Factory Farming

Toxic Waste and Fertilizer in the United States, 1990-1995

Jacqueline D. Savitz
Todd Hettenbach
Richard Wiles

Environmental Working Group™

Acknowledgments

We wish to thank Carolyn Hartmann, Jonathan Kaplan, Paul Orum, Bill Walker, Ed Hopkins and Ken Cook for their reviews and assistance in the writing of *Factory Farming*. Allison Daly coordinated the report's release. Molly Evans designed and produced the report.

Factory Farming was made possible by grants to Environmental Working Group from the Wallace Genetic Foundation 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. Any errors of fact or interpretation are the responsibility of the authors.

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.

To order a copy

Copies of this report may be ordered for $20.00 each (plus 5.75% sales tax or $1.15 for Washington, D.C. residents) and $3.00 for postage and handling. Payment must accompany all orders. Please make checks payable to:

Environmental Working Group
1718 Connecticut Avenue, N.W. Suite 600
Washington, D.C. 20009
(202) 667-6982 (phone)
(202) 232-2592 (fax)
info@ewg.org (e-mail)

www.ewg.org

This report and many other EWG publications are available on the World Wide Web at www.ewg.org

Contents

Foreword

"When it goes into our silo, it's a hazardous waste. When it comes out of the silo, it's no longer regulated. The exact same material. Don't ask me why."

—Dick Camp, President
Bay Zinc Fertilizer Company
Moxee, Washington

With this report, the phrase "factory farming" gains a new, pejorative connotation. But it's no fault of farmers.

Last year an extraordinary investigation by the *Seattle Times* blew the lid off a shocking practice by American fertilizer companies. They routinely "recycle" toxic factory wastes of all kinds into fertilizers. In the initial series, entitled "Fear in the Fields," and in a stream of follow up stories, the *Times* has described widespread use of wastes from steel mills, foundries, and chemical plants. The stuff is laden with lead, cadmium, arsenic, dioxins and other high risk toxics that end up in fertilizers widely used by farmers in the United States.

Farmers have been buying and using these fertilizers unawares. For how long? Decades, probably; no one knows. "Fertilizer products must list 'beneficial materials'," *Times* reporter Duff Wilson wrote, "but there's no requirement that toxics be included on ingredient labels."

The Federal government doesn't regulate fertilizers at all, and states have deployed a purblind oversight system. They have kept a fairly close eye on nutrient content, but have been as vigilant about toxics as Mr. Magoo. The result is a loophole–riddled regulatory "safety net." It greatly benefits factories that otherwise would be stuck with truckloads of toxic waste to dispose of at considerable cost. And it handsomely profits fertilizer makers, who are completely free under law to make use of raw materials that often contain both nutritive and toxic components, without having to disclose the fact to their customers. Farmers, their families, and their land bear the resulting risks, along

with workers in fertilizer plants and dealerships, consumers, and Mother Nature.

Mr. Wilson's investigation has caused an uproar in agricultural circles. The fertilizer industry, after initially attacking the integrity of Wilson's reporting, has been forced by the overwhelming weight of "new information" to acknowledge the immediate need for more regulation, while fighting to keep new rules as toothless as possible. Meanwhile ostriches in a number of state agencies, the EPA, and even within the agricultural science establishment, have been forced themselves to take a harder look at the issue. Legislation and new rules are sure to follow, but it remains to be seen how protective they will be in the face of strong resistance from the factories and fertilizer companies that rather liked the system as it was. We hope that other states will not follow Washington's example and adopt legislation that does little to protect farmers, consumers, or the environment.

Inspired by the evidence that Mr. Wilson uncovered, Environmental Working Group analysts Todd Hettenbach and Jackie Savitz (now executive director of the Coast Alliance) began sifting through the federal Toxics Release Inventory (TRI) in hopes of gaining insight into just how widespread the use of toxic waste has been in fertilizer manufacture. The TRI is a government repository of industry reports on the amount of toxic materials they release into the environment, or ship for reuse or recycling to other facilities. We found a bustling toxic commerce between factories and fertilizer makers. A total of 454 companies identified as farms and fertilizer manufacturers in the TRI received 271 million pounds of toxic waste over the period 1990 to 1995. The major sources were steel mills, foundries and electronic component manufacturers. Along with nutrients like zinc and nitrogen were copious amounts of lead, cadmium and all manner of solvents and other industrial chemicals—69 different types of toxics in all. The tally for carcinogens alone came to 13.9 million pounds.

The TRI has quite a few gaps itself, however. The majority of toxic waste produced by U.S. factories is not yet captured by the TRI, despite recent improvements. So it is prudent to assume that *Factory Farming* underestimates how much and what types of toxic material was sent to fertilizer makers in the early 1990s. Nor can the TRI tell us how much of the toxic material that it does track, was actually made into fertilizer at the receiving facilities, or how toxic these ingredients rendered the finished products.

Even so, *Factory Farming* provides more than enough information to raise serious questions about the materials used to manufacture fertilizers in this

country, and the potential impacts that toxic fertilizers may have on the environment and human health.

We have argued before for improvements to the TRI in order to provide a full accounting of *all* toxic materials from *all* industries, no matter how they are released into the environment or reused in products like fertilizer. People have a right to know this kind of thing. *Factory Farming* brings the issue down to earth.

Kenneth A. Cook
President, EWG

Executive Summary

Every year, polluting industries send millions of pounds of waste materials to fertilizer companies, presumably for use as raw materials in fertilizer production. Even though these wastes are often laden with toxic metal and chemical impurities, fertilizer manufacturers use steel mill smokestack ash and air pollution scrubber brine, and other industrial by-products as the raw materials for a substantial portion of the nation's fertilizers.

In theory, fertilizers applied to farm fields are subject to the same toxic chemical contamination standards as those applied to waste headed for toxic chemical dump sites. In practice, however, there is almost no monitoring of fertilizer or soil contamination levels, and contamination levels may be much higher than allowed by these loosely enforced standards. Highly contaminated fertilizer can render cropland sterile, harm the health of farmers and their families, and even threaten the food supply.

