less of hospital waste. Disposed of in "red bags" so that it may be more easily identified, most of this waste does not need to be incinerated.

Pathological Waste: Tissues and organs. This is the only fraction of waste that must be incinerated according to the Center for Disease Control (Rutala and Mayhall 1992.) Two hospitals report this comprising only 2% of total waste[1].

Figure 2. Most hospital waste is not infectious.



Source: Environmental Working Group. Based on Rutala and Mayhall 1992 and personal Communications with Hollie Shaner, CGH, VT; and Laura Brannon, Dartmouth Hitchcock Medical Center, NH.

Adapted from Leach Bisson, et al. 1993.

SIDEBAR 2. POLY VINYL CHLORIDE: A PROBLEM THAT CAN GO AWAY

Many factors contribute to dioxin formation. A complex set of conditions are involved that are commonly found wherever waste is burned. And while some industry experts attempt to dispute it, it is generally agreed that one of those factors involves the presence of chlorine in the material that is being burned. Chlorine can come from a number of sources, including chlorine-bleached paper and chlorine-containing plastics such as PVC. Chlorinated dioxins form when chlorine present in the combustion products reacts with organic chemicals that also exist due to combustion of organic material. The reaction occurs in the presence of catalysts, which are common after combustion of most fuels. Chlorine must be present for this reaction, as it is an essential component of the molecules.

PVC is a larger component of hospital waste than of other solid waste streams. One analysis found that PVC gloves and IV-bags alone accounted for over 80% of the chlorine content in medical waste from New York City (Green 1993). Removal of PVC from the waste stream, in part by minimizing its presence in hospital supplies, would significantly reduce the generation of dioxin.

Benign alternatives exist for many uses of PVC in medical settings. Easily replaced uses include patient identification bracelets and cards, IV and plasma bags, compression stockings, and fluid collection devices, for example. Rigid PVC products can be replaced with any number of substitutes, including glass, metal, and other non-chlorinated plastics such as polypropylene and polycarbonate (Thornton et al. 1996.) Intravenous and plasma bags, once thought to be one of the most difficult uses of PVC to replace are now being manufactured without the use of chlorine, and some hospitals are shifting to this alternative.

The solution to dioxin releases originating from medical facilities is many fold. Sunsetting the use of PVC is one important aspect which has far-reaching significance. Besides leading to reductions in dioxin released from medical incinerators, dioxin releases associated with the manufacture of PVC, another important source of environmental dioxin, also will be reduced. The stimulation of new technologies and new products as the result of shifting to safer materials is already evident (e.g. McGaw IV bags.) These trends will also convey to non-medical uses of PVC. But for that process to continue it is critical that EPA acknowledge the public health threats associated with medical incineration of these materials, and design policies that will drive improvements, rather than maintaining the status quo.

to the same waste minimization techniques used in homes and offices. The remaining fraction of medical waste that is truly infectious must be treated safely and properly.

TOXIC CHEMICAL POLLUTION FROM MEDICAL WASTE INCINERATORS

Waste incineration creates a variety of different pollutants, depending on the type of waste burned and the conditions that exist during burning. The type of pollution control equipment in

use, if any, and to some extent the diligence of the operator, will determine how much dioxin is released into the air. The two pollutants which pose the greatest risk associated with medical waste incineration are dioxin and mercury.

DIOXIN: A UNIQUE KILLER

Dioxin has no commercial use. It is a toxic waste product formed when waste is burned and when other organic chemicals that contain chlorine are manufactured. Everything about dioxin is unique beginning with its chemistry.

Dioxin is not just one chemical, rather it is a class of 75 chemicals technically known as the "chloro dibenzo dioxins" (CDDs). At least 7 of these chemical forms, or "congeners", are highly toxic. The most well-known, tetrachloro dibenzo dioxin, more specifically 2,3,7,8-TCDD (the numbers describe the location of the four chlorine atoms on the molecule) is the most toxic in the group. In fact, it is believed to be the single most carcinogenic chemical known to science (Huff 1994).

Dioxins commonly co-occur with another group of chemicals called furans, of which there are 135 congeners, 10 of which are highly toxic. Some furan congeners are comparable in composition and toxicity to dioxins (other than TCDD,) and dioxins and furans are frequently discussed as a group. In this report, we use the term dioxins to refer generally to both classes of chemicals.

This group of chemicals is not a component of waste prior to incineration. Neither domestic nor hospital waste contains any perceptible amount of dioxin. Nor are dioxins something that will disappear by burning waste at a higher temperature. Dioxin is actually formed *after* waste containing a chlorine source, such as poly vinyl chloride (PVC plastic) is burned, as the temperature drops to around 200 to 450°C (Lorber 1996).

Probably no other class of synthetic chemical pollutants has been studied as intensively as dioxins. The EPA has been assessing dioxin's health impacts for over a decade, and the most recent "reassessment" is ongoing even as we go to press (February 1997). The debate at this stage is not about whether dioxin is highly toxic; most everyone agrees that it is. Disagreement centers on exactly how minute an amount of dioxin it takes to cause adverse effects.

One reason this debate has gone on so long is because early dioxin studies conducted by chemical manufacturers were seriously flawed, and in some cases appeared to have been purposely rigged in order to hide the toxic effects of the compounds (CCHW 1995). In the most notorious case, Monsanto researchers were accused of intentionally falsifying studies to obscure or misrepre-

The two pollutants which pose the greatest risk associated with medical waste incineration are dioxin and mercury.

No other class of synthetic chemical pollutants has been studied as intensively as dioxins.

Dioxins are toxic in doses almost too low to measure.

sent the toxicity of the substances to which workers were exposed (CCHW 1995).

Two aspects of dioxin's toxicity are particularly important from a public health perspective: the wide variety of harmful health effects it produces, and the extremely low levels of exposure that produce these effects. Peer-reviewed research has documented that dioxin causes cancer, affects the immune system, causes birth defects —including fetal death— decreases fertility, causes female and male reproductive dysfunction, and affects a variety of hormonal processes involving insulin, thyroid hormones, and steroid hormones (EPA 1994c). In February, 1997, a group of 25 scientists from 11 countries, convened by the prestigious International Agency for Research on Cancer (IARC), classified dioxin (2,3,7,8-TCDD) as a proven human carcinogen. Few chemicals cause such a wide variety of effects.

Humans routinely and inadvertently consume 300 to 600 times EPA's acceptable daily dose every day.

Dioxin's other unique feature is its astonishing potency. Dioxins, especially 2,3,7,8-TCDD, are toxic in doses almost too low to measure. There may be no safe level of dioxin and it clearly takes only a minuscule amount to cause alarming adverse effects.

Generally dioxin toxicity is expressed in terms of the toxicity of the most toxic congener, 2,3,7,8-TCDD. In 1994, EPA's acceptable daily exposure was 0.006 picograms/kg/day. This level is equivalent to a drop of dioxin in 600,000 railroad cars of water. More recent estimates report that 0.01 picograms/kg/day (EPA 1997) is an acceptable amount[2]. EPA's current draft of the dioxin reassessment shows that while *this* level may be acceptable, humans routinely and inadvertently consume 300 to 600 times this amount every day (see also DiVito et al. 1995).

Dioxin is highly persistent in the environment. Chlorine bonds in the molecule are extremely resistant to chemical or physical breakdown, making environmental degradation almost non-existent. As a result, dioxin is ubiquitous in our food and water supply and is indeed accumulating in the environment and in the human population. Many states and municipalities have posted fish advisories due to dioxin contamination of finfish and shellfish. Despite restrictions and warnings, people still consume dioxin-contaminated fish, a particularly worrisome risk to those whose families subsist primarily on fish.

The primary route of dioxin exposure for humans is through consumption of dairy and beef products. Dioxin concentrates in the fat and fatty products of these animals after they consume grass or hay that is contaminated when dioxin emitted from incinerators is deposited on pasture land or hay fields. Dioxin also may be consumed through other foods, including pork, chicken, and eggs. There is no way for farmers and fishers

to keep dioxin compounds from contaminating the animals they raise. Even those who farm or fish far from the nearest medical incinerator are at risk because of dioxin's ability to travel long distances. Thus, medical waste incinerators put at risk not only the physical health of these populations, but their economic health as well.

Once dioxin is consumed, the human body processes it very slowly, producing a build-up of the chemical in our systems. This is referred to as the "body burden." Because dioxin is so pervasive in the food supply, the average person in the United States is already contaminated with an average body burden of 9 pg/g (EPA 1994c). One pg/g is one part per trillion, a unit so small that it is rarely used to express toxicity except in dealing with dioxins. Studies show that it takes as little as 14 pg/g to cause effects such as altering glucose tolerance (EPA 1994c). Decreased testosterone levels have been documented at levels as low as 44-122 pg/g (DeVito et al. 1995).

Most alarmingly, dioxin's tendency to concentrate in fat means that it is a common ingredient in breast milk, ensuring that the most sensitive members of the population, newborns, begin life with an unhealthy dose of the toxin. Nursing infants take in 50 times the amount of dioxins that adults take in daily (EPA 1997). In just 6 months of breast feeding, a baby in the United States will, on average, consume EPA's recommended maximum lifetime dose of dioxin (Colborn, et al. 1996).

Dioxin contamination in our food and water, and in our bodies cannot be "cleaned up." Concentrations of this chemical are found virtually everywhere on earth. Thus, prevention of further dioxin release is of critical importance.

Dioxin is also a long-distance contaminant. Studies have shown that dioxin can be transported across whole continents. A recent study by the Center for the Biology of Natural Systems predicted that dioxin emitted, for example, by medical waste incinerators in Texas and Florida are a significant source of contamination to the Great Lakes (CBNS 1995). Another researcher reported that other toxic chemicals have been found in the Canadian Arctic just days after their release in China and Russia (Bidelman 1996). This long-range transport phenomenon makes it critical that air toxics are well-regulated worldwide.

Since medical waste incinerators are one of the primary sources of dioxin, EPA's forthcoming decision on requirements for medical waste incineration will largely determine whether this one-of-a-kind chemical poison will be brought under control in the United States.

EPA's forthcoming decision on requirements for medical waste incineration will largely determine whether this one-of-a-kind chemical poison will be brought under control in the United States.

Dioxin contamination in our food and water, and in our bodies cannot be "cleaned up." Thus, prevention of further dioxin release is of critical importance.

Medical waste may account for 20 percent of the mercury in the solid waste stream.

MERCURY

Mercury is a natural heavy metal found in the earth's crust. It is used for a variety of industrial purposes and is found in many items that we use everyday, such as batteries and paints. In the medical field, mercury is best known for its use in thermometers, blood pressure gauges, batteries, and fluorescent lamps, not to mention a variety of medical procedures. Because of the significant use of these items, medical waste may account for 20 percent of the mercury in the solid waste stream (New Jersey DEP 1993).

Of the estimated 243 tons of mercury emitted annually into the atmosphere by anthropogenic sources, approximately 85 percent is from combustion by point sources including medical waste incinerators, which are responsible for 27 percent (EPA 1995a).

Mercury cannot be destroyed through incineration. Following release through a smokestack, mercury is deposited back to land or to surface waters where it essentially will remain indefinitely. It exists in both an inorganic form (elemental mercury) and in an organic form called methyl mercury. Elemental mercury can be converted to methyl mercury by microorganisms like bacteria. The methyl mercury is more biologically available, meaning that it poses more of a risk to human health. Effects of mercury poisoning include nervous system disorders such as tremors, memory loss, weight loss and mood changes as well as kidney damage (New Jersey Department of Health).

Mercury pollution exists widely in the environment, and is the cause for numerous fish and shellfish advisories (EPA 1996b). Since it is a highly bioaccumulative chemical, mercury becomes concentrated in animals and ultimately in the human body. Those species highest on the food chain carry the largest body burden of mercury. In general, fish like tuna and swordfish have high levels of mercury.

Many opportunities exist to reduce loadings of mercury into the environment and ultimately into humans. Use of alternatives to mercury products is the first step (Sidebar 3.) Separation of waste can be done in homes and in medical facilities to ensure that mercury that is still being used is appropriately disposed of. Ultimately, reducing the use of mercury will prove the most effective means of reducing mercury pollution. Some hospitals have already implemented these types of programs.

