

On May 2nd the U.S. Supreme Court ruled that ASH from municipal solid waste incinerators has to be regulated as a hazardous waste.

The work of the Environmental Defence Fund's senior scientist, Dr. Richard Denison, made this decision possible. Dr. Denison has been the country's most articulate advocate for regulating ash as a hazardous waste. The Supreme Court's ruling is a significant rebuke to the Federal EPA and the incinerator industry who have done everything possible to prevent the ash from being regulated as a hazardous waste. The Court's decision means that ash will have to be treated as a hazardous waste unless toxicity tests prove otherwise, i.e., guilty until proven innocent. On May 27 incinerator operators will have to adhere to this ruling. The likely first action will be that incinerator operators will handle the fly ash separately, instead of mixing it with the bottom ash, and arrange to have the fly ash disposed at regulated hazardous waste landfills.

The incinerator that landed this case in court is the 1,600 ton-per-day mass-burn Chicago facility. This went on line in 1970 and has as its only pollution control, an electrostatic precipitator. According to a May 3, 1994, report in the *New York Times*, the Chicago Commissioner of Environment, Henry Henderson, said "the city was quietly anticipating the decision" and that "new equipment would be installed to allow incinerator employees to retrieve batteries, paint cans and other trash containing lead and cadmium to reduce the levels of both metals in the ash. He said a new storage area was being added to the plant so that ash with higher levels of metals could be separated from less contaminated ash. But Mr. Henderson said the city anticipated that in spite of the changes, some 80 tons of ash a day would not meet the safety limit and would have to be shipped to a hazardous waste landfill at a cost of \$200 a ton, or an extra \$4 million to \$5 million a year. In addition, the safety tests cost \$1,000 to \$1,500 each, he said, and it is not clear how often the tests will be needed." (*Incinerator Operators Say Ruling Will Be Costly*, p A18). According to another *NYT* report: "In its Supreme Court appeal, Chicago warned that it would cost more than 10 times as much to dispose of its incinerator ash as in a special hazardous waste landfill, which would charge \$453 a ton while an ordinary landfill charges \$42 a ton...A recent Environmental Protection Agency study said the cost of hazardous waste landfills was not 10 times greater but somewhat more than 3 times greater than ordinary landfills." (May 3, 1994, *Justices Decide Incinerator Ash is Toxic Waste*, front page continued to page A18.)

The test for ash is called the TCLP (Toxicity Characteristic Leaching Procedure) which was designed by the U.S. EPA in collaboration with the incinerator industry. This test is designed not to discover the total metal content in the ash, it only tests what will leach out. The samples fail the TCLP test when heavy metals (except for lead) leach out at over 100 times the safe water drinking standard. (Effective on December 7, 1992, the U.S. EPA set the safe drinking water standard for lead at .015 parts per million (ppm). Prior to Dec 7th, the EPA's drinking water standard for lead was .05 ppm. When the EPA tightened the drinking water standard for lead it did not change the TCLP lead toxicity standard of 5 ppm. Currently the TCLP for lead is over 300 times the safe water drinking standard. If the EPA amends the TCLP for lead, more ash will fail the toxicity tests.) One of the many tricks employed by incinerator operators to help them pass the TCLP test is to treat the fly ash with phosphoric acid prior to the testing. The phosphoric acid converts the soluble lead into the highly insoluble substance lead phosphate, thereby fixing the lead in the ash. While this treatment enables the ash to pass the leachate tests, Dr. Richard Denison has warned that (a) lead phosphate is a suspected human carcinogen and (b) this strategy may not tie up lead indefinitely in the landfill, since phosphate is known to be a nutrient for all living things including microorganisms. A striking example of what might happen was revealed in the leachate tests at the ash monofill in Newport, N.H., designed for Wheelabrator's 200 tpd incinerator in Claremont. According to an April 9, 1993 letter from Dr. Richard Denison to Mr. George Carlson of the N.H. Water Quality/Permits & Compliance Bureau:

"Despite the treatment of fly ash from the Claremont incinerator before disposal with a 'lead-immobilizing agent,' the levels of lead in the leachate have risen sharply in recent months, and now routinely exceed EPA's action level for lead in drinking water, often by significant amounts...Monthly average levels of lead in the leachate have

exceeded EPA's action level for each of the last 6 months and for 9 of the last 12 months. The highest levels of lead ever recorded occurred in the last two months [Jan and Feb 1993]. Average levels exceeded the the EPA action level by 41 and 20 times, respectively. The highest lead level ever recorded in an individual leachate sample occurred in January [1993]; 1.5 milligrams per liter (mg/L), exceeding the EPA action level by 100-fold."

Major Sources of Lead and Cadmium in the Municipal Waste Stream (Ref 1)

LEAD: "Of the combustible portion of MSW, which is most likely to contribute to the toxicity of air emissions and ash, EPA estimates that 71% of the lead in this fraction is contributed by plastics, with the largest portion of that coming from packaging materials. Lead is used as a stabilizer in polyvinyl chloride (PVC) plastics, and as a pigment in many different types of plastics. Other uses of lead pigments besides plastics (e.g., in colored printing inks that may be used on paper or plastic packaging) account for another 24% of the lead in combustible MSW."

CADMIUM: "Of the combustible portion of MSW, almost all (88%) of the cadmium comes from plastics. Other uses of cadmium besides plastics (e.g., in colored printing inks used on packaging) account for virtually all of the rest (11% of the cadmium in combustible MSW."