Findings

The Environmental Working Group used data from the Toxics Release Inventory to track the flow of hazardous wastes from industries to fertilizer companies and businesses that appeared to be farms (see Sidebar, p.2). (Some of the fertilizer companies also produce other organic and inorganic chemicals, and the term farm includes ranches, grasslands, and other agricultural businesses — see sidebar. Due to resource limitations we were not able to contact every business that was identified as a farm or a fertilizer company in the TRI).

Top states

EWG identified more than 600 companies in 44 different states that sent more than 270 million pounds of toxic waste to farms and fertilizer companies between 1990 and 1995. More of this waste came from Nebraska than any other state, followed by California and Oregon (Table 1).

Manufacturers use waste such as steel mill smokestack ash and air pollution scrubber brine as the raw materials for a substantial portion of the nation's fertilizers.

More than 600 companies in 44 different states sent 270 million pounds of toxic waste to farms and fertilizer companies between 1990 and 1995.

The steel industry provided nearly 30% of all the waste sent to farms and fertilizer companies from 1990 through 1995, accounting for nearly 80 million pounds waste shipped.

More than 22.5 million pounds of industrial wastes were sent directly to 381 facilities that appeared to be "farms" in the TRI. This includes 1 million pounds of toxic waste, mostly toxic heavy metals, with no potential agricultural application.

Over 450 fertilizer companies and facilities that appeared to be farms in 38 different states received wastes between 1990 and 1995. Companies in California received the most toxic waste, 37.6 million pounds, followed by Nebraska and New Jersey (Table 2).

Companies

Toxic waste shippers. The steel industry provided nearly 30% of all the waste sent to farms and fertilizer companies from 1990 through 1995, accounting for nearly 80 million pounds of waste shipped. Nucor Steel of Norfolk, Nebraska sent the most waste of any company with 26.2 million pounds, followed by Atlantic Steel Industries, Inc. of Cartersville, Georgia with more than 17.5 million pounds and Allco Chemical Corporation of Galena, Kansas, with more than 12.7 million pounds (Table 3).

Fertilizer company recipients. Phibro-Tech of Santa Fe Springs, California received the most waste, more than 35.4 million pounds, followed by Old Bridge Chemical Company of Old Bridge, New Jersey, with nearly 30 million pounds and Frit Industries of Ozark, Alabama, with more than 27.4 million pounds (Table 4).

Farms. Between 1990 to 1995, industrial polluters sent more than 22.5 million pounds of wastes directly to 381 facilities that appeared to be farms (see sidebar). This includes 21 million pounds of potentially beneficial—yet not necessarily pure—chemicals, as well as more than 1 million pounds of toxic waste, mostly toxic heavy metals, with no potential agricultural application. This toxic waste includes more than 174,000 pounds of chromium and chromium compounds and over 33,000 pounds of lead and lead compounds (Table 5). Unfortunately, the TRI does not include any additional information on these "farms," so it is impossible to say what these

Companies classified as Farms in the TRI

For purposes of this analysis we included as farms all businesses identified in the TRI as farms, ranches, grasslands, dairy operations and entities engaged in other forms of agricultural production. We also included as farms, any individual who received toxic materials for "other" land disposal, "other" recycling, or land application. In total, 11 percent of the entities listed as farms into this report fell into the "other" category. The vast majority of these recipients were individuals who received waste for land disposal. The TRI provides no information about the use that may have been made of the materials sent to these "farms" nor whether food crops were grown at the locations listed.

farms did with this waste or whether food or livestock are grown on these lands.

Chemicals. The chemicals most commonly transferred to fertilizer companies and businesses that appear to be farms were zinc (90 million pounds), copper (48.8 million pounds), and sulfuric acid (34.6 million pounds).

In addition to these chemicals, the companies we studied sent more than 6.3 million pounds of lead and lead compounds, 230,000 pounds of cadmium, and 16,000 pounds of mercury. The company that sent the greatest amount of these heavy metals to fertilizer companies and farms was Nucor Steel in Nebraska. The fertilizer manufacturer receiving the greatest amount of these compounds was Frit Industries in Norfolk, Nebraska which received nearly 2.2 million pounds of heavy metals between 1990 and 1995. (Table 6)

Major Loopholes Allow Toxic Waste to be Used in Fertilizer

Three major loopholes in existing toxics law allow toxic waste to be used in fertilizer, presenting risks to farmers and the food supply.

The Steel Industry and K061. There are three major pathways that hazardous waste can follow from the industry to the farm, each with a different level of reporting and testing require-

Table 1. Companies in Nebraska, California, Oregon, and Georgia were the top sources of toxic waste shipped to farms* and fertilizer companies from 1990 through 1995.

Rank	State	Pounds of Toxic Waste Sent by Companies in State (1990-1995)
1	Nebraska	30,099,831
2	California	29,941,974
3	Oregon	25,862,573
4	Georgia	23,692,539
5	Texas	16,706,742
6	Kansas	16,392,667
7	Illinois	13,988,540
8	New York	10,387,105
9	Louisiana	8,873,327
10	Pennsylvania	8,825,078

**See sidebar, p. 2.*
Source: Environmental Working Group. Compiled from EPA Toxics Release Inventory Data (1990-1995).

Table 2. Fertilizer manufacturers in California, Nebraska, New Jersey, and Washington were the top recipients of toxic waste from 1990 through 1995.

Rank	State	Pounds of Toxic Waste Received by Fertilizer Companies in State (1990-1995)
1	California	37,677,186
2	Nebraska	36,869,240
3	New Jersey	29,733,158
4	Washington	20,863,529
5	Georgia	18,850,273
6	Kansas	15,539,137
7	Virginia	14,755,400
8	Texas	14,657,044
9	Indiana	9,474,890
10	South Carolina	8,864,457

**See sidebar, p. 2.*
Source: Environmental Working Group. Compiled from EPA Toxics Release Inventory Data (1990-1995).

Waste that must be disposed of in hazardous waste landfills is considered safe enough to be recycled into fertilizer.

ments. The most loosely regulated route is through a loophole that allows steel companies to send toxic-laden ash—technically called "K061 Waste"—from their smokestacks, to companies that make zinc fertilizers, without testing it or even recording where it is going. This material can literally flow from the smokestack directly to the fertilizer sack and from there to the crop field.