HORMONE DISRUPTERS IN MEDICAL SETTINGS

Dioxin is one of a long list of chemicals that interfere with the human endocrine system. By mimicking hormones such as estrogen, these chemicals can disrupt normal reproductive processes, many of which begin

SIDEBAR 3. ALTERNATIVES TO MERCURY-CONTAINING PRODUCTS

Mercury Products	Alternatives
Dental Amalgams	Gold, ceramics, porcelain and polymers
Batteries	Lithium, zinc, air, alkaline
Hearing Aids	
Pacemakers	
Defibrillators	
Thermometers	Electronic (digital), expansion, aneroid
Esophageal Devices	Tungsten tubing
Cantor Tubes	"
Miller Abbot Tubes	"
Electrical Equipment	Gold, optical, other metals
Lamps:	Ordinary glow lights; low sodium vapor tubes;
Fluorescent	opticals, high-energy, long-lasting lights.
High Intensity	
Ultraviolet	

Source: Reeder, 1995.

during fetal development. Reduced sperm counts, increased incidence of endometriosis and breast cancer all have been associated with these effects. What's more, since human hormone-receptor dynamics occur at minuscule hormone concentrations, a vanishingly small amount of these chemicals can trigger effects.

Recent findings shed light on a long-ignored category of toxic effects. Until now, most efforts have centered on cancer-causing substances, to the exclusion of other types of toxicological effects. In reality, chemicals can cause a variety of effects on humans including reproductive, neurological, and immunological impacts. The Environmental Protection Agency has embarked on a major study to better understand chemical processes that cause endocrine disruption. Medical facilities should take the lead in reducing potential for exposure to these chemicals. One solution is the use of sound waste management practices and materials policy, to work toward a zero emissions goal for medical waste incinerators.

Other hormone disrupters that may be found in hospital settings include plasticizers, called phthalates, and heavy metals such as cadmium and lead. Cadmium is found in medical waste largely as the component of red bags that gives them their color. Alternatives to cadmium exist for coloring red bags.

Dioxin is one of a long list of chemicals that interfere with the human endocrine system.

Medical facilities should take the lead in reducing potential for exposure to endocrine disrupting chemicals.

NOTES

[1]Personal communication with Hollie Shaner, of CGH, and Laura Brannon, of Dartmouth Hitchcock Medical Center.

[2]A picogram is 1 trillionth of a gram. In other words there are 1,000,000,000,000 picograms per gram. Picograms/kg/day refers to the allowable amount per kilogram of body weight for each day. Dioxin concentrations frequently are expressed in "toxic equivalents", or TEQ's. A toxic equivalent or TEQ, is the amount of total dioxin congeners that would equal the toxicity of one toxic equivalent of 2,3,7,8 TCDD, the most toxic form. Using TEQ's, the toxicity of dioxin mixtures can be expressed simply in terms of the relative toxicity of the mixture to one equivalent of 2,3,7,8 TCDD. For example, if the total toxicity of a mixture is 5 pg TEQ that means the mixture is 5 times as toxic as one equivalent of 2,3,7,8 TCDD, regardless of how much of each congener is present.

MOUNTAINS OF MEDWASTE

Numerous studies have documented the difficulties of estimating the volume of medical waste that is generated in the United States. Published estimates vary widely across facilities and over time. Clearly, the most important first step that the health care sector and individual facilities can take to deal with the medwaste mountain is to develop more accurate estimates of its size and composition.

To better understand the magnitude of the problem and its geographic distribution, this study developed estimates of the amount of waste generated by America's hospitals. Our methodology draws on published studies that derived per patient hospital waste estimates, and on the most recent available data on the number of medical facility beds and occupancy rates derived from the American Hospital Association (AHA) and the U.S. EPA. (Sidebar 4). Despite growing interest, it is generally believed that relatively few hospitals have undertaken rigorous waste reduction efforts, or programs to purge their waste streams of dioxin-forming materials. Nevertheless, because some medical facilities clearly have reduced medical waste, and because bed numbers and occupancy rates are not available for many of those facilities, this study does not present facility level estimates of waste.

In total, we estimate that hospitals and other medical facilities such as nursing homes and doctors' offices, generate about 1.9 million tons of waste per year. In 1987, the Environmental Protection Agency estimated a much higher amount of total waste, ranging from 2.1 to 4.8 million tons per year. (EPA 1987.) At the time, OTA considered this to be an underestimate of the total (U.S. Congress 1988). The difference in these two estimates is likely due to EPA's assumption of a greater number of actual patients in 1985 than the present study derived from more recent American Hospital Association data.

This study's conservative estimate of 1.9 million tons of total waste translates to approximately 295,000 tons of *infectious waste* per year, assuming on average that 15% of medical facility waste is

We estimate that hospitals and other medical facilities generate about 1.9 million tons of waste per year.

[This] translates to approximately 295,000 tons of *infectious waste* per year, assuming on average that 15% of medical facility waste is infectious.

Sidebar 4. Estimating Waste Generation at Health Care Facilities

To estimate the amount of waste generated annually by health care facilities, This study assumed a waste generation rate of 15 lbs. per occupant per day. Several studies (Rutala 1988, 1989, EPA 1987) report values ranging from 8 lbs. to 45 lbs. per patient per day. The most frequently cited value, however, is in the range of 15 lbs (Rutala 1989). This value is calculated by dividing total waste generated at a facility by the number of beds, even though not all beds are occupied at a given time. Therefore, 15 pounds per patient per day is an underestimate; each patient actually would be expected to generate a bit more.

Since hospital occupancy rates generally are well under 100 percent (that is, not all beds are filled at a given time) we calculated the number of patients using either census data for each hospital, or a national occupancy rate (AHA 1995-1996a) where no census was available. We assumed that each patient would generate 15 pounds of waste per day. Since, as mentioned above, this is an underestimate, our aggregate estimate is very likely an underestimate, too. Given recent health care trends, hospital occupancy rates may be an important variable and therefore a conservative approach is justified. Data available from a number of specific hospitals confirm that these values are underestimates.

Our analysis draws on information in a national database of medical facilities compiled by the American Hospital Association (AHA 1996-97). Occupancy data were available for most hospitals and we calculated a national average occupancy rate of 66 percent[3]. This value is consistent with the occupancy rates reported by the AHA for 1994. The 66 percent occupancy rate was, in turn, used as an estimator of the occupancy rates of facilities for which data were not available. The variability in occupancy rates among hospitals prevents us from determining the exact occupancy of those facilities for which data were not available; however, it is sufficient for aggregate estimates. Waste generation was then aggregated for each Metropolitan Statistical Area (MSA), a standard Census Bureau geographical designation, that usually includes a grouping of coterminous counties.

Current estimates suggest that infectious waste comprises about 15 percent (2 to 3 lbs/patient/day) of the total of 15 lbs. of waste generated per patient per day. Some hospitals, for example, Beth Israel in New York, have achieved considerable reductions (up to 75%) in infectious waste generation. Chesapeake Hospital in Virginia has reduced infectious waste to 1.3 pounds per patient per day. Based on the characterization of total waste described above, this study estimated the current amount of infectious waste generated assuming that 15% of wastes are infectious. An additional estimate was made to determine the potential reduction in infectious waste that could be achieved if facilities achieved reductions to 1.3 lbs/patient/day figure as did Chesapeake Hospital in Virginia (Table 3). This analysis shows that infectious waste can be reduced considerably, facilitating a shift away from incineration, which would eliminate a major source of dioxin contamination. We present this state-level scenario as a useful benchmark for reducing the amount of waste that requires special handling.

Table 1. The 30 largest hospitals in the United States (by number of beds).

Rank	Hospital	City	Number of Beds
1	Central State Hospital	Milledgeville, GA	1,980
2	Central Texas VA Healthcare	Temple, TX	1,852
3	Memorial Hospital Southwest	Houston, TX	1,515
4	Pilgrim Psychiatric Center	West Brentwood, NY	1,478
5	Jackson Memorial Hospital	Miami, FL	1,422
6	Barnes-Jewish Hospital	Saint Louis, MO	1,419
7	Catholic Medical Center	Jamaica, NY	1,407
8	Florida Hospital	Orlando, FL	1,406
9	Nassau County Medical Center	East Meadow, NY	1,384
10	Veterans Affairs Center-West LA	Los Angeles, CA	1,347
11	Society of the New York Hospital	New York, NY	1,310
12	LAC-USC Medical Center	Los Angeles, CA	1,284
13	Mississippi State Hospital	Whitfield, MS	1,283
14	Grady Memorial Hospital	Atlanta, GA	1,273
15	Hudson River Psychiatric Center	Poughkeepsie, NY	1,258
16	Laguna Honda Hospital & Rehab Center	San Francisco, CA	1,203
17	Mount Sinai Medical Center	New York, NY	1,171
18	Brookdale Hospital Medical Center	Brooklyn, NY	1,167
19	Bellevue Hospital Center	New York, NY	1,150
20	Montefiore Medical Center	Bronx, NY	1,141
21	Veterans Affairs Medical Center	Long Beach, CA	1,131
22	Baptist Memorial Hospital	Memphis, TN	1,130
23	Beth Israel Medical Center	New York, NY	1,126
24	Audie L Murphy Memorial Hospital	San Antonio, TX	1,112
25	Central Virginia Training Center	Madison Heights, VA	1,112
26	North Alabama Regional Hospital	Decatur, AL	1,111
27	University of Pittsburgh Medical Center	Pittsburgh, PA	1,107
28	Via Christi Regional Medical Center	Wichita, KS	1,098
29	Presbyterial Hospital	New York, NY	1,093
30	Kings County Hospital Center	Brooklyn, NY	1,093

Source: Environmental Working Group. Derived from American Health Association, AHA Guide to the Health Care Field on Diskette, 1996-97.

infectious. This figure is consistent with other published estimates, which range from 147,000 tons per year (JFA 1988) to 359,000 tons per year (EPA 1989).

THE BIGGEST PEAKS

Without an effective waste minimization program, starting with thoughtful procurement practices, the largest hospitals will remain significant sources of dioxin in the environment. Table 1 lists the 30 largest hospitals in the country based on the number of beds, according to the AHA Database. These 30 hospitals account for 3.5 percent of the medical facility beds in the country.

Table 2. Ten states generate half of the hospital waste in the United States (tons/year).

State	Number of Facilities	Waste Generation at 15 lbs per patient per day (tons/year)	Rank
Alabama	134	41,800	16
Alaska	27	3,100	51
Arizona	90	22,400	28
Arkansas	96	20,400	31
California	507	168,800	2
Colorado	86	19,900	32
Connecticut	54	22,300	29
Delaware	13	5,400	48
District Of Columbia	17	11,800	36
Florida	271	104,100	5
Georgia	195	61,500	10
Hawaii	26	8,100	42
Idaho	48	6,100	47
Illinois	240	89,500	6
Indiana	136	39,700	18
Iowa	127	24,600	25
Kansas	151	24,400	26
Kentucky	124	31,400	22
Louisiana	166	40,800	17
Maine	45	9,300	39
Maryland	83	34,200	21
Massachusetts	142	52,200	12
Michigan	194	62,500	9
Minnesota	155	38,800	19
Mississippi	110	28,900	23
Missouri	151	43,500	15
Montana	61	8,000	43
Nebraska	101	15,900	34
Nevada	29	7,500	45
New Hampshire	36	7,500	44
New Jersey	113	70,000	8
New Mexico	61	11,000	37
New York	288	201,700	1
North Carolina	152	56,900	11
North Dakota	51	8,700	40
Ohio	209	73,700	7
Oklahoma	138	22,100	30
Oregon	71	15,700	35
Pennsylvania	280	115,100	3
Rhode Island	16	7,200	46
South Carolina	84	24,700	24
South Dakota	62	9,800	38
Tennessee	150	45,900	14
Texas	494	112,500	4
Utah	50	8,400	41
Vermont	17	4,300	49
Virginia	129	47,100	13
Washington	104	24,200	27
West Virginia	67	16,800	33
Wisconsin	143	35,900	20
Wyoming	29	4,000	50
United States	6,323	1,970,300	

Source: Environmental Working Group. Derived from hospital bed and occupancy data in the AHA Guide to the Health Care Field on Diskette 1996-97.