(1) Recycling & Incineration, Edited by Richard Denison and John Ruston, published by Island Press, 1990, p 180, Table 5.2

Summary of Available Extraction Procedure [EP] Toxicity Test Data for Lead and Cadmium from MSW Incinerator Ash (Ref 2)

	Fly Ash: 23 Facilities		Bottom Ash: 22 Facilities		Combined Ash: 47 Facilities	
	Lead	Cadmium	Lead	Cadmium	Lead	Cadmium
No. of samples analyzed	185	97	773	271	933	806
No. of samples over EP limit	168	94	276	5	373	115
% of samples over EP limit	91%	97%	36%	2%	40%	14%

(2) Recycling & Incineration, Edited by Richard Denison and John Ruston, published by Island Press, 1990, p 183, Table 5.3

ESTIMATED POUNDS OF METAL IN EACH TON OF MSW INCINERATOR ASH: (Ref 3)

Metal	Fly Ash	Bottom Ash
Chromium	0.09 lb.	0.1 lb.
Cadmium	0.56 lb.	0.07 lb.
Lead	7.9 lb.	5.6 lb.
Arsenic	0.14 lb.	0.2 lb.

(Ref 3) Hazardous Waste News #92, August 29, 1988, published by Environmental Research Foundation, PO Box 5036, Annapolis, MD 21403-7037.

METAL CONCENTRATIONS IN FLY ASH AND NATURAL SOILS: (Ref 4)

Range of Concentrations in parts per million		
Metal	Fly Ash	Natural Soils
Lead	2,300-50,000	10-13
Cadmium	100-2,000	0.1-0.2
Arsenic	10 - 750	2
Mercury	9 - 300	0.05 - 0.08

(Ref 4) Vogg et al, 1986.

Background to the U.S. Supreme Court Case:

- April 24, 1991: 2nd Circuit Court of Appeals in New York City ruled in Environmental Defense Fund (EDF) vs. Wheelabrator that MSW incinerator ash is a non-hazardous waste.
- November 18, 1991: U.S. Supreme Court refused to hear EDF's appeal of the 2nd Circuit Court decision.
- November 19, 1991: 7th Circuit Court of Appeals in Chicago reversed a lower court decision and ruled in EDF et al. vs. the City of Chicago that MSW incinerator ash is a hazardous waste under current federal law. EDF brought this suit against the City of Chicago in 1988. (See *Waste Not # 173*.)
- November 20, 1991: The city of Chicago state their intention to appeal the Nov. 19 ruling to the U.S. Supreme Court.
- September 18, 1992: The Supreme Court, in deciding to hear the appeal, requested the U.S. Justice Department to ask EPA what their position was. On Sept. 18, William Reilly, as head of the U.S.EPA, issued a memorandum titled Exemption for Municipal Waste Combustion Ash from Hazardous Waste Regulation Under RCRA Section 3001(i) to all regional EPA administrators. The EPA did not note that the memo was written in response to the Supreme Court's request. The incinerator industry celebrated the memo and circulated it widely in all the communities where they had incinerator proposals. (See *Waste Not #218*.)
- November 16, 1992: U.S. Supreme Court remands the case back to the 7th Circuit Court of Appeals to reconsider their decision in light of the September 18th EPA memorandum.
- January 12, 1993: The 7th Circuit Court of Appeals in Chicago states that the EPA memo is unpersuasive and rules again that ash from MSW incinerators should be regulated as a hazardous waste. (See *Waste Not # 223*.)
- May 2, 1994: The U.S. Supreme Court ruled in a 7-2 decision that MSW incinerator ash must be regulated under federal hazardous waste law. Justice Antonin Scalia authored the opinion with agreement from Chief Justice William Rehnquist and Justices Harry Blackmun, Anthony Kennedy, David Souter, Clarence Thomas and Ruth Bader Ginsburg. Justices John Paul Stevens and Sandra Day O'Connor dissented.

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The Great Incinerator Ash Scam: Part 1.

EPA'S JANUARY 1995 RULING ON MSW INCINERATOR ASH

The procedure that EPA selected in January 1995 to test MSW incinerator ash will allow **HIGHLY HAZARDOUS AND TOXIC ASH** to be classified as a **NON-HAZARDOUS WASTE**.

May 27, 1994

Letter to Carol Browner, US EPA Administrator
from

J. Thomas Cochran,

Exec. Director, U.S. Conference of Mayors

"The U.S. Conference of Mayors and its affiliate, The Municipal Waste Management Association are extremely dismayed by the announcement made by the U.S. Environmental Protection Agency on Tuesday, May 24, 1994 that the Agency intends -- essentially overnight and without warning -- to subject ash from waste-to-energy facilities to potential regulation as a hazardous waste under Subtitle C of the Resource Conservation and Recovery Act. In its announcement, EPA has ignored the concerns of the cities completely, creating yet another unfunded mandate on the nation's cash-strapped local governments...EPA has ample authority to avoid such results and we respectfully ask that you exercise this authority immediately...It would take considerable time for facilities to identify and enter into contracts with hazardous waste transporters, treaters, and disposal facilities, particularly given the current limited capacity for managing hazardous wastes that exists throughout the country. Even if facilities could somehow make the necessary arrangements in time, Subtitle C disposal also would likely be prohibitively expensive..."

Excerpts from "Comments of The United States Conference of Mayors, The National League of Cities and The Municipal Waste Management Association" submitted in 1994 to the US EPA: "Ash should be tested at the point at which it is discarded, i.e., at the end of the ash management processing system of the resource recovery facility..."

January 25, 1995

Carol Browner's Address to the
U.S. Conference of Mayors.