The second method is for companies to exploit a loophole that was designed for the "recycling" of hazardous wastes. Any company sending any wastes to a fertilizer company for recycling need only ensure that the material would pass the EPA's Land Disposal Rule (LDR); regulations written for the storage of treated toxic wastes in lined and highly regulated hazardous waste landfills. If the waste is safe enough to be stored in these landfills, then it is considered safe enough to be recycled into fertilizer. The generating company is not required to test their wastes beyond the LDR standards, nor are they required to document what eventually happens to it.

The third recycling loophole allows companies to transfer their wastes directly to farms if the farms can treat the waste on their land and render the material harmless. This "land treatment" process is more highly regulated than the previous two loopholes and was originally designed to allow beneficial use of relatively benign waste. This report, however, shows that manufacturers sent more than 200,000 pounds of non-beneficial heavy metals to farms between 1990 and 1995.

Conclusions

Between 1990 and 1995, manufacturers sent hundreds of millions of pounds of hazardous

Table 3. Five companies shipped more than one quarter of the toxic waste sent to farms* and fertilizer companies.

Rank	Company	City	State	Pounds Sent (1990-1995)
1	Nucor Steel	Norfolk	NE	26,219,034
2	Atlantic Steel Ind. Inc.	Cartersville	GA	17,570,000
3	Allco Chemical Corp.	Galena	KS	12,700,750
4	Cascade Steel Rolling Mills	Mc Minnville	OR	12,597,492
5	Hoechst-celanese Chemical	Pasadena	TX	9,191,044
6	Oregon Steel Mills Inc.	Portland	OR	8,244,876
7	Schuylkill Metals Corp.	Baton Rouge	LA	7,900,000
8	Armco Inc.	Sharon	PA	7,534,950
9	Photocircuits Corp.	Glen Cove	NY	6,764,632
10	H. Kramer & Co.	Chicago	IL	6,427,575

**See sidebar, p. 2.*
Source: Environmental Working Group. Compiled from EPA Toxics Release Inventory Data (1990-1995).

materials to fertilizer companies and businesses that appear to be farms, where they were almost certainly incorporated into nutrients that are spread on the soil that produces America's food supply. The ultimate use of these chemicals, however, is difficult to determine because of severe limitations in the federal programs — most notably the Toxics Release Inventory — that are theoretically designed to guarantee the public the right to know the fate of industrial waste and toxic chemicals used or generated in their communities.

Table 4. Ten companies received nearly three quarters of all toxic waste sent to fertilizer manufacturers from 1990 through 1995.

Rank	Company	Pounds Received (1990-1995)
1	Phibro Tech Inc.	35,479,808
2	Old Bridge Chemical Company	29,730,992
3	Frit Industries	27,409,394
4	Bay Zinc	20,860,444
5	Tri Chem	17,580,000
6	Albright & Wilson, Inc.	12,048,115
7	Dupont	9,191,044
8	IMC-Agrico	8,680,000
9	Jersey Menier Zinc	8,340,424
10	American Microtrace Corporation	8,041,985

Source: Environmental Working Group. Compiled from EPA Toxics Release Inventory Data (1990-1995).

Recommendations

Anyone who uses fertilizer has the right to know what is in it, and whether is was made from toxic industrial waste. But beyond this basic public right to know, health officials need to know what is in the nation's fertilizer in order to protect the nation's food supply, rural communities, and farmers from toxic chemical contamination. Agricultural authorities, in turn, need an efficient means to monitor possible contamination of the nation's cropland with toxic metals and industrial chemicals.

Table 5. Methanol, chromium, and glycol ethers were the toxics with no fertilizer value shipped most frequently to farms*.

Chemical	Pounds Received (1990-1995)
Methanol	448,082
Chromium And Chromium Compounds	174,443
Certain Glycol Ethers	140,111
Methylenebis(phenylisocyanate)	103,492
Ethylene Glycol	101,403
Lead And Lead Compounds	33,115
Acetone	9,845
Formaldehyde	6,789
1,2,4-trichlorobenzene	5,825
C.I. Basic Green 4	5,270

**See sidebar, p. 2.*
Source: Environmental Working Group. Compiled from EPA Toxics Release Inventory Data (1990-1995).

To achieve these goals we recommend:

- **Expansion of the Toxics Release Inventory** to include full chemical use reporting for all manufacturing, utility, and waste-treatment facilities. The EPA is considering expand-

Table 6. Ten fertilizer plants received more than 90 percent of the total amount of toxic heavy metals sent to fertilizer manufacturers between 1990-1995.

Rank	Company Name	City	State	Pounds Received (1990-1995)	Percent of Total
1	Frit Industries	Norfolk	NE	2,189,481	27.3
2	Bay Zinc	Moxee	WA	1,897,556	23.7
3	Tri Chem	Atlanta	GA	970,000	12.1
4	Hynite Corp	Oak Creek	WI	595,523	7.4
5	Stoller Chemical Co. Inc.	Jericho	SC	462,782	5.8
6	Midwest Zinc	Chicago	IL	365,170	4.6
7	American Microtrace Corporation	Fairbury	NE	336,867	4.2
8	Big River Zinc	Sauget	IL	304,204	3.8
9	Old Bridge Chemical Company	Old Bridge	NJ	210,936	2.6
10	Occidental Chemical Corp.	Castle Hayne	NC	175,000	2.2

Source: Environmental Working Group. Compiled from EPA Toxics Release Inventory Data (1990-1995).

ing the Toxics Release Inventory to include materials accounting requirements as done in New Jersey and Massachusetts. This would be an important first step toward fulfilling the public's right to know about toxic chemicals in their homes, workplaces, and communities.

- **Elimination of the RCRA exemption for K061 waste.** This would close a recycling loophole that allows millions of pounds of heavy metals, carcinogens, and dioxin to be incorporated into fertilizer and applied to the nation's farmland.