At the state level, our analysis suggests that based on the capacities and occupancy rates defined in our methodology (Sidebar 4), New York produces more hospital waste than all other states, with a total of over 200,000 tons per year followed by California with nearly 170,000 tons per year, Pennsylvania with 115,000 tons per year, and Texas with over 112,000 tons per year. Florida rounds out the top five with 104,000 tons/year (Table 2). This is an aggregate state-wide estimate based on conservative assumptions; however, there may be individual facilities in each of these states that are either higher or lower than we have assumed.

This mountain of medical waste can be significantly reduced through changes in procurement, reuse of many items and recycling of others. To maximize waste reduction, such efforts must be accompanied by an aggressive waste segregation program to ensure that only items needing to be classified as infectious are captured in designated containers for treatment. Such practices are intrinsic to sound waste management and, at the same time, sound hospital management. These straightforward first steps can take a facility a long way toward minimizing the worker safety, and public health risks associated with hospital waste.

NOTE

[3]The average occupancy rate calculated by EWG was 66% with a standard deviation of 10%.

Table 3. Waste reduction can sharply reduce infectious waste.

State	Number of Facilities	Infectious Waste Generated at 15 lbs per patient per day (tons/year)	
		Typical Hospital	Hosp. with Waste Red.
Alaska	27	470	270
Alabama	134	6,260	3,620
Arkansas	96	3,060	1,770
Arizona	90	3,360	1,940
California	507	25,330	14,630
Colorado	86	2,990	1,730
Connecticut	54	3,350	1,930
District Of Columbia	17	1,780	1,030
Delaware	13	810	470
Florida	271	15,610	9,020
Georgia	195	9,230	5,330
Hawaii	26	1,220	700
Iowa	127	3,690	2,130
Idaho	48	910	530
Illinois	240	13,420	7,760
Indiana	136	5,960	3,440
Kansas	151	3,650	2,110
Kentucky	124	4,710	2,720
Louisiana	166	6,130	3,540
Massachusetts	142	7,830	4,530
Maryland	83	5,130	2,970
Maine	45	1,390	800
Michigan	194	9,370	5,410
Minnesota	155	5,820	3,360
Missouri	151	6,530	3,770
Mississippi	110	4,330	2,500
Montana	61	1,210	700
North Carolina	152	8,540	4,930
North Dakota	51	1,300	750
Nebraska	101	2,380	1,380
New Hampshire	36	1,130	650
New Jersey	113	10,500	6,060
New Mexico	61	1,650	950
Nevada	29	1,130	650
New York	288	30,250	17,480
Ohio	209	11,050	6,380
Oklahoma	138	3,310	1,910
Oregon	71	2,360	1,360
Pennsylvania	280	17,260	9,970
Rhode Island	16	1,080	620
South Carolina	84	3,700	2,140
South Dakota	62	1,460	850
Tennessee	150	6,890	3,980
Texas	494	16,880	9,750
Utah	50	1,260	730
Virginia	129	7,070	4,080
Vermont	17	650	380
Washington	104	3,630	2,100
Wisconsin	143	5,380	3,110
West Virginia	67	2,520	1,460
Wyoming	29	600	350
United States	6,323	295,540	170,760

Source: Environmental Working Group. Derived from hospital bed and occupancy data in the AHA Guide to the Health Care Field on Diskette 1996-97. Good Hospital estimates based on on infectious waste generation of 1.3 lbs/patient/day as achieved by Chesapeake Hospital in Virginia.

When a health care facility implements an aggressive waste segregation program, combined with strong staff education, a dramatic reduction in the amount of infectious waste generated can be achieved.

CHAPTER THREE

STATUS OF MEDICAL WASTE INCINERATORS: A PUBLIC RIGHT TO KNOW

Available information suggests an overall decline in recent years in the number of medical waste incinerators operating on-site at hospitals and other health care facilities in the United States, and in selected states[4]. Beyond that general trend, uncertainty reigns. Though it is on the verge of issuing an exceedingly weak rule for medical waste incinerators based on estimates of total dioxin emissions from these sources, EPA lacks a great deal of rudimentary knowledge about the status of medical waste incinerators in the United States. Uncertainty and disputes exist over such basic information as the number of permitted and operating facilities, their location, the amount of waste they burn, the type and efficacy of pollution control technologies in use, the quantity and composition of the pollutants, and patterns of human exposure to those pollutants in the vicinity of the incinerators. EPA has not attempted, on its own or in collaboration with the states, to develop and maintain a comprehensive, up to date information base about medical waste incinerators and their characteristics.

Prior to issuing the first set of (comparatively stringent) proposed regulations for medical waste incineration in 1995, EPA estimated that 6,000 medical waste incinerators were operating in the late 1980's (EPA 1994a). The American Hospital Association (AHA 1994), in its submission to EPA on the proposed regulations, reported a much smaller number—about 2,200 incinerators. After EPA contractors reviewed the AHA database the agency issued a revised calculation of 2,400 facilities, more in line with the industry estimate.

All of these figures are based on state-issued air pollution permits for facilities that burn medical waste, including hospitals, medical clinics, and nursing homes, as well as commercial medical waste incineration facilities. A number of pharmaceutical companies are also included in the database, while crematoria, municipal waste incinerators and hazardous waste incinerators are not. It is generally recognized

EPA lacks a great deal of rudimentary knowledge about the status of medical waste incinerators in the United States.

Zero emissions of dioxin must be the policy goal.

The Health Care Without Harm Campaign believes that, given the unprecedented toxicity of dioxin emissions from incineration of any level of medical waste, the EPA should err on the side of public safety and strictly regulate medical waste incinerators.

that many of these permitted incinerators are not operating today. No one, including the EPA, has bothered to figure out which one these are.

The national and state-level editions of this report present what we believe to be the best, most up to date information on U.S. medical waste incinerators. It is the first attempt to publish and analyze facility-level information of the type that EPA is utilizing to develop national regulations on medical waste incineration. The database utilized in this study includes at least some information on a total of 2,063 facilities. It is derived from EPA's most recent contractor study on the subject (MRI, 1996), and has been subjected to additional quality control checks for some states by researchers at the Center for the Biology of Natural Systems (CBNS) at Queens College. Other changes have been made for a handful of states based on recommendations to CBNS or state agency personnel.[5] Environmental Working Group modified the database by deleting duplicate records to ensure no double-counting occurred, and additional changes were made to remove facilities that no longer operate, where information was available. The resulting database, while much improved, is like its predecessors, imperfect. The relative lack of data strengthens the case for citizens' right to know about the status of medical waste incinerators in their vicinity, and casts into doubt the propriety of pending EPA proposals that will result in weak standards and continued, unacceptably high levels of pollution from hundreds of incinerators.

Our analysis examines what is known about the capacity and distribution of MWI's, as well as their use of air pollution control devices, in order to help characterize the potential threat of toxic pollution from these facilities. Other investigators (MHHA, 1996) have limited their focus to "operating" facilities. This approach, however, does not count potential emissions from medical waste incinerators which are still permitted, and are thus reserving the right to burn medical waste as existing sources. These facilities could commence incineration at any time, and still be considered "existing sources" eligible for less stringent air pollution standards than those that would be applied to new facilities under the Clean Air Act (EPA 1996a). Therefore, all facilities holding permits for medical waste incineration should be considered in setting new standards for Maximum Achievable Control Technology (MACT).

The Health Care Without Harm Campaign believes that, given the unprecedented toxicity of dioxin emissions from incineration of any level of medical waste, the EPA should err on the side of public safety and strictly regulate medical waste incinerators. In particular, zero emissions of dioxin must be the policy goal. Because EPA ap-

pears on the verge of issuing very weak rules to regulate medical waste incinerators, the Health Care Without Harm Campaign is seeking to have those rules strengthened. In addition, the Campaign encourages individuals and organizations to act through local and state regulatory and permitting processes to protect their communities.

- **Accountability**. Hospitals, the general public, public interest organizations, regulators and the media deserve an opportunity to review vital information on which EPA is basing regulatory actions of direct and serious consequence to public health. The Health Care Without Harm Campaign hopes to assist in the development of improved public information about medical waste incinerators for use by all interested parties.

- **Public Right to Know.** Given the potential risks to public health from dioxin and mercury pollution, people have a right to know if a medical waste incinerator is operating in their community, or if a facility has a permit and could begin or resume operation. The best first step toward exercising that right would be for EPA to make public reliable, up to date information on those incinerators. This information will form an important basis for the EPA's imminent decisions on medical waste regulation. In the majority of communities where medwaste incinerators are permitted, this type of information has not been made available.

GEOGRAPHIC DISTRIBUTION OF MEDWASTE INCINERATORS

Permits have been recently held by facilities with medical waste incinerators in 42 of the 50 states. Thirty-five (35) states have a dozen or more incinerators, and 38 states have an overall permitted capacity of over 2,000 lbs/hour, or 4 million pounds per year.[6]

Given potential risks from dioxin and mercury pollution, people have a right to know if a medical waste incinerator is operating in their community

Thirty-six states have a dozen or more incinerators.

The most recent EPA database, combined with additional information from EPA (1995b), indicate that Michigan has 290 permitted medical waste incinerators with a combined capacity of 67,000 pounds per hour, more than any other state (Table 4). As noted above, however, the number of facilities that are actually operating in the state is unclear.

According to EPA and state sources, Kansas has the next most permitted incinerators (110) with capacity of 45,000 pounds/hr.; Illinois has 106 incinerators, with 64,000 lbs. capacity; Georgia follows with 98 incinerators and 46,000 lbs. capacity; and Texas is fourth with 97 incinerators and about 34,000 lbs. capacity. Indiana and Pennsylvania also rank high in terms of total permitted

Table 4. According to EPA, Michigan has the most facilities with permits to operate medical waste incinerators and the greatest capacity in the country.

State	Number of Incinerators	Burn Capacity (lbs/hour)
Michigan*	290	67,585
Kansas	110	45,451
Illinois	106	64,376
Georgia	98	46,357
Texas	97	34,646
Pennsylvania	90	50,049
Louisiana	90	44,174
Indiana	89	54,780
North Carolina	77	35,865
North Dakota	73	16,993
Maryland	68	35,327
New Jersey	61	37,121
Virginia	58	23,611
Missouri	52	40,013
Alabama	52	20,770
Tennessee	51	25,148
Massachusetts	49	19,701
Florida	44	40,921
Arkansas	39	13,592
Colorado	38	6,850
Kentucky	35	10,744
Iowa	34	10,456
Nebraska	33	4,791
Oklahoma	32	12,303
Ohio	26	7,752
Minnesota	25	4,856
South Carolina	23	12,414
Connecticut	22	12,316
California	20	4,338
New York	21	18,883
Mississippi	21	8,453
New Hampshire	17	6,796
Washington	15	7,128
Arizona	14	8,598
Idaho	12	2,482
Rhode Island	10	5,409
Maine	7	1,141
Delaware	6	3,230
Montana	5	911
District Of Columbia	3	900
Utah	2	3,933
Vermont	1	1,000
Wisconsin	19	Unknown
West Virginia	1	Unknown
Total	2036	872,164

* While there is some discrepancy about the number of facilities in the state of Michigan, EPA's database which is intended to include all permitted facilities documents nearly 300 and additional facilities were added based on an EPA memorandum (EPA 1995b).

Source: Environmental Working Group. Based on EPA's 1996 data validated as described in the text.

capacity, with 54,000 and 50,000 lbs./hr, respectively (Table 4).

According to the EPA about 36 percent of these incinerators are located in "rural areas" while the another 53 percent of the facilities are in metropolitan areas (11 percent of the facilities were not categorized) (Table 5).

Already, some perceive that the solution to the problem of dioxin contamination of food is simply to remove those items from their diets. This of course does not solve the contamination problem, and may ultimately threaten the livelihoods of farmers and fishers. In this study an analysis of cattle raised in proximity to medical waste incinerators was conducted at the county level. In seven states, including Delaware, Michigan, Maine, Oklahoma, Massachusetts, New Hampshire and Connecticut more than three quarters of the cattle within the state graze in counties that have medical waste incinerators (Table 6, according to EPA. In Kansas, 4.2 million cattle, (71%) in the state, graze in counties with medical waste incinerators.