"...With her agency under attack in Congress for issuing too many costly rules, EPA Administrator Carol Browner sought out city officials Wednesday at the winter meeting of the Conference of Mayors and took along some presents...she told the mayors the EPA would allow a testing method for municipal incinerator ash that essentially would ensure that the ash would not be classified as a hazardous waste. The decision is critical for scores of cities, including Chicago and Detroit, that will save millions of dollars in ash disposal costs each year...'**We have decided that the ash should be tested at the point when it leaves the combustion building,**' Browner told the mayors, who immediately knew that would mean tens of millions of dollars in savings because of lower disposal costs. Under the EPA rule, the more toxic fly ash in the smokestack can be combined with the less toxic bottom ash before testing. EPA officials acknowledged that combining the two types of ash was likely to allow conventional disposal because of lower toxicity level...Some environmental groups had argued that the EPA should test the fly ash separately because it contains the highest levels of toxic metals and should undergo the same special handling and storage as other toxic waste. Detroit Mayor Dennis Archer estimated that EPA's ash testing policy would save cities with municipal incinerators a total of \$200 million a year. If fly ash had to be tested separately and disposed of as a hazardous waste, it would require spending up to \$3 million per incinerator for capital improvements and substantially higher annual operating costs, said Dave Gatton, an environmental advisor for the Conference of Mayors." *A.P. report, January 26, 1995.*

EPA Rescues the MSW Incinerator Industry with January 1995 Ash Ruling. When Carole Browner made the announcement in January 1995 that the trash incinerator industry could mix the bottom ash and the fly ash together prior to the toxicity testing required by the Supreme Court ruling of May 2, 1994 (see Waste Not # 280) she gave the kiss of life to a dying industry. Trash incineration is the most unpopular technology since nuclear power. Since 1985 over 280 incinerator

proposals have either been defeated outright or put on hold (see Waste Not #s 283-294). Not only is incineration extremely unpopular with citizens, but for those officials who examine the economic liabilities entailed (and who avoid the wooing of the consultants and financiers who can make a fortune out of the hidden taxation of municipal bonding) it is a very dubious economic proposition. One of those economic liabilities is the enormous cost involved of disposing of the ash produced (approximately one ton of ash for every three tons of trash) if it receives a "hazardous waste" designation. How the incinerator industry, and its friends in the EPA and state and regulatory agencies, have done their level best to avoid this designation is a long and convoluted story. As long and convoluted as the story may be, the trajectory of the saga was clearly spelled out by David Sussman (formerly with the EPA and now Vice President for Environmental Affairs for Ogden Martin) in an article which appeared in the Waste-To-Energy Report of September 10, 1986:

"It means finito, morte, the end for the resource recovery industry if ash is treated as hazardous waste...Either that or widespread violations. There is simply no room for four million additional tons annually of ash waste. It would overwhelm all existing hazardous waste fills."

Carol Browner's Gift to the Incineration Industry. When many environmentalists read about Browner's decision on ash testing requirements they probably felt two things: (a) at least she is following the Supreme Court's ruling that the ash should be tested and (b) she has done a little favor to the incinerator industry by allowing them to dilute the more toxic fly ash with the less toxic bottom ash, prior to testing. However, it was more than a little favor, this is a **huge giveaway**.

In the other parts of this 4-part series on ash we will give the details of the four developments which have facilitated the bureaucratic detoxification of this hazardous material. These four developments are:

1. The willful avoidance of a requirement to measure the total content of the toxic substances in the ash. This includes toxic metals, like lead, cadmium and mercury, and the dioxins and furans which are known to form on the fly ash particles.
2. The change over from the EP Tox Test (Extraction Procedure Toxicity Test) to the TCLP Test (Toxic Characteristic Leaching Procedure Test). The former test required reaching a pH of 5, the latter does not.
3. The use of large quantities of lime in the air pollution equipment which nullifies the effort to simulate acidic leaching conditions in the testing of the ash.
4. The mixing of the fly ash (10-20% of the total) with the bottom ash (80-90% of the total) prior to testing enables the lime in the fly ash to protect the bottom ash also from exposure to acidic leaching conditions and thus allowing the "combined" ash to pass the test artificially.

Text of January 1995 "EPA Environmental Fact Sheet" - EPA 530-F-95-004:

"EPA Determines that Ash from Waste-To-Energy Facilities is Subject to Hazardous Waste Regulations Upon Exiting the Combustion Building."

"Background. On May 2, 1994, the U.S. Supreme Court issued an opinion interpreting Section 3001 (1) of the Resource Conservation and Recovery Act (RCRA). The Court held that, although municipal waste-to-energy (WTE) facilities that burn household wastes alone, or in combination with nonhazardous wastes from industrial and commercial sources, are exempt from regulation as hazardous waste treatment, storage, or disposal facilities, the ash that they generate is not exempt. Generally, two basic types of ash are collected at WTE facilities: bottom ash from the furnace and fly ash from the air pollution control equipment. EPA estimates that nearly 80 percent of WTE facilities routinely combine the bottom ash and fly ash. Bottom ash is approximately 75-80 percent of the total ash by weight. Studies show that ash (usually fly ash) sometimes can be classified as hazardous waste because it can leach lead or cadmium above levels of concern. WTE facilities must determine if the ash they generate is hazardous. This determination can be made by either testing or by using knowledge of the combustion process to understand whether the ash would be hazardous. The Court ruling did not specify when or where this determination had to be made. **Action.** Because the Court did not specify where a hazardous waste determination should be made, EPA is designating this point. EPA interprets Section 3001 (1) of RCRA to first subject the ash generated by a WTE facility to hazardous waste regulations when it exits the combustion building following the combustion and air pollution control processes. This means that owners and operators of WTE facilities may combine bottom ash and fly ash inside the combustion building before making a hazardous waste determination. This action is a statutory interpretation, and does not change the Supreme Court decision. Ash that is hazardous waste must be managed in full compliance with RCRA hazardous waste management rules. The Agency will vigorously enforce against violation under RCRA. Landfilling of nonhazardous ash must occur in a facility that meets stringent federal design and operating standards, which are fully protective of human health and the environment."