- **A ban on the use of any hazardous waste in fertilizer production that could possibly be contaminated with dioxin.** At a minimum this ban would prohibit waste from the steel industry, hazardous and municipal waste incinerators (including pulp incinerators) and cement kilns as a raw feed stock for fertilizer production.

- **A moratorium on all waste incorporation into fertilizers** until standards for non-degradation of the soil can be designed and enforced. A policy of non-degradation would limit application of materials to the soil that would result in a net increase of toxics in the soil over a 40 year or longer time period.

- **All raw materials used to produce fertilizers should be tested for toxic constituents.** This requirement would include but would

not be limited to cement kiln dust and mining waste.

- **Full labeling of fertilizers.** Fertilizers derived from toxic waste should be tested for heavy metals, persistent organic poisons, and other toxics, and the results of those tests should be printed on labels on the containers. All fertilizers derived from toxic waste should be labeled as such.

- **Monitoring farms treated with toxic waste derived fertilizers** for leaching of materials from the cropland into the surrounding environment. In addition, a record of use of these chemicals on the land should be retained as an addendum to the land deed in order to inform and protect future purchasers of the land. Farms treated with toxic waste-derived fertilizers could contain high levels of heavy metals and other persistent poisons. These chemicals are some of the most commonly found pollutants at Superfund sites and could create a toxic legacy for generations to come.

Introduction

Every year, polluting industries send millions of pounds of toxic wastes to fertilizer companies, where they are incorporated into commercial fertilizers, and then applied to the nation's farmland. These chemicals include heavy metals like lead and cadmium and carcinogens like dioxin and arsenic. Samples of these fertilizers taken by the Washington State Department of Ecology contained lead and chromium concentrations that were more than 10 and 3 times the respective commercial limits for those types of fertilizer. The state also found dioxin levels that were more than 100 times the state's hazardous waste site cleanup standard.

These toxins are finding their way into the fertilizer supply because of a set of loopholes in hazardous waste laws and haphazard monitoring on the part of regulatory agencies. All of this is carried out under the innocuous banner of "recycling", a crafty way of making a dangerous situation sound benign. In the meantime, farmers and others who buy fertilizers are farming and gardening with hazardous wastes that are not carefully regulated.

Recycling

In its purest form, recycling is a win-win situation. There is immense environmental and economic value in reusing paper to save trees, recycling glass to cut down on landfill space, and recycling heavy metals like mercury rather than sending them to a landfill. It also makes sense to find ways to reuse potentially valuable constituents of the hazardous waste stream rather than losing them to incineration or landfilling. These practices can save money and protect the environment at the same time.

The word "recycling", however, has been handily misused as a seemingly beneficial yet potentially quite harmful method of hazardous waste disposal. Perhaps the best illustration so far is the practice of "recycling" wastes by packaging them into fertilizers. According to the fertilizer industry, up to 40 percent of the nation's micronutrient zinc fertilizer (used in the grain belt and elsewhere to grow America's food supply) doubles as a convenient repository for wastes from heavy industry (Horstmeier 1998). This process saves American industry money by avoiding more expensive but environmen-

According to the fertilizer industry, up to 40 percent of the nation's micronutrient zinc fertilizer doubles as a convenient repository for wastes from heavy industry.

tally safe waste disposal and supplies fertilizer companies with a cheap source of raw materials. According to the analysis in this report, at least 270 million pounds of toxic wastes were recycled by fertilizer manufacturers and facilities listed as "farms" in the TRI between 1990 and 1995.

There are many potential sources of toxics in fertilizer. Information on some potential sources, such as waste from mining and cement kilns, is not currently available to the public. This report examines the information available on the small subset of waste where the generating facilities were required to report the transfers to fertilizer companies and farms. Even with the small amount of information available, these findings demonstrate that toxic waste-laden fertilizers are a national problem that is poorly accounted for by existing regulations. The Environmental Protection Agency (EPA) has acknowledged that there is no systematic testing of all types of fertilizer and there is virtually no information available on entire classes of persistent organic chemicals in fertilizers (EPA 1997).

The Public's Right to Know

Congress passed the Emergency Planning and Community Right to Know Act (EPCRA) in 1986 to make information on toxic chemical release and disposal available to communities across the nation; however, twelve years later, this goal is largely unrealized. A 1991 General Accounting Office report estimated that only 5% of all chemical releases to the environment were accounted for in the TRI, primarily because major sources of toxic pollution are exempt from the reporting requirements, including medical and solid waste incinerators and sewage treatment plants. In addition, very high reporting thresholds block reporting on some of the most hazardous substances known to science, such as lead, mercury, and dioxins. These chemicals are highly toxic in very small quantities, and hazardous releases routinely occur well below levels that trigger reporting requirements.

Another reason for the lack of public knowledge is that federal law (the TRI) does not require reporting on the ultimate uses of toxic chemicals used or produced by industry. Two states, New Jersey and Massachusetts have use reporting requirements. For the other 48 states, however, the public has no information on what toxics are transported to and from industrial facilities, what toxics are found in the workplace, and—perhaps most important—what chemicals ultimately make their way to consumer products.

Chapter 2

Fertilizers Flow Through Loopholes in the Law

The policies that govern the use and disposal of hazardous waste in the United States are codified in a series of statutes and amendments that are commonly referred to as the Resource Conservation and Recovery Act (RCRA). With the passage of RCRA Congress stated the national policy of the United States to be:

> Wherever feasible, the generation of hazardous waste is to be reduced or eliminated as expeditiously as possible. Waste that is nevertheless generated should be treated, stored, or disposed of so as to minimize the present and future threat to human health and the environment.
>
> (42 USC § 6902)

Clearly, using toxic substances as fertilizer does not support this policy.

With the passage of RCRA Congress stated the national policy of the United States to be [that] "wherever feasible, the generation of hazardous waste is to be reduced or eliminated as expeditiously as possible."

Clearly, using toxic substances as fertilizer does not support this policy.

The Current Regulatory System

RCRA Subtitle C outlines two regulatory systems that are applicable to the fertilizer issue. The first is a manifest system designed to track hazardous wastes from the point of generation to ultimate disposal. Under this program, each step in the "life" of toxic waste is catalogued and a "cradle-to-grave" narrative is constructed. The goal of the manifest system is to make it possible to evaluate the flow of toxic wastes and ensure that these substances do not pose a threat to the public health.