MOST MEDWASTE INCINERATORS LACK POLLUTION CONTROLS

The hierarchy of air pollution control for medwaste incinerators is described in Table 7. The least preferred methods, which specify only the amount

of time the material spends in the combustion chamber, are listed first, followed by the more effective technologies. The residence times range from 0.25 seconds (1/4 of a second) to 2 seconds. According to the EPA database, most medical waste incinerators use this relatively ineffective air pollution control approach.

Indeed, more than two thirds (69% percent) of all medical waste incinerators utilize no pollution controls at all. This estimate is based on an EWG analysis of the 1,817 facilities for which information on pollution control practices was available (Table 9). These facilities rely on the "residence time."

Rather than requiring actual pollution control technology for small medical waste incinerators, the EPA has proposed that small, rural incinerators simply burn their waste for two seconds to minimize subsequent dioxin emissions. No other controls will be required. Burning waste for two seconds will change dioxin emission only marginally from these facilities. This lenient requirement may even be extended to small urban facilities. Table 8 shows the breakdown of facilities based on EPA's size classes.

Such a laissez-faire approach to small incinerators ignores the fact that such facilities are a major source of dioxin emissions. This is due, in part, to their lack of pollution control technology, and also to their number. About 812, or 40% of the facilities thought to be operating have a capacity of less than 200 pounds per hour, EPA's definition of small (Table 8). This fraction could increase, however. The AHA, in their comments to EPA, suggested that the agency create a loophole by which larger incinerators could also avoid pollution control requirements by promising to burn less than their capacity would allow (AHA 1996):

> "The AHA strongly recommends that the EPA recognize and accept federally enforceable state operating permit limits for any particular facility that elects to derate the capacity of a MWI below its design criteria *in order to fall within the requirements of a lesser size category* (emphasis added)."

Currently, about 617 facilities (30 percent) analyzed do not even meet the 2-second requirement generally considered "good combustion" practices (Table 9). About 500 (80 percent) of those incinerators have capacities greater than 100 pounds per hour.

Table 5. Location of medical waste incinerators.

Location	Total Burn Capacity (lbs/hr)	Number of MWIs	Percent
Non Rural	574,516	1,083	53%
Rural	222,754	729	36%
Unknown	74,894	224	11%
Total	872,164	2,036	

Source: Environmental Working Group. Based on EPA's 1996 data validated as described in the text.

More than two thirds (69% percent) of all medical waste incinerators utilize no pollution controls at all.

Table 6. Counties with both medical waste incinerators and cattle.

State	Cattle Operations in Counties with MWIs Number	Cattle Operations in Counties with MWIs Percent	Cattle* in Counties with MWIs Number	Cattle* in Counties with MWIs Percent	MWIs in Counties with Cattle	Counties with Cattle and MWIs
Michigan**	15,204	89%	987,138	89%	274	66
Kansas	28,883	76%	4,287,204	71%	108	75
Illinois	14,399	53%	801,148	50%	102	48
Georgia	9,198	39%	471,228	37%	98	61
Indiana	17,469	67%	745,566	67%	89	59
Louisiana	11,013	73%	610,518	72%	89	43
North Carolina	12,658	56%	504,885	56%	77	47
North Dakota	10,412	69%	1,127,423	65%	72	35
Maryland	3,723	75%	231,831	82%	66	17
New Jersey	1,253	65%	42,857	62%	60	16
Virginia	5,343	19%	348,585	21%	58	40
Pennsylvania	18,458	66%	1,211,193	71%	55	38
Alabama	11,464	43%	637,317	44%	52	30
Tennessee	15,534	31%	639,404	30%	51	26
Missouri	16,572	24%	900,190	22%	47	25
Florida	6,275	40%	499,348	28%	44	22
Arkansas	14,242	49%	817,407	50%	39	27
Colorado	7,171	48%	1,605,501	52%	36	24
Texas	17,213	13%	1,573,268	12%	36	27
Kentucky	15,344	29%	782,789	31%	35	30
Iowa	11,937	27%	1,087,431	27%	34	30
Maine	1,786	85%	87,081	83%	33	13
Nebraska	12,297	40%	2,217,593	37%	33	32
Oklahoma	18,016	34%	1,318,133	28%	32	24
Massachusetts	1,301	83%	54,946	80%	29	11
Minnesota	12,007	35%	875,831	34%	23	21
South Carolina	4,387	44%	176,775	39%	23	18
Connecticut	1,129	84%	61,185	78%	22	7
California	3,465	18%	623,337	13%	21	14
New York	4,161	23%	341,504	23%	21	14
Mississippi	3,943	19%	198,981	17%	20	19
Ohio	5,934	20%	291,271	21%	19	14
New Hampshire	812	85%	41,544	86%	16	8
Washington	3,921	29%	310,958	24%	14	9
Arizona	2,200	72%	458,855	49%	14	9
Idaho	4,620	37%	574,066	32%	12	11
Rhode Island	159	76%	3,899	64%	10	3
Delaware	411	100%	28,838	100%	6	3
Montana	1,603	12%	290,253	11%	5	5
Utah	515	7%	38,512	4%	2	2
Vermont	192	5%	15,914	5%	1	1

* Includes beef cows, dairy cows, heifers, steers, and bulls.

** While there is some discrepancy about the number of facilities in the state of Michigan, EPA's database, which is intended to include all permitted facilities, documents nearly 300, and additional facilities were added based on an EPA memorandum (EPA 1995b). EWG removed duplicate records to avoid double counting.

Source: Environmental Working Group. Compiled from EPA data (EPA 1996), state documents and permit records supplied by Catherine Hill of the Center for the Biology of Natural Systems. U.S. Bureau of the Census, 1992 Census of Agriculture.

Pollution control technology used at the remaining facilities involves the use of either wet or dry scrubbers. Scrubbers are devices that remove toxic chemicals from air as it leaves the stack following combustion. Wet scrubbers have been classified into three categories based on their effectiveness; low, moderate, and high efficiency wet scrubbers. Dry scrubbers are used either with or without the injection of carbon, which aids in the removal of toxic chemicals prior to release from the smokestack.

About 380 facilities employ wet scrubbers; of these, however, 370 are characterized as having either low or moderate efficiency, while only 9 are high-efficiency wet scrubbers (Table 9). Not all of these 9 appear to be hospitals based on the facility name in the EPA database. In fact, very few on-site medical waste incinerators appear to use the best wet-scrubber technology available to reduce dioxin emissions.

Dry scrubbers, the preferred air pollution control technology for incinerators, provide enhanced removal of mercury and dioxin when used in conjunction with carbon injection (EPA 1996a.) This technology is rarely used, according to EPA's database. Only 36 permitted medical waste incinerators out of 1,817 in the database (<2%) employ dry scrubber technology, and only 10 are hospitals, as far as we can tell from the EPA data. Those 36 incinerators amount to just 6% of the capacity according to EPA's data.

Only 10 of these facilities couple dry scrubbers with carbon injection, and not all of these are hospitals. Three hospitals that use this technology are in the state of New York. Only five facilities are listed as using fabric filter/packed bed devices, probably the most effective pollution reduction technology (Table 9).

This near total absence of preferred pollution control technology bodes ill for public health, it also

Table 7. Pollution control hierarchy for medical waste incinerators.

↑ No Controls	1/4 Second Residence Time
	1 Second Residence Time
✳ Worse	2 Second Residence Time
	Low Efficiency Wet Scrubber
	Moderate Efficiency Wet Scrubber
	High Efficiency Wet Scrubber
	Dry Scrubber w/o Carbon Injection
Better	Dry Scrubber with Carbon Injection
↓	Fabric Filter/Packed Bed

Table 8. Most Medical Waste Incinerators are small, but large incinerators account for 67 percent of total burn capacity.

Size	Incinerators No.	Incinerators Pct.	Total Capacity Lbs/hr	Total Capacity Pct.
Under 200 lbs/hr	812	40%	72,830	8%
200 - 500 lbs/hr	660	32%	208,959	24%
Over 500 lbs/hr	564	28%	590,375	68%
Total	2,036		872,164	

Source: Environmental Working Group. Compiled from EPA data (EPA 1996), state documents and permit records provided by Catherine Hill of the Center for the Biology of Natural Systems.

Table 9. One half of all the medical waste incinerators listed by EPA have no pollution control devices.

	Pollution Control Technology	Incinerators No.	Incinerators Pct	Capacity Lbs/hr	Capacity Pct
↑ No Controls	1/4 Second Residence Time	315	15.5%	117,799	13.5%
	1 Second Residence Time	302	14.8%	121,955	14.0%
✳ Worse	2 Second Residence Time	780	38.3%	248,043	28.4%
	Low Efficiency Wet Scrubber	270	13.3%	143,913	16.5%
	Moderate Efficiency Wet Scrubber	100	4.9%	97,861	11.2%
	High Efficiency Wet Scrubber	9	0.4%	13,036	1.5%
	Dry Scrubber w/o Carbon Injection	25	1.2%	37,688	4.3%
Better	Dry Scrubber with Carbon Injection	11	0.5%	16,329	1.9%
↓	Fabric Filter/Packed Bed	5	0.2%	3,650	0.4%
	Unknown	219	10.8%	71,890	8.2%
	Total	2,036		872,164	

Source: Environmental Working Group. Compiled from EPA data (EPA 1996), Catherine Hill of the Center for the Biology of Natural Systems, state doucments and permit records.

leads to weak standards. EPA sets standards based on the technology employed at the best facilities. While preferred air pollution control technologies exist, they are ignored in setting MACT for medical waste incinerators. As this analysis shows, the "best of the best" among medwaste incinerators sets a very weak benchmark standard. The result is weaker requirements for facilities that burn medical waste, than exist for facilities that burn toxic chemicals.

IMPLICATIONS FOR CHILDREN, POOR PEOPLE, PEOPLE OF COLOR.

Pollutants emitted by medwaste incinerators have been shown to contaminate the environment at great distances from the source. Less is known about health risks that incinerator pollutants like mercury and cadmium may pose to populations living in close proximity to medwaste incinerators. EPA has not determined if children, people of color or low income Americans may be at special risk by virtue of living near medwaste incinerators. We were able to develop a precise geographic location for 1,348 health care institutions that have recently been issued incineration permits according to the EPA. When we analyzed these locations against 1990 U.S. Census data we found:

- Over 5.6 million American children under the age of 16 live within 2 miles of a permitted medical waste incinerator.

- Over 7.1 million people of color—15 percent of the

minority population— live within 2 miles of a permitted medical waste incinerator. By comparison, 9 percent of white Americans live within 2 miles of medwaste burners.

- Nearly one American in seven (14%) who is living below the poverty line also lives within 2 miles of a medical waste incinerator.

NOTES

[4]Various lists of incinerators and their characteristics have been developed over the past two years. EPA 's draft dioxin reassessment in 1994 cited "over 6,000" medical waste incinerators, based on a contractor's study. In response to EPA's intial proposed rule, in 1995 the hospital industry's main trade association, the American Hospital Association, submitted a revision prepared by Lawrence Doucet (1994) to the EPA list, indicating a much smaller number of MWIs––only 2,200 nationwide. Then EPA, through another contractor, produced a new list of some 2,400 MWIs (MRI 1996b) The Center for the Biology of Natural Systems checked the AHA list against incinerator permit records and other information obtained from state agencies, and in 1995 CBNS identified incinerators with permits that did not appear on the AHA listing (Hill 1995). The most recent and, we believe, most accurate list, has been compiled by Catherine Hill, a researcher at the Center for the Biology of Natural Systems (CBNS) at Queens College in New York. Updates were made by CBNS based on information obtained from state agencies. EWG performed this function for two states in the database (Texas and Massachusetts) using information those states had provided to CBNS. EWG also deleted duplicate records to avoid double counting. The national database used this report consists of 2,223 incinerators originally derived from the MRI (1996) list, with some states verified as described.