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The Great Incinerator Ash Scam. Part 2.

A key step in the 'bureaucratic' detoxification of waste from municipal solid waste (MSW) incinerators is the willful avoidance of regulation to require the measuring of the total content of toxics in the ash. Instead, all the emphasis is placed on 'leaching' tests supposedly designed to simulate the acidic leaching conditions in a municipal waste landfill. While it is extremely important to protect surface and ground water from these toxics it is equally important to protect human beings and other species from direct exposure to this ash. Unfortunately, when incinerator operators pass the inappropriate TCLP testing, press releases and newspaper headlines usually and loudly proclaim "ash tests show ash safe." As a result, workers in the incinerators, ash truck drivers, workers at the landfills and residents near landfills, incinerators and truck routes are not made aware of how dangerous this material is if it is inhaled or ingested. This actually applies not only to the fly ash but also to the lime from the air pollution control devices which is extremely corrosive and would tend to irritate the membranes in the respiratory system. The following table gives a summary of the ranges of various toxics found in ash from municipal waste incinerators.

TABLE A¹
Concentrations of Substances in MSW Bottom and Fly Ash.

Substance	Fly ash	Bottom ash	Substance	Fly ash	Bottom ash
Inorganics (ppm)			Vanadium	22-166	53
Aluminum	5,300-176,000	5,400-53,400	Yttrium	2-380	
Antimony	139-760		Zinc	2,800-152,000	200-16,700
Arsenic*	15-750	1.3-24.6	Organics (ppb)		
Barium*	88-9,000	47-2,000	Acenaphthalene	ND-3,500	37-390
Beryllium	ND-4	ND-0.44	Alkanes	50,000	
Bismuth	36-100	ND	Anthracene	1-500	53
Boron	35-5,654	85	Benzanthrene	0-300	
Bromine	21-250		Benzo(k) fluoranthene	ND-470	ND-51
Cadmium*	5-2,210	1.1-46	Benzo(g,h,i) perylene	0-190	ND
Calcium	13,960-27,000	5,900-69,500	Benzo(a) pyrene	ND-400	ND-5
Cesium	2,100-12,000		Biphenyl	2-1,300	
Chloride	1,160-11,200		Chlorobenzenes	80-4,220	17
Chromium*	21-1,900	13-520	Chlorophenols	50.1-9,630	0
Cobalt	2.3-1,670	3-62	Chrysene	0-690	ND-37
Copper	187-2,380	80-10,700	Di-n-butyl Phthalate	ND	360
Gold	0.16-100		Dioxins		
Iron	900-87,000	1,000-133,500	2,3,7,8-TCDD	0.1-42	0.04-0.7
Lead*	200-26,600	110-5,300	Total PCDDs	5.23-10,883	ND-110
Lithium	7.9-34	7-19	Fluoranthene	0-6,500	110-230
Magnesium	2,150-21,000	880-10,100	Fluorene	0-100	ND-150
Manganese	171-8,500	50-3,100	Furans		
Mercury*	0.9-47	ND-1.9	2,3,7,8-TCDF	0.1-5.4	ND-10
Molybdenum	9.2-700	29	Total PCDFs	3.73-3,187	ND-65
Nickel	9.9-1,966	9-226	Naphthalene	270-9,300	570-580
Phosphorus	2,900-9,300	3,400-17,800	Phenanthrene	21-7,600	500-540
Potassium	11,000-99,000	920-14,500	Phthalates		
Selenium*	0.48-15.6	ND-2.5	Bis (2-EH)	85	2,100
Silicon	1,783-266,000	133-188,300	Butyl benzyl	ND	180
Silver*	ND-700	ND-38	Diethyl	6,300	
Sodium	9,780-49,500	1,800-33,300	PCBs	ND-250	ND-180
Strontium	98-1,100	81-240	Pyrene	0-5400	150-220
Tin	300-12,500	40-800			
Titanium	50-42,000	3,067-11,400			

*Regulated under the RCRA Extraction Procedure (EP) Toxicity Test (40 CFR 261.24).
ND = not detected.

SOURCE: U.S. Environmental Protection Agency, *Characterization of Municipal Waste Combustor Ashes and Leachates From Municipal Solid Waste Landfills, Monofills, and Codisposal Sites*, prepared by NUS Corporation for Office of Solid Waste and Emergency Response, EPA/530-SW-87-028A (Washington, DC: October 1987).

Science, as well as common sense, tells us that as incinerator operators get better at protecting the air, the levels of many of these toxics in the ash, particularly the toxic metals, must get worse.

HAZARDOUS WASTE CLASSIFICATION. Under federal regulations there are four ways a substance may be classified hazardous and thus be required to be sent to a hazardous waste facility. It may be ignitable, corrosive, reactive or toxic. As far as incinerator ash is concerned there are two problem areas. Firstly, with the presence of large quantities of lime in the fly ash generated in modern incinerators the ash may fail the "corrosive" characteristic. The corrosive label is given to materials which produce a solution of pH less than or equal to 2, or greater than or equal to 12. Samples of fly ash from incinerators fitted with lime scrubbers frequently produce solutions with a pH greater than 12. The second concern about ash is its toxicity. This is determined by a **LEACHING TEST**. Up to March 1990 this leaching test was the **EP Tox Test** (Extraction Procedure Toxicity Test). Since then it has been replaced with the **TCLP Test** (Toxic Characteristic Leaching Procedure Test). Both tests were supposedly designed to mimic the acidic conditions generated by rotting garbage in a municipal waste landfill.