The second regulatory system sets standards for the transport, storage, and disposal (TSD) of hazardous materials. The Land Disposal Rule (LDR), one of these regulations, is the definitive source for information concerning the placement of toxic wastes directly in the ground or in hazardous waste landfills. The LDR sets treatment standards for each type of hazardous waste based on what the EPA considers to be most effective treatment method available to hazardous waste treatment facilities. This method is known as the Best Demonstrated Available Technology (BDAT). Before generators can put a hazardous waste into the ground, they need to treat it with a technology that is at least as good as the BDAT standard.

Lead is extremely toxic to the fetal and infant brain.

Arsenic is a carcinogen in humans.

Cadmium is a probable cancer-causing agent in humans.

The K061 Loophole

Although RCRA was designed to protect human health and the environment, there are three major ways in which wastes may be exempted from RCRA regulations and turned into fertilizer. The first is through a specially-designed pathway from steel mills to zinc fertilizer manufacturers. Using this loophole, steel mills can send "K061 Waste", dust from electric arc furnaces, to companies that make zinc micronutrient fertilizers without having to comply with the manifest requirements and the LDR standards.

K061 contains a number of zinc compounds and, because zinc is a trace mineral necessary for plant growth, fertilizer manufacturers have viewed the waste as a good source of raw materials. Unfortunately, K061 waste is also a good source of lead, arsenic, cadmium, and dioxin, highly toxic materials that are not beneficial to plants. Many fertilizer companies do not separate the toxic chemicals from the zinc, creating toxic fertilizer.

The dangers of these chemicals are well known[1].

- **Lead** is extremely toxic to the fetal and infant brain. Levels of lead that are non-toxic to adults can cause permanent learning impairment, lower IQ, and behavioral disorders when exposure occurs in the womb or in early childhood. Lead is also a probable cause of birth defects in humans and may decrease fertility in both men and women. Higher levels may cause aching and weakness in the arms and legs, loss of concentration and memory, and may cause anemia. Lead exposure also increases the risk of high blood pressure.

- **Arsenic** is a carcinogen in humans. It has been shown to cause skin and lung cancer and lymphomas. Some arsenic compounds are known to cause birth defects. Repeated exposure can also damage the liver, cause narrowing of the blood vessels, or interfere with the bone marrow's ability to make red blood cells.

- **Cadmium** is a probable cancer-causing agent in humans. There is evidence that it causes prostate and kidney cancer in humans and it has been shown to cause lung and testes cancer in animals. It also is a probable cause of birth defects in humans and may affect the female reproductive cycle. Repeated low exposures can cause kidney stones and permanent kidney damage.

- **Nickel** refining is associated with an increase in lung, nasal and throat cancers in humans. It also causes lung cancer in ani-

mals. Nickel may damage the developing fetus. Single high or repeated lower exposures may damage lungs, scar lung tissues, and cause damage to the heart, liver, or kidney. Nickel and nickel compounds are acutely toxic to aquatic life and are extremely persistent in water.

- **Dioxin** has been called the most toxic chemical known to science. It is a known human carcinogen, and is suspected of disrupting the endocrine and reproductive systems in humans, contributing to the ongoing increase in birth defects and cancers of the reproductive organs. Dioxin "bio-accumulates" in humans and livestock, building up year after year.

"Use Constituting Disposal" Loophole

The second pathway through which wastes can be recycled into fertilizer is through a set of regulations that the EPA devised to further its pollution prevention and recycling goals. These regulations specify that hazardous materials sent for recycling "in a manner constituting disposal" (e.g.; spreading on a farm field) are exempt from RCRA's manifesting requirements as long as the material meets the LDR for that particular type of waste (40 CFR 266.20). There are two problems with this loophole:

First, exempting wastes from testing requirements if they meet the LDR—if they are treated to a standard equal to the Best Demonstrated Available Technology (BDAT)—assumes that the LDR is designed specifically to protect the human health. Clearly, this is not the case since the BDAT is not based on the danger that a waste poses to the public, but rather how well a particular technology treats it. Human health and risk assessments are not part of the BDAT formula. This means that even those wastes that are tested under the Land Disposal Rule and subjected to treatment equal to the Best Demonstrated Available Technology, may be extremely toxic to humans and are in no way guaranteed to be safe for use as fertilizers.

Second, exempting waste from the manifesting requirements makes it nearly impossible to discover possible mistakes in the testing or in the labeling of wastes. One clear example of this concerns fertilizer made by Bay Zinc, Inc. in Washington State. In 1994, Exeter Energy Limited Partnership (Exeter), a tire incinerator in Sterling, Connecticut, sent hazardous incinerator ash across the country to Bay Zinc without any manifests or testing. Exeter assumed because they were shipping directly to a fertilizer company, that land disposal regulations and manifesting requirements did not apply. Un-

Dioxin has been called the most toxic chemical known to science.

Even those wastes that are tested under the Land Disposal Rule and subjected to treatment equal to the Best Demonstrated Available Technology, may be extremely toxic to humans and are in no way guaranteed to be safe for use as fertilizers.

fortunately, however, millions of pounds of toxic waste were shipped to Bay Zinc before regulators in both states discovered and stopped the practice (See sidebar).

A letter from representatives of the copper, brass, bronze, steel, galvanizing, and fertilizer industries to EPA Administrator Carol Browner in 1997 also illustrates this loophole. In this letter, the industry representatives clearly implied that they had not been complying with RCRA regulations because they felt that they were exempt from these regulations since they were sending their wastes to fertilizer companies for "recycling" (Bowman, et al 1997). They then requested that the agency make this exemption official EPA policy.

The Fertilizer Institute justified this exemption by claiming that micronutrient fertilizer prices would rise dramatically if the metals companies were required to comply with the law (Myers 1997). The EPA denied this request, and instructed all of the industries except for the Steel Industry that they were, indeed, subject to RCRA LDR testing and manifesting requirements (Fields 1997); however, the EPA has yet to take any broad action against the industries.