[5]States for which changes have been made to the EPA database include PA, MI, WI, MN, TX, VT, MA. State agency memoranda are listed as references.

[6]Assuming operation for 8 hours per day and 250 days per year.

CHAPTER FOUR

ENVIRONMENTALLY RESPONSIBLE HEALTH CARE

Current trends in the U.S. health care system create a window of opportunity for waste management improvements. As hospitals are admitting fewer patients due to the upsurge in managed care, critical decisions are being made about waste disposal options. At the same time, proposed changes in regulatory requirements for medical waste incinerators confront health care administrators with the decision whether to continue to burn hospital waste in on-site incinerators or shift to alternatives including transport off-site for disposal. Alternative treatment technologies, coupled with waste reduction programs, can alleviate the need for costly improvements to out-of-date burners or wasteful, unnecessary off-site incineration, allowing hospitals to allocate more resources to health care and cut down on toxic emissions.

The American Public Health Association (APHA) has adopted a resolution to encourage the reduction of dioxin releases from medical facilities through the reduced use of items made of PVC (Appendix A). Part of the resolution states:

"Observing that highly effective programs for the reduction of hospital waste generation have been initiated in the US and programs for the substitution of PVC are in place in some hospitals in Europe; therefore:

1. Urges all health care facilities to explore ways to reduce or eliminate their use of PVC plastics;

2. Calls upon health care professionals to encourage health care institutions with which they are associated to adopt policies that will lead toward the reduction and elimination of he use of PVC plastic products."

A wide variety of considerations already have led some hospitals to reduce waste generation. Significantly, many hospitals have found considerable cost savings through waste reduction programs. Others are driven by an interest in being a "Good Neighbor," a desire to decrease overall operating expenses, a response to pending regulations, or a concern for the environmental and public

Many hospitals have found considerable cost savings through waste reduction programs.

SIDEBAR 5. GOOD HOSPITAL WASTE MANAGEMENT IS GOOD HOSPITAL MANAGEMENT

Beth Israel Medical Center, a 950 bed facility in Manhattan, New York, saves $600,000 per year in waste haulage fees through better management of wastes.

Hospital waste management is a public health issue which when improved has many benefits: cost savings, reduced liability, safer working environment, improved community relations and regulatory compliance, positive press coverage and reduced negative impacts on the environment.

In February 1991 Beth Israel created the position of a waste manager during a hiring freeze to oversee waste minimization programs with the expectation of cost savings.

Red bag waste (potentially infectious material) haulage is five times more expensive than non regulated (regular solid) waste. Through proper placement of red bags, education, signage, monitoring and maintenance, generation of red bags can be reduced by controlling the non-regulated wastes (food, flowers, packaging) that end up in the red bags. Through this process, Beth Israel staff reduced their generation of red bags by 1,000,000 pounds per year, decreasing waste haulage fees by $600,000 per year. This shifting of waste from regulated to nonregulated did not increase haulage of nonregulated medical waste because nonregulated waste volume simultaneously was reduced through recycling. Beth Israel staff recycle bed pans, denture cups, soap dishes, wash basins, corrugated boxes, office paper and food service items such as cans and plastic jugs.

Collecting sharp items such as needles in reusable sharps containers, instead of disposable ones, has eliminated the incineration of 2,700 disposable sharps containers per month. By contracting out the sharps collection services, risks associated with handling sharps containers were reduced. Offsite the containers are mechanically opened and dumped, the contents autoclaved, ground into a confetti and landfilled and the containers are disinfected for reuse.

Worker safety has improved because the staff are better educated on the various types of wastes including potentially infectious materials, sharps, chemicals and cytotoxic drugs. Beth Israel is currently working towards

The first steps in sound health care waste management are good materials policies.

health consequences of incineration.

Costs of operating an on-site medical waste incinerator include insurance and permitting fees, staff, operator training, utility, fuel and ash costs, expenses associated with air pollution control and monitoring, costs of downtime, and even fines associated with improper operation, and the cost of supplies.

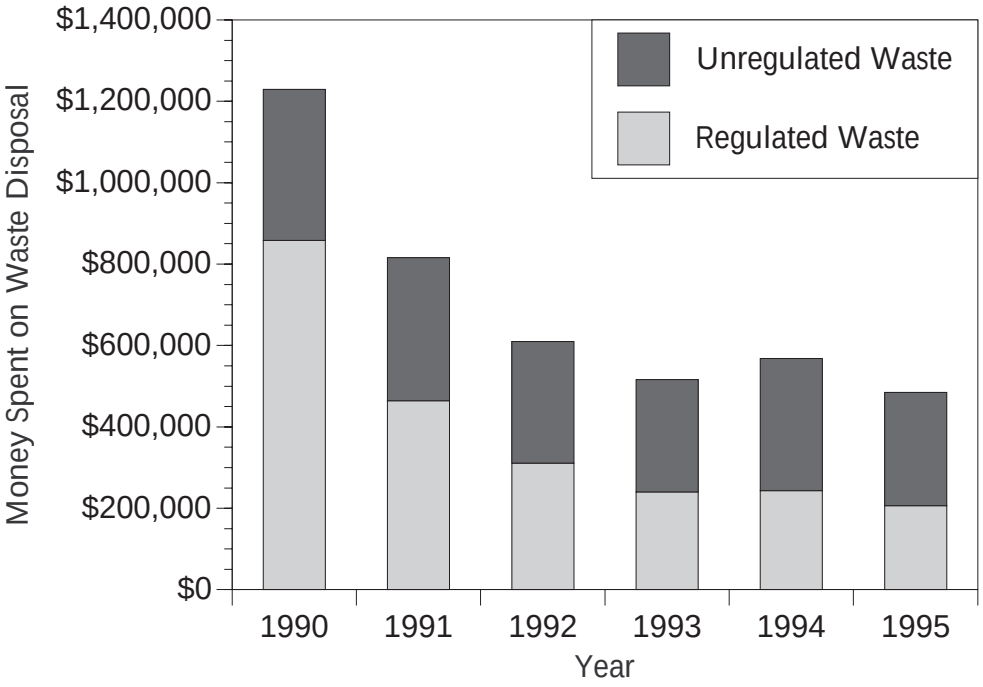
The first steps in sound health care waste management are careful waste segregation and good materials policies, including smart procurement, recycling and reuse programs. Shifting to alternative technologies such as autoclaving or microwaving most infectious waste, while recycling or landfilling non-regulated solid waste, has proven to be cost effective for many hospitals.

becoming a mercury free facility. When comparing the costs of spill cleanups and chemical waste haulage, a mercury-free facility will save money through better environmental management.

Beth Israel's commitment to the environment saves money while addressing public health concerns associated with mismanagement of wastes.

Written by Janet Brown, Beth Israel Medical Center.

Figure 3. Beth Israel Hospital cuts medical waste disposal costs by 60 percent.



Source: Environmental Working Group. Data provided by Janet Brown, Beth Israel Medical Center.

Some hospitals, including Beth Israel in New York, saved money in the very first year of their programs.

PROCUREMENT, WASTE REDUCTION AND SEGREGATION

Waste minimization strategies must begin with the initial process of procurement of hospital supplies. Procurement professionals working with vendors can considerably increase the amount of reusable items and decrease the volume of waste generated. Minimizing packaging, and buying products that are durable rather than disposable, when feasible, all lead to reduced waste disposal costs. In the longer term, even those hospital supplies that end up in a much reduced waste stream can be made from materials that do not contain mercury

Sidebar 6. Rural Hospital Can Shift to Alternative Technology

Dartmouth-Hitchcock Medical Center, a 429-bed, rural medical center in New Hampshire, is leading the health care industry in shifting to alternative medical waste technology, in part due to an incinerator shutdown. After bricks from the incinerator stack began to deteriorate, the Medical Center began an analysis of costs associated with rebuilding the stack to retain the incinerator, which also generated the facility's steam heat. Their conclusion: long-term costs associated with incineration were higher than for shifting to autoclave technology[7]. This result held even when the costs of shifting to oil heat were included.

As is true at many hospitals with incinerators that burn both medical waste and some solid waste, medical waste minimization had not been the Waste Management Program's focus. After switching to autoclave technology, waste that had gone into red bags was drastically reduced from 35 percent to only 12 percent. Key to the Medical Center's success was its willingness to commit staff resources to the job, including a half-time Waste Minimization Coordinator and half-time Biosafety Manager. In addition, staff training, waste audits, new employee orientation, and "courtesy notes," issued when waste was disposed of improperly, further reduced the waste needing special treatment. Pathological waste[8] larger than about an inch in diameter is still shipped off-site for disposal; however, this includes only about 2 percent of the waste stream.

The Medical Center's goal is to further reduce the infectious waste it generates to perhaps as little as 8 percent of the total. Other waste minimization efforts, including an extensive recycling and waste diversion programs also have saved the hospital money. The shift from incinerator to autoclave provides benefits to public health by eliminating the release of dioxin from the incinerator. As Laura Brannon, the facility's Waste Minimization Coordinator puts it, "We are an organization concerned with the health of our community. Managing our waste in a safe and environmental friendly manner is part of the commitment."

or chlorine, which create severe pollution problems when incinerated.

While this study estimates that hospitals produce nearly 2 million tons of waste per year, only about 15 percent of that waste, or 295,000 tons, is infectious. Separating the regulated infectious waste from the common trash has immense potential to reduce waste disposal costs. To begin with, segregating waste allows at least 85 percent of the waste to be dealt with as regular trash. Recycling programs that focus on removing recyclable paper, cardboard, glass, plastic and metals can considerably reduce the volume of this waste. Sound management practices have saved some hospitals hundreds of thousands of dollars on waste disposal costs per year (See Sidebars 5, 6, and 7).

The types of materials that may be recycled, or disposed of in landfills, vary among states

due to differences in state requirements, and landfill operators' preferences. Some of this variability would be remedied by a uniform national definition of infectious waste that defines narrowly those wastes that must be specially treated. A template for such a national definition already has been designed by the Centers for Disease Control (CDC). If the CDC definition were applied nationally, "infectious wastes" could be reduced considerably, saving medical facilities thousands of dollars in disposal costs.

Waste that is actually infectious is regulated and must be disposed of in accordance with state and Federal laws. State requirements vary, but frequently demand that infectious waste be disinfected and in some states, for aesthetic reasons, rendered unrecognizable. Generally this waste contains syringes, blood bags, gauze dressings and the like. Sterilization, which is more complete destruction of infectious agents, is also required in some instances.

REDUCING RISKS OF INCINERATION: ALTERNATIVE SYSTEMS ARE AFFORDABLE

Environmentally responsible health care facilities minimize all waste, especially those wastes that must be incinerated. To encourage waste minimization systems and protect public health, it is essential that medical waste incinerators be held to the highest combustion standards achievable, and at least meet the same standards as are required for hazardous waste incinerators. To do less is indefensible on human health grounds, nor is it justified by technological or cost considerations.

Environmentally responsible health care facilities minimize all waste, especially those wastes that must be incinerated.

The EPA acknowledges the extremely low cost of alternative

SIDEBAR 7. NAPLES COMMUNITY HOSPITAL IN FLORIDA SHUTS DOWN INCINERATOR

Frequent malfunctions and community concerns led the Naples Community Hospital to shut down its incinerator and switch to autoclaving. The technology shift made economic sense and was the appropriate response from a community relations standpoint. Operating costs for waste disposal dropped more than 80 percent, from 24 cents to only 4 cents per pound.

Autoclave technology allows the hospital to meet regulatory requirements for disposal of all types of wastes. In conjunction with improved recycling and reuse of materials, use of the autoclave allowed Naples Hospital to short circuit EPA's proposed new MACT requirements for incinerators. By shifting, the hospital zeroes out dioxin emissions from the incinerator.

Source: Environment Reporter Vol. 27 p. 1443-4. November, 1996.

We estimate the additional cost per patient day of shifting to alternative disposal of infectious waste is less than a dollar on hospital stays that cost as much as $1000 per day .

hospital waste treatment. In its cost assessment the agency demonstrates that switching to alternative technology is more cost-effective than continuing to incinerate waste.