THE EP TOX TEST. In this test 100 grams of the ash is placed in a given quantity of water and dilute acetic acid added until the solution has a pH of 5. This solution is stirred constantly for 24 hours with the acidity maintained at pH 5, with more additions of acetic acid, if necessary. After 24 hours the solid ash is filtered off and the solution is made up to a total of 2 liters with water. This final solution is then examined for pollutant levels which have dissolved out of the solid ash. Of particular relevance for incinerator ash are the levels of several toxic metals, particularly lead and cadmium. If these metals are present at levels one hundred times* the safe drinking water standards then the material in question fails the test and is designated "EP Toxic" and should be classified as hazardous waste.

Table B below lists the safe drinking water standards for cadmium and lead and the EP Tox levels. Table C gives a summary of the percentage of ash samples which were failing the EP Tox test in the 1980s. As can be seen from Table C, 94% percent of fly ash, 36% of bottom ash and 40% of combined ash were failing the EP Tox test. We have already pointed out the huge financial implications of these results for the incinerator operators, however, the EPA in the 1980s dragged its feet on enforcing these regulations with respect to ash disposal.

Table B

Leaching Toxicity Levels used in Table C

Safe Drinking Water Standard	EP Tox Test Toxicity Leaching Levels
CADMIUM	
0.01 mg/liter or 0.01 ppm	1 mg/liter or 1 ppm
LEAD	
0.05 mg/liter* or 0.05 ppm	5 mg/liter or 5 ppm

* **NOTE ON LEAD.** Effective on December 7, 1992, the USEPA dropped the safe drinking water standard (SDWS) for lead from 0.05 to 0.015 ppm. However, when the USEPA tightened the SDWS for lead it did not change the toxicity levels for leaching tests. To be consistent, the toxic leaching levels for lead should now be set at 1.5 ppm (i.e., one hundred times the new SWDS.) All other metals of concern from MSW incinerator ash are classified as toxic if they exceed levels one hundred times the SWDS in the leaching tests. If toxicity levels for lead in leaching tests were set at at 1.5 ppm in Table B, many more lead samples would have failed.

Table C¹

Table 6-8—Summary of Extraction Procedure Toxicity Test Data for Lead and Cadmium from Ash

Type of ash	Lead	Cadmium	Either
<i>Fly ash (23 facilities)</i>			
# samples analyzed	185	97	185
# samples over EP limit	168	94	173
% samples over EP limit	91%	97%	94%
# facilities over EP limit ^a	20	21	22
<i>Bottom ash (22 facilities)</i>			
# samples analyzed	773	271	773
# samples over EP limit	276	5	278
% samples over EP limit	36%	2%	36%
# facilities over EP limit ^a	9	1	9
<i>Combined ash (46 facilities)</i>			
# samples analyzed	883	756	883
# samples over EP limit	345	90	354
% samples over EP limit	39%	12%	40%
# facilities over EP limit ^a	21	5	21

^aNumber of facilities for which mean of all available samples exceeds limits. NOTE: Caution must be exercised in drawing conclusions about the overall rate at which samples exceed EP test limits (see text).

SOURCE: Environmental Defense Fund, "Summary of All Available EP Toxicity Testing Data on Incinerator Ash" (Washington, DC: February 1989).

Testing with water instead of acetic acid. One of the first responses to these test results by incinerator operators was to suggest that it was unfair to mimic the acid conditions of a municipal waste landfill because the ash was going to be sent to "monofills." Thus, the claim went, the ash would not come into contact with rotting garbage and the testing with acid was not appropriate. A better test would be to test the ash with water. One of the first places where the ash was tested with water was in Claremont, NH. In 1987, 20 samples of ash were tested with acid and water. 19 of the 20 tests with water failed for lead. In fact, in some cases, higher levels of lead were leaching out with water than with dilute acetic acid. (A full copy of these test results will be made available for anyone who wants them.) Part 3 of this ash series will explain lead's peculiar solubility profile as the pH of the leaching medium changes, and the impact of this on the new TCLP test.

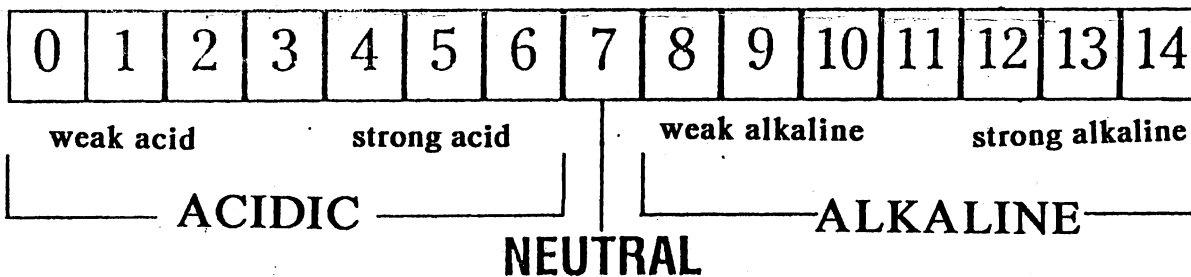
1. U.S. Congress, Office of Technology Assessment (OTA), *Facing America's Trash: What's Next for Municipal Solid Waste*. Published in 1992 by Van Nostrand Reinhold, NY, NY, ISBN 0-442-01048-6. Table A from Table 6-6 on page 248. Table C from Table 6-8 on pg. 253. Originally published by the OTA in October 1989, OTA-0-24 (Washington, DC: U.S. Govt. Printing Office.)