This incident not only shows how loopholes like the one for K061 can be enlarged but also raises questions regarding the amount of toxic waste sent to fertilizer companies. This correspondence revealed that at least some companies in the metals industries did not report transfers of waste to the fertilizer industry because they thought that they were exempt from RCRA regulations. We may never know how many millions of pounds of undocumented toxic waste these industries shipped to fertilizer makers during this period of non-compliance.

The Land Treatment Loophole

The third pathway through which wastes can be recycled into fertilizer is through a treatment standard called "Land Treatment". According to the EPA, wastes can be treated by application to land when the "hazardous constituents in the waste can be completely degraded, transformed, or immobilized in the treatment zone" (40 CFR 264.271). Wastes subjected to land treatment are neither exempt from the manifesting nor the testing requirements, and the EPA recognizes the hazardous nature of these wastes. Before a land treatment facility can begin operation, it must demonstrate that wastes can be treated "in a manner that protects human health and the environment" (40 CFR 264.272). In theory, this program could be an effective method of treating relatively benign wastes like nitrates; however, in practice, land treatment has become another low-cost method for companies to dispose of all types of wastes.

CAUGHT RED-HANDED
THE EXETER ENERGY LIMITED PARTNERSHIP'S STORY

In 1994, a Connecticut tire incineration facility that legitimately recycled its wastes by sending them to a secondary smelter decided that it could make money on its waste by selling the ash from its operation to a fertilizer company. So, the incinerator, Exeter Energy Limited Partnership, signed a contract with Bay Zinc, a micronutrient fertilizer company in Washington state, to sell up to 550 tons of toxic ash per month.

These transactions continued for three years even though they violated federal environmental laws, because the companies did not believe that they were required to report the sales. Indeed, without the efforts of a Seattle Times journalist, this practice would likely continue today. This case demonstrates the real world need for tracking and testing hazardous wastes bound for fertilizer manufacturers. Since farmers probably used fertilizers that were loaded with toxic metals from this incinerator, this example also demonstrates why consumers need to know what chemicals are in the products that they use.

Under the Resource Conservation and Recovery Act, (RCRA), wastes bound for true recycling operations are considered to be raw materials and are thereby exempt from regulation as solid waste; however, when these wastes are recycled "in a manner constituting disposal"—e.g.; applied to farm fields—the EPA specifically requires them to be treated as waste. This means that the tire ash that was sold to Bay Zinc should have been manifested and tested according to the RCRA Land Disposal Rule.

Companies do not always follow the testing rules. This may be due to a lack of awareness, or a gamble that federal and state regulators will not catch them. The Exeter case in an example where the state agencies lacked the resources to track the wastes in their state. Since Exeter was not listed as a hazardous waste generator with the state—they were instead listed as a recycler—they were not subjected to routine inspections. The company claimed to be unaware of the distinction between the recycling and fertilizer rules and proceeded to send untested waste to Bay Zinc. Bay Zinc, however, should have understood the distinction between "recycling" and "use constituting disposal" and should not have accepted the wastes without having Exeter test it.

Neither company recognized this error while about three years worth of shipments crossed the country. In fact, it was not until a local news reporter brought the practice to light that the shipments stopped (Wilson 1997). In the meantime, Bay Zinc received and processed Exeter's wastes, which the company indicated were "likely to contain lead and cadmium at levels exceeding federal hazardous waste limits" (Connecticut DEP, 1997).

Once this information came to light, the state of Connecticut informed Exeter that testing would be required, but by that time Bay Zinc stepped in. The fertilizer company, perhaps recognizing that the wastes were likely to exceed standards, discontinued their agreement with Exeter.

The risks posed by three years of shipments of lead and cadmium-containing wastes to Bay Zinc are not known. The workers at the fertilizer facility, who did not know the contents of the waste may have been the first to be exposed. Farmers and household gardeners were perhaps the next. Lead or cadmium applied to land may have harmed livestock or impeded plant growth, contaminated nearby streams or aquifers, or it may have been taken up into the plants, ultimately destined for America's tables.

Industries sent more than 174,000 pounds of chromium, 33,000 pounds of lead, and 1,000 pounds of xylene to facilities listed as 'farms' for land treatment or land disposal between 1990 and 1995.

Three recycling loopholes in the law create mechanisms through which toxic materials can flow from heavy industry to fertilizer companies or farms, to farm fields and even the food supply.

According to our analysis, industries sent more than 174,000 pounds of chromium, 33,000 pounds of lead, and 1,000 pounds of xylene to facilities listed as 'farms' for land treatment or land disposal between 1990 and 1995. These substances could not be "completely degraded, transformed, or immobilized" in the soil. These materials would simply evaporate (in the case of xylene), build up in the soil, wash away into a local river or stream, or be taken up by the crops grown on that land.

The legislative requirements of RCRA call for a regulatory system that protects the public health and the environment. The three recycling loopholes in the law create mechanisms through which toxic materials can flow from heavy industry to fertilizer companies or farms, to farm fields and even the food supply.

Note

[1] Sources for toxicological information are the New Jersey Department of Health, Right to Know Program, Hazardous Substances Fact Sheets, EPA's ACQUIRE Database, EPA's 1994 Toxics Release Inventory Public Data Release, and Casarett and Doull's Toxicology: The Basic Science of Poisons, Third Edition. C.D. Klaassen, M.O. Amdur, and J. Doull, Eds. Macmillan Publishing Company, New York.

Findings

According to the EPA, in 1995 the fertilizer industry sold 54 million tons of fertilizer valued at more than 9 billion dollars (EPA 1997). Forty (40) million tons, or 74 percent, of this fertilizer contained zinc, meaning that 74 percent of the nation's fertilizer in that year could have been at least partially derived from steel mill and other industrial toxic waste.

State Rankings

States Sending the Most. Nebraska companies sent the most waste to fertilizer companies and farms between 1990 and 1995, more than 30 million pounds. California and Oregon followed, sending nearly 30 and nearly 26 million pounds to fertilizer companies and farms respectively (Table 7).