> "This scenario [switching to alternatives and segregating out 85 percent of waste] results in the lowest costs because 85 percent of the waste is disposed at the relatively inexpensive cost of municipal waste disposal" (EPA 1996a).

Regardless of the MACT requirement chosen, the short-term impact on hospitals that switch to alternative practices would be about 1 tenth of a percent of their budget according to the agency (EPA 1996a). This is considerably less than costs associated with incineration which, even under the weakened requirements, would be three to five times more expensive than alternative practices, the agency concludes (EPA 1996a). These costs represent short-term costs associated with compliance with new MACT requirements. For facilities that continue to incinerate, the costs represent upgrading to meet requirements. For those that choose to switch, the costs represent the short-expenses for capital investments. In sum, whether or not they switch, the new MACT rule costs medical facilities only minimally in the short term. In the long term, hospitals save money through sound waste management policies (See Sidebars 5, 6, and 7).

The AHA has raised concerns about additional costs to hospitals due to the new standards (Doucet 1994). However, the Center for the Biology of Natural Systems (Commoner et al. 1996) has demonstrated that closing an incinerator and shifting to either autoclaving or commercial disposal adds only about 60 cents to the national average cost per patient per day of approximately $800, based on an additional cost of only about one tenth of one percent of daily operating costs. These values account for the short term investment in the new technologies chosen, but not the savings that accrue in the longer term.

The analysis in this study demonstrates that such costs are small enough to be easily recouped through saving from waste reduction programs. Using the EPA estimate of percent increases, and AHA data on cost per day per patient (AHA 1995-96a), EWG has estimated the additional cost per patient day of shifting to alternative disposal of infectious waste. This analysis assumes, as did EPA, that shifting would be coincident with a waste segregation program, reducing wastes needing special treatment to 15% of the total. In most states (38) the average additional cost per patient is less than a dollar on hospital stays that otherwise cost as much as $1000 per day (Table 10).

Many hospitals have shown that, in practice, these costs are easily overcome by savings real-

ized through procurement and waste reduction programs as discussed above. In an EPA survey of hospitals that use alternative on-site treatment, including autoclaves, microwaves, and chemical treatment, seven out of eight hospitals reported saving money compared to on-site incineration. The one hospital that did not report savings was comparing the alternative to an incinerator that was uncontrolled, which would not be allowable, even under EPA's weak proposed MACT requirements (MRI 1996a). Case studies presented in this chapter further corroborate these findings, showing that, in practice, infectious wastes can be reduced even further than EPA has assumed, thus generating a net savings.

Given the differences in costs of hauling unregulated wastes (4 cents/pound) and treating regulated waste, (autoclaving @ 20 cents/pound) an approximate savings of 45 cents per patient per day could be realized on the 15 pounds that an average hospital generates per patient, simply through segregation of non-infectious wastes. Recycling solid waste would reduce waste disposal costs as well, saving even more money. This would about match the increased short term costs, thus demonstrating how hospitals have saved money in the transition to alternatives.

Table 10. Switching from incineration to alternative waste management technology adds little to the cost of a hospital stay.

State	Cost per Patient per Day (Dollars)	Additional Cost (Dollars)
U.S. Average	$931	$0.93
Alabama	781	0.78
Arkansas	1,091	1.09
Arizona	724	0.72
California	1,301	1.30
Colorado	993	0.99
Connecticut	1,121	1.12
Delaware	1,042	1.04
Washington, DC	1,304	1.30
Florida	975	0.98
Georgia	797	0.80
Idaho	679	0.68
Illinois	988	0.99
Indiana	955	0.96
Iowa	672	0.67
Kansas	715	0.72
Kentucky	748	0.75
Louisiana	929	0.93
Maine	802	0.80
Maryland	981	0.98
Massachusetts	1,131	1.13
Michigan	929	0.93
Minnesota	695	0.70
Mississippi	584	0.58
Missouri	915	0.92
Montana	470	0.47
Nebraska	606	0.61
New Hampshire	825	0.83
New Jersey	934	0.93
New York	854	0.85
North Carolina	806	0.81
North Dakota	515	0.52
Ohio	1,008	1.01
Oklahoma	848	0.85
Pennsylvania	892	0.89
Rhode Island	970	0.97
South Carolina	876	0.88
Tennessee	870	0.87
Texas	1,055	1.06
Utah	1,115	1.12
Virginia	885	0.89
Washington	1,206	1.21
Wisconsin	802	0.80

Source: Environmental Working Group. Based on average costs by state for hospital stay (AHA 1995-1996a) and estimated 0.01% increase based on EPA 1996a. Alternatives defined by EPA.

The Health Care Without Harm Campaign recommends the use of non-burn technology over either on-site or off-site incineration, except for pathological waste.

WASTE DISPOSAL ALTERNATIVES

In coping with huge quantities of medical waste, no single technology is the cure. Fundamentally, the most important part of waste management is waste minimization. Sound programs are required, from procurement of less waste-intensive items, to recycling and reuse. Options for shifting waste disposal practices away from wholesale incineration range from the use of on-site non-incineration technologies such as autoclaves and microwaves, to use of off-site commercial medical waste disposal companies, especially those which employ technologies other than incineration. Different practices will suit different situations; and all rely upon wise procurement practices, waste reduction and segregation. The Health Care Without Harm Campaign recommends the use of non-burn technology over either on-site or off-site incineration except for pathological waste. The following information is offered as a designation of alternatives, not an endorsement of either non-burn technology.

AUTOCLAVES

Autoclaves are the most commonly used medical waste treatment alternative in the United States (MRI 1996a). Like most waste disinfection techniques, an autoclave destroys infectious agents through the use of heat. Unlike incineration, however, the material is not combusted, thus reducing the risk of dioxin production. An autoclave is like a high technology dishwasher that relies on increased temperature and pressure to ensure that materials are disinfected. Frequently wastes are shredded prior to autoclaving, in order to facilitate the process. There are some occupational risks associated with autoclaving; however, worker training can significantly manage these (MRI 1996a). While autoclave use is not risk free, overall environmental risks are far less severe than those associated with incineration (MRI 1996a).

MICROWAVE

Microwaves use radiant energy to heat water that is sprayed onto waste. Once the water reaches it's boiling point, it essentially boils the infectious microbes, rendering most of them harmless. In a study done for EPA (MRI 1996a), microwaves were shown to disinfect but not completely sterilize medical waste. Some of the most heat-resistant bacteria were not inactivated. However, because the technology has been judged effective, many states' standards would permit microwave disinfection even when low levels of heat-resistant bacteria persist (MRI 1996a).

OFF-SITE DISPOSAL

Many hospitals send regulated waste off-site for disposal by commercial medical waste companies. This is the least

economical alternative. Some of these facilities use autoclave technology, others continue to burn wastes. While these incinerators are more likely to be equipped with pollution control equipment than are on-site incinerators, their unnecessary use as burners of unregulated solid waste creates unacceptable risks to public health. For these reasons, the Health Care Without Harm Campaign does not support off-site incineration of waste material except for pathological waste.

EPA should regulate the commercial facilities in a way that significantly reduces risks to the public. Currently, however, commercial medical waste incinerators are being held to much less protective standards than hazardous waste combustors. This situation creates an uneven playing field that could lead to additional non-infectious wastes being disposed of at commercial medical waste incinerators and unnecessarily high emissions of dioxins, mercury, cadmium and other pollutants.

SUMMARY

Waste minimization, including improvement of procurement practices, reduction in use of disposable products, and reuse of certain items, coupled with the use of autoclaves or microwave technology can fulfill the waste management needs of most hospitals. Longer-term shifts to safer materials that must still be disposed of will also reduce the risk of pollution from dioxin, mercury, and other pollutants.

Given the availability, efficiency, safety, and low comparative costs of on-site alternatives to incineration, it is imperative that EPA set medical waste incinerator standards that will serve to stimulate, and reward the transition now underway at many health institutions to cleaner, healthier waste management practices. Weak standards, of the type EPA is now proposing, will merely perpetuate substandard waste management and unsafe incineration at hundreds of health care facilities nationwide.

NOTES

[7] See discussion of autoclave technology on page 40.

[8] Pathological waste includes material that has been removed from a human body.

Sidebar 8. Protect Workers in the Transition to Environmentally Responsible Health Care

For many years health care workers have fought for greater protection in the workplace from infection and other occupational hazards. We need to ensure that we create health care institutions that are safer for workers as well as safer for the environment and community residents.

In changing materials purchasing policies, waste segregation, and recycling, health care workers need to be involved in key decisionmaking about needed improvements. For example, in the transition from medical waste incinerators to autoclaves and other alternative waste treatment technology, hospitals need to guarantee proper occupational safety training for workers, and ensure compliance with safety regulations.

The Health Care Without Harm Campaign seeks to phase out PVC and other chlorinated plastics from the health care industry to eliminate dioxin emissions and other damaging health and environmental effects of these chlorinated plastics. In the transition away from PVC products in health care, chemical workers may be left coping with the entire social cost of this change. The Campaign seeks to ensure that the lives of workers who produce PVC are not destroyed by the societal decision to phase out its use. For this reason, the Campaign seeks to provide a just transition for chemical workers that produce PVC, in order that they can be financially supported while seeking other comparable employment.

The Campaign will conduct a job impact analysis of a PVC phase out from health care. If the analysis determines that this materials transition will result in the loss of jobs, the Campaign will seek a tax on waste volume produced by those health care institutions still producing toxic wastes that can create a "Just Transition Fund" for displaced workers as well as support educational efforts to teach hospitals to reduce their waste volume.

Contributed by Gary Cohen.

CHAPTER FIVE

EPA'S "PAINLESS" MEDWASTE RULES WILL NOT PROTECT THE PUBLIC HEALTH

In June 1996 the EPA flip flopped on virtually every aspect of medical waste incinerator rules the agency originally proposed in 1995 — under the pressure of a court order. By the end of 1996, in a leading trade publication, *Hospital Facilities Management*, top industry consultant Larry Doucet went so far as to tell readers, "OK, you can stop bending the EPA's ears now. Officials heard your pleas for relatively 'painless' med waste incinerator rules."[9]

EPA's proposed rule, which was published in February of 1995, is not yet finalized and is currently undergoing significant changes due largely to intense commenting on the part of Larry Doucet on behalf of the American Hospital Association, the main industry trade association. EPA published a supplemental assessment in June, 1996, and is expected to issue a final rule in the summer of 1997.

The guidelines require EPA to set separate rules designating what is referred to as the Maximum Achievable Control Technology (MACT) for both new and existing medical waste incinerators. Under the Clean Air Act, EPA is allowed to set less protective standards for existing facilities compared to new facilities, which can be held to stricter standards. This mechanism in the law discourages the closure of the oldest facilities and establishment of new ones. Existing medical waste facilities in this country are 14 years old on average (EPA 1993), but many are much older.

The performance standards for new sources require that any new source control pollution at least as well as the best existing source. For existing sources, on the other hand, EPA is required to set the MACT at least at the level of the best performing 12 percent of units currently in operation. This arbitrary benchmark circumvents the requirement of the very best technology, and holds facilities to an unimpressive standard that is in fact contributing to a level of pollution acknowledged as unacceptable by the agency. EPA then divides the facilities into different classes and applies additional considerations that take the size into account.

"OK, you can stop bending the EPA's ears now. Officials heard your pleas for relatively 'painless' med waste incinerator rules."

—industry consultant Larry Doucet

The new proposed rules are indeed painless for hospital managers and profits.

In proposing these weak standards EPA is ignoring its Clean Air Act section 112 (c)(6) mandate which states:

> "With respect to alkylated lead compounds, ..., mercury, polychlorinated biphenyls, 2,3,7,8 tetrachlorodibenzofurans and 2,3,7,8 tetrachlorodibenzodioxins, the Administrator *shall*, ... assur[e] that sources accounting for not less than 90 per centum of the aggregate emissions of each such pollutant are subject to standards under subsection (d)(2) or (d)(4)" emphasis added.

Section (d)(2) states that:

> "Emissions standards promulgated under this subsection and applicable to new or existing sources of hazardous air pollutants *shall* require the maximum degree of reduction in emissions of the hazardous air pollutants subject to this section *(including a prohibition on such emission, where achievable)* ..." emphasis added.