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The Great Incinerator Ash Scam Part 3.

Take a wild guess at what pH range the TCLP tests ash at?

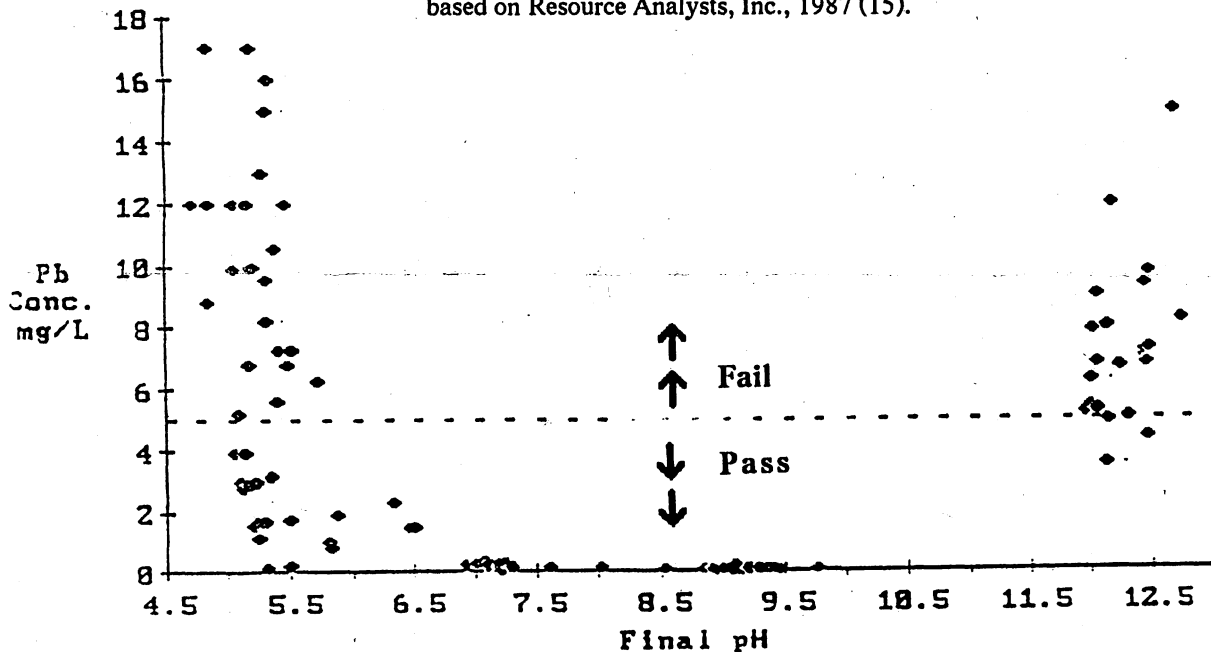
←←←←Lead is soluble→→→→ ←Lead is insoluble→ ←Lead is soluble→



Concentration of Lead in Leachates of Combined Fly Ash, Scrubber Residue, and Bottom Ash as a Function of Leachate pH.

(The dotted line represents the regulatory limit for lead in the EP Tox Test, 5.0 mg/liter.)

Source: R. Denison, Environmental Defense Fund, based on Resource Analysts, Inc., 1987 (15).



LEAD'S PECULIAR LEACHING BEHAVIOR. The metal that most frequently caused incinerator ash to fail the old EP Tox Test was lead. However, the solubility of lead is highly dependent on the pH of the leaching medium used. The Wheelabrator incinerator in Claremont, NH, was one of the first incinerators in the U.S. to use a lime scrubber as part of its air pollution control. This lime makes the ash very alkaline. Lead has a peculiar solubility profile as the pH of the leaching

medium changes. Lead is highly soluble at a pH of 5 or less. Like most metals, its solubility decreases as the acidity decreases and alkalinity increases. However, unlike many other metals as the pH rises above 11, its solubility begins to rise again. At a pH at or near 12, lead is very soluble. A rough profile of lead's solubility is illustrated in the diagram on the front page. When excess lime is present in the ash the pH of the solution it generates in water is around 12. Hence the failure for lead when water is used instead of acetic acid in the leachate tests. **Conclusion:** If an incinerator is using a lime scrubber as part of its air pollution control it is essential to test the ash (especially the fly ash) with water. This, after all, is what it will meet first in the form of rain or melting snow. We can argue about whether distilled water or simulated acid rain should be used in the test, but we need to know how much lead dissolves out of the ash as it gets exposed to the elements. Unfortunately, the TCLP test gives no indication of the impact of rain or melted snow on ash containing lime.

THE TCLP TEST.

The EPA replaced the EP Tox Test, on March 29, 1990, with the TCLP test. The TCLP test was billed as a more stringent test primarily because it increased the number of pollutants that were examined. However, there was one key difference from the EP Tox Test which has proved highly beneficial to the incinerator industry -- especially for those incinerators which operated with lime scrubbers. That difference was dropping the requirement to reach an acidity of pH 5 in the leaching procedure. Instead, a fixed quantity of dilute acetic acid is added and the pH may end up where it may. In the case of ash which contains high levels of lime, the lime neutralizes most of the added acid and does not allow the leaching solution to reach a pH of 5. The pH ends up between 7 to 10, i.e. **where lead is least soluble.** The benefit of this change in protocol was spotted early by the incinerator industry. In 1986, David Sussman, V.P. of OGDEN MARTIN stated:

"...the chemistry of the residue [ash] changes with plants that use dry scrubbers and/or have high calcium levels in the waste...Preliminary findings indicate the change in ash chemistry may enable this residue to pass the TCLP procedure and perhaps flunk the EP test."