States Receiving the Most. Companies in California received the most waste, 37.6 million pounds, between 1990 and 1995. This total makes California a net importer of hazardous wastes for fertilizer-related use. Nebraska and New Jersey followed, with 36.9 and 30 million pounds respectively (Table 8).

Companies sending wastes for use in fertilizers

Nationally, 606 companies sent waste to be "recycled" to fertilizer companies and farms. Of those, Nucor Steel topped the list, sending 26.2 million pounds of waste to fertilizer companies and farms between 1990 and 1995. Atlantic Steel Industries, Inc. and Allco Chemical, Inc. followed, with 17.5 million pounds and 12.7 million pounds, respectively (Table 9).

Nebraska companies sent the most waste to fertilizer companies and farms between 1990 and 1995, more than 30 million pounds. California and Oregon followed.

Industries. Nearly one-third of the waste received by fertilizer companies and farms—79.9 million pounds—came from Steel Works, Blast Furnaces and Rolling and Finishing Mills (SIC 331). The Electronic Components and Accessories industry and the Industrial Organic Chemical industries followed, sending 52.8 and 23.5 million pounds, respectively, during the time period analyzed (Table 10). In total, these three industries account for 57.7% of the wastes tracked to fertilizer companies and farms.

Companies in California received the most waste, 37.6 million pounds, between 1990 and 1995.

Companies receiving wastes

Companies in standard industrial classification codes for fertil-

Table 7. Nebraska manufacturers sent more waste to farms* and fertilizer manufacturers than companies in any other state.

Rank	State	Pounds of Toxic Waste Sent by Companies in State (1990-1995)
1	Nebraska	30,099,831
2	California	29,941,974
3	Oregon	25,862,573
4	Georgia	23,692,539
5	Texas	16,706,742
6	Kansas	16,392,667
7	Illinois	13,988,540
8	New York	10,387,105
9	Louisiana	8,873,327
10	Pennsylvania	8,825,078
11	Indiana	8,134,566
12	Connecticut	7,355,486
13	South Carolina	7,132,152
14	Utah	7,062,696
15	Florida	6,578,650
16	Ohio	5,486,346
17	Arizona	5,445,103
18	Alabama	5,355,789
19	New Hampshire	4,590,347
20	Virginia	3,497,381
21	Michigan	2,853,885
22	Massachusetts	2,835,925
23	Washington	2,783,094
24	North Carolina	2,434,277
25	Missouri	2,143,256
26	Tennessee	1,567,930
27	Delaware	1,537,793
28	New Jersey	1,444,383
29	Minnesota	1,381,209
30	Wisconsin	1,379,401
31	Colorado	1,135,172
32	Arkansas	1,051,841
33	Kentucky	829,853
34	Iowa	629,849
35	West Virginia	482,400
36	Oklahoma	420,220
37	Mississippi	400,337
38	South Dakota	86,786
39	Rhode Island	71,123
40	Idaho	63,520
41	Vermont	57,785
42	Maine	39,830
43	Maryland	37,884
44	Wyoming	16,772

See sidebar, p. 2.
Source: Environmental Working Group. Compiled from EPA Toxics Release Inventory Data (1990-1995).

izer production, as well as companies listed as farms in the TRI, and companies known to make fertilizers as at least part of their activities were included in this analysis. In total, the TRI reports 454 different companies from these categories as receiving wastes for "recycling". Most of these, 381, appeared to be farms, based on the information given in the TRI. In total, however, the percentage these "farms" received was small, only 9 percent of the total amount of waste received.

Phibro-Tech received the greatest amount of waste for "recycling" between 1990 and 1995, more than 35.5 million pounds. Old Bridge Chemical Company and Frit Industries followed with 29.7 and 27.4 million pounds, respectively (Table 11).

The TRI lists 381 farms (see Sidebar, p. 2) receiving over 22.5 million pounds of chemical wastes between 1990 and 1995. Chemicals transferred to these farms include some that could have beneficial uses, such as zinc and ammonia, as well as some that do not, such as lead and chromium (Tables 12 and 13). There is no guarantee that even the most potentially beneficial chemicals did not harm the fields to which they were applied, because the industrial processes could easily have introduced heavy metals and other toxic contaminants. In fact, applications of seemingly harmless ammonia are generally thought

Table 8. Fertilizer companies in just five states received more than half of all toxic waste sent from heavy industry from 1990-1995.

Rank	State	Pounds of Toxic Waste Received by Companies in State (1990-1995)
1	California	37,677,186
2	Nebraska	36,869,240
3	New Jersey	29,733,158
4	Washington	20,863,529
5	Georgia	18,850,273
6	Kansas	15,539,137
7	Virginia	14,755,400
8	Texas	14,657,044
9	Indiana	9,474,890
10	South Carolina	8,864,457
11	Louisiana	8,688,381
12	Tennessee	8,420,719
13	Iowa	7,102,105
14	Illinois	6,726,723
15	Utah	6,186,403
16	Montana	5,599,636
17	Florida	4,790,389
18	North Carolina	3,686,232
19	Oregon	2,318,124
20	Colorado	2,030,826
21	Ohio	1,617,191
22	Wisconsin	1,260,304
23	Arkansas	1,025,447
24	Michigan	725,872
25	Mississippi	718,619
26	Missouri	551,152
27	Pennsylvania	511,984
28	Alabama	391,304
29	Maryland	359,811
30	Massachusetts	346,715
31	Connecticut	294,215
32	New York	144,272
33	West Virginia	98,100
34	South Dakota	93,240
35	Minnesota	76,581
36	Kentucky	39,043
37	Arizona	5,995
38	Oklahoma	220

Source: Environmental Working Group. Compiled from EPA Toxics Release Inventory Data (1990-1995).

Table 9. Five companies were the source of more than one-quarter of the toxic waste sent to farms* and fertilizer companies.