Therefore, the changes that EPA has made to weaken the rule run directly counter to the Clean Air Act mandate.

Doucet, who was heavily involved in the AHA effort to weaken the rule, summarized the changes to the initial May, 1994 rules as "a positive, dramatic—and somewhat unexpected—reversal of the stringency of the proposed regs." The proposed regs "were indeed tough," Doucet observed, and most hospital managers "believed that the EPA's main motive was to force the closure of as many Medwaste Incinerators as possible and to make it difficult to permit new MWI facilities."

But the revised, "painless" version of the rules came about as a result of "a vast amount of additional data, documents and information" from the hospital industry that persuaded EPA to reverse course.

The new proposed rules are indeed painless for hospital managers and profits. But not for the rest of us, who will face the consequences of continued exposure to dioxin, mercury and other toxins that EPA's new rule will allow to spew from thousands of virtually unregulated hospital incinerators.

WORSE THAN HAZARDOUS WASTE INCINERATORS

EPA's supplemental notice indicates that the final rule will drop requirements for any air pollution control devices whatsoever on hundreds of small incinerators, which are often the dirtiest—and account for a substantial amount of total dioxin generated by medwaste incinerators. The initial rule contained a single standard for all medwaste incinerators; the new rule will

likely make standards contingent on incinerator size.

As a result of EPA's proposed rules, Medwaste Incinerators will be held to weaker standards than those applied to other types of burners even though:

- EPA has acknowledged that stronger "beyond the floor" controls reduce risks posed by emissions of dioxins and furans (EPA 1996c),
- the contribution of dioxin emissions from medical waste incinerators is greater than from hazardous waste incinerators, and
- the combustion objectives and the applicable air pollution control technologies are nearly identical.

In fact, the most stringent EPA proposal for the largest medwaste incinerators is ten times weaker than that proposed for hazardous waste incinerators, cement kilns, and other burners (Table 11). As discussed previously, dioxin emissions are regulated based on their toxicity, which is measured and related to the toxicity of the most toxic congener, 2,3,7,8 Tetrachloro dibenzo dioxin. These units are called Toxic Equivalents, or TEQ's. EPA proposes that all medwaste incinerators regardless of size be allowed to release either 2.3 or 15 nanograms toxic equivalent per dry standard cubic centimeter of air (ngTEQ/dscm) depending on the size and location of the facility (Table 11). While EPA has not committed to either number, the wording of the proposal, strongly suggests that the weakest standard being considered, ultimately will be chosen for most facilities. Hazardous waste burners, in contrast will be allowed to release only 0.2 ngTEQ/dscm.

Table 11. Proposed MACT requirements for dioxin releases from medical waste incinerators will permit 10 times more dioxin to be released than under the proposed rules for hazardous waste incinerators.

	Medical Waste Incinerators	Hazardous Waste Incinerators
Weakest Proposal	15.0 ng	0.2 ng
Strongest Proposal	2.3 ng	0.2 ng

Values are in nanograms toxic equivalent per dry standard cubic meter (ng TEQ/dscm).

Source: Environmental Working Group. Based on EPA Proposed Rules, (EPA 1996a and 1996c.)

For most medical waste incinerators, EPA's proposal will mean no pollution reduction at all. "Small" medical waste incinerators (those burning less than 200 lbs/hr.), account for about 40 percent of all Medwaste Incinerators nationwide according to the EPA-generated database utilized in this study. Under EPA's proposal this weak standard would require the addition of no pollution control equipment. Only "good combustion practices" would be required. Operators must simply be trained and certified, and the waste would have to remain in the combustion chamber for two seconds.

The most stringent EPA proposal for the largest Medwaste Incinerators is ten times weaker than that proposed for hazardous waste incinerators, cement kilns, and other burners.

- **Weaker monitoring.** Under the Administration's proposal, EPA will require "initial testing" for regulated pollutants at incinerator start up with *no* subsequent testing for facilities that rely only on good combustion practices to control emissions. The original rule called for initial and annual testing for at least three years. For facilities with scrubbers the EPA will require initial testing and skip testing for the first three years. This means that the facilities with no pollution controls will have to test their emissions *less* than those with scrubbers. EPA's initial rule required that tests would consist of three test runs of four hours each. Now EPA will require only three test runs of one hour each, reducing the reliability of the monitoring data.

- **Less training for operators, less accountability for incinerators.** EPA significantly weakens requirements for operator training and eliminates the requirement for a trained and qualified operator to be on duty when the incinerator is burning, despite the reliance on "good combustion practices" as the sole pollution control measure for hundreds of smaller incinerators.

NOTE

[9]Larry Doucet. 1996a (December). "EPA prescribes 'painless' rules for med waste incinerators." Health Facilities Managment. p. 40. Doucet gave a similar account in the November-December 1996 issue of ASHES Newsletter. "Very Positive Changes to Medical Waste Incincerator Regulations." (Doucet, 1996b)

RECOMMENDATIONS

Clearly, health care institutions have an important role and responsibility in improving environmental quality. Health care providers and the Environmental Protection Agency are in a position to significantly reduce the amount of dioxin and mercury among other chemicals that are released into the air and ultimately into the food chain. We are currently presented with a window of opportunity as the health care paradigm is changing and EPA is developing new regulations for medical waste incinerators. Based on this analysis the Health Care Without Harm Campaign recommends that health care providers, state agencies and the EPA formulate policies to achieve the following overarching goals (for the full list of Campaign goals, see Appendix B):

- Eliminate the non-essential incineration of medical waste and promote safe materials use and treatment practices;
- Phase out use of PVC and persistent toxic chemicals;
- Phase out the use of mercury in the health care industry;
- Develop health-based standards for medical waste management and recognize and implement the public's right to know about chemical usage in the health care industry;
- Develop just siting and transport guidelines that conform to principles of environmental justice: "no communities should be poisoned by medical waste treatment and disposal."

FOR HEALTH CARE PROVIDERS:

- **Enlist and educate personnel.** Staff should be trained to segregate the waste stream, separating out only those wastes —infectious, mercury-containing, and other hazardous materials— that require special treatment and disposal.
- **Make waste reduction a priority.** Hire or assign a

Health care providers and the Environmental Protection Agency are in a position to significantly reduce the amount of dioxin and mercury that are released into the air.

waste reduction specialist to implement programs to reduce, re-use and recycle waste.

- **Shift to non-burn technology.** With reduced amounts of "infectious" waste resulting from waste reduction practices, alternatives will be more cost-effective than improvements in incineration.

FOR THE ENVIRONMENTAL PROTECTION AGENCY:

The agency should adopt rules that would eliminate emissions of dioxins and other pollutants from medical facilities. EPA should exercise its existing authority to eliminate from the medwaste stream materials that lead to the formation of dioxins and cause pollution from mercury and other toxins in the first place.

- **In the interim, EPA should not let hospitals pollute more than hazardous waste burners.** Our hospitals ought to be held to at least the same standard for pollution reduction in the name of public health as are hazardous waste incinerators.

- **Recognize that dioxin is more than a local threat.** Rural incinerators contaminate very large airsheds. Rural hospitals should uphold the same standard of public health protection and should not be given special pollution rights. The goal of medical waste incineration policy should be zero discharge of dioxin for all medical waste incinerators.

- **Set National standards for infectious wastes.** National standards like those defined by the CDC should be developed to allow medical facilities to limit incineration to those materials that absolutely need to be burned. This could significantly reduce waste management costs.

- **Honor the public's right to know.** The public has a right to be informed about medical waste incineration and about health care waste disposal practices.

FOR STATE GOVERNMENTS:

States should adopt policies that prohibit the burning of medwaste in cement kilns and municipal solid waste incinerators. Hospitals should be encouraged to minimize their waste stream instead of foisting their wast problems on other communities, including low income communities and people of color.

- **Account for permitted and operating medical waste facilities.** State governments should immediately identify the medical waste facilities holding operating permits. States should update listings of medical waste incinerators annually, making the list and emissions data available

to the public.

- **Initiate monitoring programs.** Many facilities that burn medical waste are not required to monitor emissions. States should initiate monitoring programs to characterize the release of pollutants from these facilities. All of this information should be made public in a timely fashion.

- **Adopt a moratorium on new incinerators that burn medical waste.** Moratoria on new commercial incinerators, for example, already exist in eight states. Setting such requirements will help drive a shift to alternative technologies.

RESOLUTION ADOPTED BY THE AMERICAN PUBLIC HEALTH ASSOCIATION TITLED: "PREVENTION OF DIOXIN GENERATION FROM PVC PLASTIC USE BY HEALTH CARE FACILITIES"

November 22, 1996

The following is a copy of the text of a resolution adopted by the American Public Health Association (APHA) at its 124th Annual Meeting in New York City on November 20, 1998. The reference list is not electronically available at this time but may be soon.

An official version of the resolution will be available from APHA soon. APHA; 1015 Fifteenth Street, NW, Washington, DC 20005; 202-789-5600.

The resolution was introduced by Peter Orris, MD, MPH; Division of Occupational Medicine; Cook County Hospital; 720 South Wolcott; Chicago, IL 60612.

Prevention of Dioxin Generation from PVC Plastic Use by Health Care Facilities

The American Public Health Association,

- Noting, the conclusion in the 1994 Draft Dioxin Reassessment by US Environmental Protection Agency that medical waste disposal is a major source of Dioxin contamination; (1,2) and

- Also realizing, as did APHA resolution #9304, "that virtually all chlorinated organic compounds that have been studied exhibit at least one of a wide range of serious toxic effects such as endocrine dysfunction, developmental impairment, birth defects, reproductive dysfunction and infertility, immunosuppression, and cancer, often at extremely low doses"; (3) and

- Recognizing that scientific and policy attention and concern for several years, has been directed at the potential public health threat from dioxins which, in addition to their carcinogenic effects, can disrupt the endocrine system; (4) and

- Understanding that dioxins are created by the disposal

of synthetic chlorinated organic compounds. (5) Though the factors which determine dioxin formation during incineration are not fully understood, they are released into the environment during combustion of chlorinated plastic products; (5,8) and

- Observing that chlorinated plastic products - predominately polyvinyl chloride (PVC) - represent, on a tonnage basis, the largest and fastest growing class of synthetic chlorinated organic compounds; (6) and

- Observing that the use of PVC products by the health care industry began after World War II and has grown rapidly, especially for the single use or short term use applications, account for most of the organically bound chlorine in medical waste; (7) and

- Confirming that a prime ethical principal of health care provider is “First, to do no harm”; and

- Understanding as did APHA resolution #9304 “that the only feasible and prudent approach to eliminating the release and discharge of chlorinated organic chemicals and consequent exposure is to avoid the use of chlorine and its compounds in manufacturing processes’; (3) and

- Understanding that appropriate alternative products composed of non-chlorinated materials are currently available for many, but not all health care uses of chlorinated plastics, (e.g. Blood Bags); (9) and

- Affirming that any substitution for a chlorinated plastic product must provide a less toxic alternative with concern for the full public health implications of the replacement, including infectious considerations; and

- Observing that highly effective programs for the reduction of hospital waste generation have been initiated in the US and programs for the substitution of PVC are in place in some hospitals in Europe; (9,10) therefore

1. Urges all health care facilities to explore ways to reduce or eliminate their use of PVC plastics;

2. Calls upon health care professionals to encourage health care institutions with which they are associated to adopt policies that will lead toward the reduction and elimination of the use of PVC plastic products;

3. Suggests that health care facilities hire or assign professional staff to evaluate the potential for persistent toxic pollu-

tion associated with the life-cycle of products the facility purchases;

4. Strongly urges medical suppliers to develop, produce and bring to market appropriate, cost-competitive products that can replace those that contain PVC or other chlorinated plastics;

5. Encourages government oversight agencies and private accrediting bodies to incorporate institutionally, the requirement that health care institutions have programs for the reduction of toxic pollution in their certification standards; and

6. Encourages study and evaluation of alternative products and practices that will lead to the reduction and elimination of the use of PVC products; also encourages programs to provide technical assistance and training to health care facilities that seek help in the reduction of their reliance on chlorinated plastics.