Waste-To-Energy Report, September 10, 1986.

To summarize we can now see what a favor the TCLP test does for an incinerator using a lime scrubber. Both the fly ash and the combined ash (but not the bottom ash alone) would yield a highly alkaline solution with water, with a pH in the range 11.5 to 12.5. Treated with water alone, we would anticipate a high proportion of the lead would be leached out. If this same ash was treated with acid in quantities sufficient to reach a pH of 5 (as in the case of the old EP Tox test) again we would anticipate leaching of lead at higher levels than the 5 mg/liter standard for nearly all the fly ash samples, and about half of the combined ash samples. However, in the TCLP test where only a fixed amount of acetic acid is added, with no concern about reaching a final pH of 5, then the effect of adding the acid is to lower the pH from 12 to a pH of about 7 to 10 -- i.e., in the range of minimum lead solubility. In other words, the TCLP test does not reach the level of acidity where we would expect failure (because the lime neutralizes the acid added), but it does take it away from the high pH (12) where we would expect it to fail the TCLP test if only water was added.

THE CAROL BROWNER GIFT.

Carol Browner, the head of the US EPA, handed the incinerator industry a huge gift by allowing the incinerator operators to mix the fly ash with the bottom ash prior to testing. The bottom ash contains no lime. A TCLP test applied to this ash alone would probably yield a pH in the acid range and one would anticipate a failure rate of about 30 to 40 percent of the time, as in the case of the old EP Toxicity Tests. However, when the fly ash is mixed with the bottom ash, the lime protects the bottom ash as well. Again, the leaching medium will not reach pH 5, but stay in the range of lead's least solubility. As bottom ash represents 80 to 90 percent of the total ash, this protection represents a huge financial bonanza to the incineration industry. While the TCLP test serves the industry's interests, it presents a major threat to human health and the environment.

SHE LIED!

"The issue that the court order required us to decide is at what point you test the ash. We have made this decision with the utmost attention to public health..."
Carol Browner, January 25, 1995, in her address to the U.S. Conference of Mayors.

HOW SHOULD THE ASH BE TESTED?

1. The fly ash and the bottom ash should not be combined.
2. The fly ash should be tested daily for total metal content and used as an indicator of the effectiveness of the air pollution control devices.
3. The fly ash should be tested on a monthly basis for its total content of dioxins and furans to see how well the dioxin control strategy is working.
4. The fly ash should be tested with water in a leaching test when the fly ash comes from an incinerator using a lime scrubber (most modern incinerators use lime scrubbers.)
5. The bottom ash should be tested with the EP Toxicity Test to ensure a pH 5 is reached.
6. When a worker begins working at an incinerator or a landfill or driving an ash truck, a blood sample should be taken and stored, should it prove necessary to determine their baseline lead/cadmium and dioxin exposure.

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The Great Incinerator Ash Scam Part 4.

Ward Stone: 1st Ash Scam Victim.

The ash from Ogden Martin's 990 ton-per-day MSW incinerator in Syracuse, NY, which went on line in November 1994, was classified as non-hazardous after it passed the TCLP test. Citizens living close to the landfill, where the ash is used as a daily cover, surreptitiously retrieved some of this ash and asked

N.Y. State Wildlife Pathologist, Ward Stone,
to test the ash for heavy metals, because the landfill abuts the Montezuma Wildlife Refuge in Seneca County, NY.

Stone analyzed the ash for total heavy metal content.

The ash was found to contain hazardous levels of lead, cadmium and mercury. Because of this, Ward Stone, is under attack.

Ogden Martin's 990 tpd Syracuse incinerator may become the eye of the storm of the incinerator ash scam. This \$180 million dollar project is already in deep economic trouble because of a May 1994 U.S. Supreme Court ruling against flow control. According to a March 5, 1995, report in the Syracuse Post-Standard, the trash agency's "standing on Wall Street is so weak, it probably couldn't borrow the money needed to build the Van Buren landfill if the land and permits were ready today." Local officials released a huge sigh of relief when the ash passed the TCLP test. The Post-Standard loudly proclaimed on March 3, 1995, "Ash from trash is 'safe'..." In the same article, an environmental engineer for the county's trash agency said: "All of the metals were well below regulatory limits...This is what was expected. We knew the results would be very low." However, into this celebration party came one Ward Stone, who for the past 26 years has been the Wildlife Pathologist for the New York State Department of Environmental Conservation (DEC) and a pain in the side of the regulatory bureaucrats who would prefer to serve the economic interests of New York corporations, rather than the interests of the environment and the tax payers. Again and again, Ward Stone has provided citizens with the data that his bosses would have preferred to have kept under wraps. This was particularly so in the case of the PCB contamination in the wildlife on and around the Akwesasne reservation in NY. The reservation is downwind and downriver of three large corporations: GM, Reynolds Aluminum and Alcoa.