THE MISSION OF HEALTH CARE WITHOUT HARM

To transform the health care industry so it is no longer a source of environmental harm by eliminating pollution in health care practices without compromising safety or care. We will accomplish this mission by:

- promoting comprehensive pollution prevention practices.
- supporting the development and use of environmentally safe materials, technology and products.
- educating and informing health care institutions, providers, workers, consumers, and all affected constituencies about the environmental and public health impacts of the health care industry and solutions to its problems.

THE GOALS OF HEALTH CARE WITHOUT HARM

1. To work with a wide range of constituencies for an ecologically sustainable health care system;
2. To eliminate the non-essential incineration of medical waste and promote safe materials use and treatment practices;
3. To phase out use of PVC and persistent toxic chemicals, and to build momentum for a broader PVC phaseout campaign;
4. To phase out the use of mercury in the health care industry;
5. To develop health-based standards for medical waste management and to recognize and implement the public's right to know about chemical usage in the health care industry;
6. To develop just siting and transport guidelines that conform to principles of environmental justice: "no communities should be poisoned by medical waste treatment and disposal;"
7. To develop an effective collaboration and communication structure among campaign allies.

REFERENCES

Agency for Toxic Substances and Disease Registry. 1990. The Public Health Implications of Medical Waste. A Report to Congress. September, 1990.

American Hospital Association. 1994. Reassessment of Maximum Achievable Control Technology (MACT) Floors For Existing Medical Waste Incinerators. November 1, 1994. Doucet and Mainka, Peekskill, New York. U.S. EPA Air Docket A-91-61.

American Hospital Association. 1995-1996a. Average Cost to Community Hospitals per Patient, by State: 1990-1994. In: The American Almanac 1996-97. Bureau of the Census.

American Hospital Association. 1995-1996b. Hospitals— Summary Characteristics: 1972-1994. Hospital Stat. In: The American Almanac 1996-97. Bureau of the Census.

American Hospital Association. 1996. Comments from the American Hospital Association on the United States Environmental Protection Agency's Supplemental Notice of June 12,1996. Regarding Proposed Standards and Guidelines for Medical Waste Incinerators. Prepared by L.G. Doucet, Doucet and Mainka, P.C. Peekskill, New York. 25 pp.

American Hospital Association. 1996-1997. The AHA Guide to Health Care Facilities on Diskette.

Bidelman, T.F. 1996. Considerations Needed to Establish Air Criteria for Persistent, Bioaccumulative and Toxic Substances. Paper presented at Society of Environmental Toxicology and Chemistry, 17th Annual Meeting. November, 1996.

Citizens Clearinghouse for Hazardous Waste. 1995. Dying from Dioxin: A Citizen's Guide to Reclaiming Our Health and Rebuilding Democracy. South End Press, Boston, Massachusetts. 360 pp.

Center for the Biology of Natural Systems. 1995. Quantitative Estimation of the Entry of Dioxins, Furans and Hexachlorobenzene into the Great Lakes. 86 pp.

Cleverly, D. H. 1996. Estimation of Environmental Releases of Dioxin-Like Compounds in the United States: 1987 and 1995. Presentation by Mr. Cleverly, U.S. EPA at the EPA Dioxin Formation/Sources Workshop, Chevy Chase Maryland. November, 1996.

Colborn, Theo, D. Dumanoski, and J.P. Myers. 1996. Our Stolen Future. Dutton, New York. 1996.

Commoner, B., M. Cohen, P.W. Bartlett, A. Kickar, H. Eisl, C. Hill, and J. Rosenthal. 1996. Zeroing out Dioxin in the Great Lakes: Within our Reach. Center for the Biology of Natural Systems. June 1996.

DeVito, M.J., L.S. Birnbaum, W.H. Farland, and T.A. Gasiewicz. 1995. Comparisons of Estimated Human Body Burdens of Dioxinlike Chemicals and TCDD Body Burdens in Experimentally Exposed Animals. Environmental Health Perspectives 103:820-831.

Doucet, L.G. 1994. Comments and Recommendations to the U.S. EPA's Draft Medical Waste Incinerator Regulations. On behalf of the American Hospital Association. July 25, 1994. 10 pp.

Doucet, L.G. 1996a. EPA Prescribes 'Painless' Rules for Med Waste Incinerators. Health Facilities Management. December, 1996. pp. 40-43.

Doucet, L.G. 1996b. Very Positive Changes to Medical Waste Incinerator Regulations. American Society for Health Care Environmental Services Newsletter. American Hospital Assoc., Volume 11, No. 6.

Environment Reporter. 1996. Hospitals Abandoning Medical Waste Incineration because of Strict Rules, Officials Tell Conference. Volume 27:1443-44. November, 1996.

Franklin Associates. 1994. Characterization of Municipal Solid Waste in the United States: 1994. Prepared for the U.S. Environmental Protection Agency. In: The American Almanac 1996-97. Bureau of the Census.

Green, A.E.S., and J.C. Wagner. 1993. Toxic Products of medical waste incineration. In: Green AES, editor. Medical Waste Incineration and pollution prevention. New York: Van Nostrand Reinhold, pp 1-36. As cited in Thornton et al. 1996.

Hill, C. 1995. Comments on MACT Proposal. Submitted to Mr. Richard Copland, U.S. EPA, Office of Air Quality Planning and Standards. May 19, 1985. 14 pp.

Huff, J. 1994. Dioxins and Mammalian Carcinogenesis. In: Dioxins and Health. Arnold Schecter, Ed. Plenum Press, New York.

International Association for Research on Cancer. 1997. IARC Evaluates Carcinogenic Risk Associated with Dioxins. February 14, 1997.

Jack Faucett Associates. 1988. Regulatory Impact and Flexibility Analysis, of Proposed Standards for Occupational Exposure to Blood-Borne Diseases. Prepared for U.S. Department of Labor. December 22, 1988. 486p. Cited in EPA 1993.

Kiser, J.V.L. 1995. Hospital Recycling Moves Ahead. Biocycle. November, 1995. p.30-33.

Leach Bisson, C., McRae, G., and Shaner, H. G., R.N. 1993. An Ounce of Prevention: Waste Reduction Strategies for Health Care Facilities. American Society for Healthcare Environmental Services. Chicago. 214 pp.

Lorber, M. 1996. Formation and Sources of Dioxin-Like Compounds: A background issue paper. Versar, Inc. November 1996. 84 pp.

Massachusetts Department of Environmental Protection. 1996. Memorandum to the Center for the Biology of Natural Systems. From the Office of Research and Standards. October, 1996.

Michigan Health and Hospital Association. 1996. Medical Waste Incineration Survey. November 1996. Prepared for National Wildlife Federation by Pier-George Zanoni.

Midwest Research Institute. 1996a. Alternative Methods for Medical Waste Treatment: Availability, Efficacy, Cost, Owner Satisfaction, Operator Safety and Environmental Impacts. January, 1996. Docket number IV-B-028.

Midwest Research Institute. 1996b. Updated Medical Waste Incinerator Data Base. Memorandum from Brian Strong (MRI) to Richard Copland (ESD Combustion Group, US EPA). May 20, 1996. Air Docket No. A-91-61 IV B 045.

Minnesota Pollution Control Agency. 1996. Memorandum to the Center for the Biology of Natural Systems. September 10, 1996.

National Research Council. 1996. Carcinogens and Anticarcinogens in the

Human Diet. Committee on Comparative Toxicity of Naturally Occurring Carcinogens, Board on Environmental Studies and Toxicology, Commission on Life Sciences. National Academy Press, Washington. 417pp.

New Jersey Department of Environmental Protection and Energy. 1993. Task Force on Mercury Emissions Standard Setting. Volume I. July 1993.

New Jersey Department of Health. Hazardous Substance Fact Sheet. Mercury. State of New Jersey, Right to Know Program.

Ohio Environmental Protection Agency. 1996. Memorandum to the Center for the Biology of Natural Systems. From the Division of Solid and Infectious Waste Management. February 1996.

Pennsylvania Bureau of Air Quality. 1996. Memorandum to the Center for the Biology of Natural Systems. From the Division of Permits. September, 1996.

Rutala, W. A. 1988. Management of Infectious Waste by United States Hospitals. As cited in U.S. Congress, OTA 1988.

Rutala, W.A., R.L. Odette, and G.P. Samsa. 1989. Management of infectious waste by U.S. hospitals. Journal of the American Medical Association. 262:1635-1640.

Rutala, W.A., and C.G. Mayhall. 1992. Society for Hospital Epidemiology of America position paper. Infection Control and Hospital Epidemiology. 13:38-48. Reprinted in Leach Bisson et al. 1993.

Reeder, R. 1995. The case against mercury: Diagnosis, Treatment, and Alternatives. Terrene Institute, Washington, D.C.

Texas Natural Resource Conservation Commission. 1996. Memorandum to the Center for the Biology of Natural Systems. From the Permit Division, Combustion Section. January, 1997.

Thornton, J, M. McCally, P. Orris, and J. Weinberg. 1996. Hospitals and Plastics: Dioxin Prevention and Medical Waste Incinerators. Public Health Reports, Volume III. July/August 1996. pp. 298-313.

U.S. Code of Regulations. Clean Air Act. 42 U.S.C.A. § 112.

U.S. Congress, Office of Technology Assessment. 1988. Issues in Medical Waste Management- Background Paper, OTA-BP-O-49 Washington, DC: U.S. Government Printing Office, October 1988. 37 pp.

U.S. EPA. 1987. Hospital Waste Combustion Study, Data Gathering Phase. Final Draft prepared by the Radian Corp. As cited in U.S. Congress Office of Technology Assessment 1988.

U.S. EPA. 1989. Medical Waste Management in the United States: Draft Interim Report to Congress. Office of Solid Waste and Emergency Response. December 11, 1989. Cited in EPA 1993.

U.S. EPA. 1993. Industry Profile Calculations. Docket number A-91-61 II-B-092.

U.S. EPA. 1994a. Estimating Exposure to Dioxin-Like Compounds, Vol. I: Executive Summary. External Review Draft. U.S. EPA, Office of Research and Development. EPA/600/6-88/005Ca, June 1994.

U.S. EPA. 1994b. Estimating Exposure to Dioxin-Like Compounds, Vol. II: Properties, Sources, Occurrence and Background Exposures. Review Draft. U.S. EPA, Office of Research and Development. EPA/600/6-88/005Cb, June 1994.

U.S. EPA. 1994c. Health Assessment Document for 2,3,7,8-Tetrachlorodibenzo-p-Dioxin(TCDD) and Related Compounds. External Review Draft. U.S. EPA, Office of Research and Development. EPA/600/BP-92/001a-c. June 1994.

U.S. EPA. 1995a. Mercury Study Report to Congress, Executive Summary. EPA-452/R-96-001a, June 1995.

U.S. EPA. 1995b. Memorandum to the Center for the Biology of Natural Systems. From the Region V, Air Toxics and Radiation Division.

U.S. EPA. 1996a. Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Medical Waste Incinerators. Federal Register Vol. 61, No. 120. PP. 31736-31779. June 20, 1996.

U.S. EPA. 1996b. National Listing of Fish Consumption Advisories. EPA-823-C-96-011.

U.S. EPA, 1996c. Hazardous Waste Combustors; Revised Standards; Proposed Rule. Federal Register volume 61, number 77.

U.S. EPA. 1997. Draft Discussion Documents for the Current Dioxin Reassessment Draft.

Wisconsin Department of Natural Resources. 1995. Memorandum to the Center for the Biology of Natural Systems. From the Bureau of Solid and Hazardous Waste. February 1995.

HEALTH CARE
WITHOUT
HARM
THE CAMPAIGN FOR
ENVIRONMENTALLY
RESPONSIBLE
HEALTH CARE

C/O CCHW
P.O. BOX 6806
FALLS CHURCH, VA 22040
TEL 703-237-2249 · FAX 703-237-8389
CCHW@ESSENTIAL.ORG

ENVIRONMENTAL
WORKING GROUP™

1718 CONNECTICUT AVE., N.W. SUITE 600
WASHINGTON, DC 20009
TEL 202-667-6982 · FAX 202-232-2592
INFO@EWG.ORG