Ward's interest was aroused by the Syracuse case because the landfill to where the ash is being sent lies next to the Montezuma Wildlife Refuge in Seneca County, NY. In fact, a stream which flows through the landfill drains into the refuge. Citizens supplied ash to Stone for analysis. He not only repeated the TCLP test, but he also had the total content of toxic metals analyzed. As expected, the ash passed the TCLP test, but the absolute levels of several heavy metals (lead, mercury and cadmium) were high. When Ward Stone released this data to the public it attracted a lightning storm of abuse onto his head.

Results from Ward Stone's Testing for Total Heavy Metals:

The Seneca Meadows landfill accepts ash from Ogden Martin's 990 tpd incinerator in Syracuse and Foster Wheeler's 400 tpd incinerator in Hudson Falls, NY.

Metal Tested Parts per million - ppm	Ogden Martin's Syracuse Incinerator Ash	Foster Wheeler's Hudson Falls incin. ash.	Mean Background Levels in U.S. Soils
LEAD	1400 ppm	2650 ppm	35 ppm
CADMIUM	40.1 ppm	60.3 ppm	0.30 ppm
MERCURY	4.3 ppm	4.1 ppm	0.18 ppm

March 8, 1995

"I am outraged by the news coverage in this morning's area newspapers. A representative of your Department, namely Ward Stone, is quoted as making several statements about Onondaga's ash residues...Are these the official positions of the New York State Department of Environmental Conservation?... Letter from Onondaga County Resource Recovery Agency director, Paul O'Connor, to Michael Zagatta, acting commissioner of the NY DEC.

March 9, 1995

"...What Stone is doing isn't science. It's advocacy...A far more independent analysis of the ash comes from the DEC itself...Ward Stone doesn't speak for the DEC...he should not use his position to capitalize on people's fears and burnish his own image as a folk hero." Editorial in the Post-Standard.

March 11, 1995

"Ward Stone's conduct in this has completely been out of line, bordering on the criminal." William Sanford, Chairman of the Onondaga County Legislature. Post-Standard.

March 8, 1995

"My conclusion after working with Ward Stone is that he's done more harm to the environment than any single individual I've ever known...He has a lot of people who love him, when in fact he's more dangerous than the polluter." Robert Flacke, a former DEC commissioner. Post-Standard.

It is ironic that Ward Stone's integrity is being challenged because in our opinion, and the opinion of many environmentalists in N.Y. state, he has more integrity in one nail clipping than the whole bodies of his accusers. However, the lightning storm directed at Ward Stone will undoubtedly put the spotlight on the ash scam we have described in this series. **Of particular interest are the pH levels of the final solution in the TCLP test conducted by the county: they were 9.6, 9.7, 9.8, 9.9, 10.0, 10.8.** As can be seen in the graph in Waste Not # 317, these pH's correspond with the pH range to where lead is least soluble. The scam continues. The TCLP test obscures the dangers. Ward Stone, as a biologist and wildlife pathologist for the state of NY, acted responsibly in testing for total heavy metal content in the ash so that he could assess the potential adverse impact on the wildlife refuge surrounding the ash landfill. We believe that OSHA and Syracuse public health officials should follow Ward Stone's lead, and determine the true toxicity of this ash so that they protect the health of the workers handling the ash.

A little background to Ogden Martin's incinerator:

Builder/Operator: Ogden Martin
Tons-per-day: 990 tpd
Location: Syracuse, Onondaga County, NY
Start-Up Date: November 10, 1994
Air Pollution Controls: Activated charcoal injection, dry scrubbers, deNOX, Baghouse
Cost: \$183.7 million in bonds issued by the Onondaga County Resource Recovery Agency. Director: Paul O'Connor.

Owners: A partnership of Ogden Martin, Ford Motor Credit Co., Dana Corp (Toledo, Ohio); Montauk Inc. (Wilmington, Del.). "Ogden put up 20 percent of the project's cost, then borrowed the money back by selling partnerships to Ford, Dana and Montauk...On paper, they hold the plant and are leasing it back to Ogden...By buying into the plant, Dana, Ford and Montauk can use a depreciation schedule that allows tax breaks over time." - *Syracuse Herald-American*, March 5, 1995.

Violations: Ogden Martin received a \$5,000 fine for storing refuse at the incinerator prior to burning. Residents bitterly complained about the "smell and look of the trash heap." Residents say that Trash Agency director, Paul O'Connor, lied to them when he said that the state Department of Environmental Conservation (DEC) gave permission to store the trash. It was the state DEC who fined Ogden Martin \$5,000.

Ash Landfill: To secure a NY state permit to build an incinerator, a 5-year ash disposal contract must be assured. The trash agency paid \$200,000 to Chambers Development to reserve space at their Charles City County landfill in Virginia. With this contract in place, the state gave Ogden Martin the permit to build. Without this contract, the state would not have given a permit to build the incinerator. However, according to a report in the *Syracuse Post-Standard* of Nov. 11, 1994: "...just hours before the start-up time, agency officials still had no place to store the burner's ash. The agency finally approved a contract with the Seneca Meadows landfill in Seneca Falls (Seneca County, NY) at a 6:30 pm meeting...The agency will pay \$22 a ton to dispose of its ash during the first year of its 2 1/2 year contract with Seneca Meadows...By the time that contract expires, the agency hopes to be able to dump ash in its own landfill..."

WARD STONE NEEDS OUR HELP

It is extremely unfortunate that the attack on Ward Stone has occurred at this juncture. NY's Governor Pataki has already cut his budget to the bone and there are many state officials who would be glad to see Ward dismissed. We urge our readers to write to Governor Pataki to ask that he restore Ward Stone's budget and recognize the merits of an official who rises above inadequate regulations to do his job. Send your letter to: Gov. Pataki, Executive Chamber, State Capital, Albany, NY 12224.

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