Rank	Company	City	State	Pounds Sent (1990-1995)
1	Nucor Steel	Norfolk	NE	26,219,034
2	Atlantic Steel Ind. Inc.	Cartersville	GA	17,570,000
3	Allco Chemical Corp.	Galena	KS	12,700,750
4	Cascade Steel Rolling Mills	Mc Minnville	OR	12,597,492
5	Hoechst-Celanese Chemical	Pasadena	TX	9,191,044
6	Oregon Steel Mills Inc.	Portland	OR	8,244,876
7	Schuylkill Metals Corp.	Baton Rouge	LA	7,900,000
8	Armco Inc.	Sharon	PA	7,534,950
9	Photocircuits Corp.	Glen Cove	NY	6,764,632
10	H. Kramer & Co.	Chicago	IL	6,427,575
11	Magnesium Corp. of America	Rowley	UT	5,200,000
12	Seidel Inc.	Waterbury	CT	4,558,796
13	Stepan Co.	Elwood	IL	3,590,000
14	Nicca USA Inc.	Fountain Inn	SC	3,589,790
15	Phelps Dodge Magnet Wire No.	El Paso	TX	3,552,361
16	Phibro-Tech Inc.	Union City	CA	3,476,824
17	Bloom 'n' Egg Farm	Bloomfield	NE	3,466,400
18	Metalplate Galvanizing Inc.	Birmingham	AL	3,182,950
19	Metalplate Galvanizing Inc.	Atlanta	GA	3,111,825
20	Gulf Coast Recycling Inc.	Tampa	FL	3,107,716
21	Zycon Corp.	Santa Clara	CA	3,092,642
22	Midstates Wire	Crawfordsville	IN	3,071,509
23	Continental Circuits Corp.	Phoenix	AZ	2,936,918
24	PQ Corp.	Kansas City	KS	2,738,352
25	Harvard Ind. Inc.	Spencerville	OH	2,622,686
26	Nucor Steel	Darlington	SC	2,581,156
27	Philson Inc.	Watertown	CT	2,167,908
28	Ilco Unican Corp.	Rocky Mount	NC	2,054,552
29	Hadco Corp.	Derry	NH	2,022,000
30	Hadco Corp.	Owego	NY	1,972,000
31	Mueller Brass Co.	Port Huron	MI	1,889,966
32	Macklanburg Duncan Co.	Gainesville	GA	1,834,616
33	Cyprus Rod Chicago Inc.	Chicago	IL	1,817,842
34	Herco Tech. Corp.	San Diego	CA	1,796,855
35	Metalplate Galvanizing Inc.	Birmingham	AL	1,607,850

**See sidebar, p. 2.*
Source: Environmental Working Group. Compiled from EPA Toxics Release Inventory Data (1990-1995).

Table 10. Steel mills and electronic component factories were the source of nearly half of all toxic wastes sent to farms* and fertilizer companies.

Rank	Industry	Pounds of Toxic Waste Sent (1990-1995)	Percent of Total
1	Steel Works, Blast Furnaces, And Rolling And Finishing Mills	79,932,179	30%
2	Electronic Components And Accessories	52,812,315	20%
3	Industrial Organic Chemicals	23,538,608	9%
4	Coating, Engraving, And Allied Services	21,690,344	8%
5	Secondary Smelting And Refining Of Nonferrous Metals	20,261,853	8%
6	Rolling, Drawing, And Extruding Of Nonferrous Metals	19,444,463	7%
7	Industrial Inorganic Chemicals	7,915,093	3%
8	Soap, Detergents, And Cleaning Preparations;	7,653,790	3%
9	Miscellaneous Fabricated Metal Products	5,226,688	2%
10	Primary Smelting And Refining Of Nonferrous Metals	5,200,000	2%
11	Meat Products	4,698,921	2%
12	Metal Forgings And Stampings	3,097,307	1%
13	Agricultural Chemicals	2,293,156	0.8%
14	Nonferrous Foundries (castings)	2,226,004	0.8%
15	Petroleum Refining	1,727,987	0.6%

See sidebar, p. 2.
Source: Environmental Working Group. Compiled from EPA Toxics Release Inventory Data (1990-1995).

to be what caused some farm contamination in Washington state. The farms receiving the most chemicals are listed in Table 14 and those that received the most non-beneficial waste are listed in Table 15.

"Recycled" Chemicals Often Travel Far Beyond the "Recycler"

Once a manufacturer sends chemical waste to be recycled, it is difficult for the public to determine its exact disposition. Through the Toxics Release Inventory, one can determine that a transfer occurred, but what happened to the chemical remains unknown. In this report, chemicals sent to be "recycled" in fertilizer plants or farms are considered a potential source of toxics in fertilizers; however, there is no way of knowing their ultimate fate.

The chemical most commonly transferred (by weight) is, not surprisingly, zinc. Industries sent about 90 million pounds of zinc (including all forms of zinc) to fertilizer companies and facilities that appeared to be farms for "recycling" between 1990 and 1995. Copper and sulfuric acid followed with nearly 49 million pounds, and 34.5 million pounds, respectively (Table 16). While these chemicals may have valuable uses, there is a high likelihood that they also contain other unnecessary and possibly toxic con-

Table 11. Fertilizer companies received nearly 250 million pounds of toxic waste from 1990 through 1995.

Rank	Company	Pounds Received (1991-1995)	Percent of Total
1	Phibro Tech Inc.	35,479,808	14%
2	Old Bridge Chemical Company	29,730,992	12%
3	Frit Industries	27,409,394	11%
4	Bay Zinc	20,860,444	8%
5	Tri Chem	17,580,000	7%
6	Albright & Wilson, Inc.	12,048,115	5%
7	Dupont	9,191,044	4%
8	Imc-agrico	8,680,000	4%
9	Jersey Menier Zinc	8,340,424	3%
10	American Microtrace Corporation	8,041,985	3%
11	Nutra-flo	6,844,157	3%
12	American Chemet Corp.	5,599,636	2%
13	Van Waters & Rogers, Inc	5,309,950	2%
14	Thatcher Chemical Co.	5,200,000	2%
15	Phelps-dodge Corp.	5,024,405	2%
16	Rhone Poulenc Basic Chemicals	4,988,171	2%
17	Stoller Chemical Co. Inc.	4,920,327	2%
18	Agri Feed & Seed	3,589,790	1%
19	Midwest Zinc	3,588,727	1%
20	Conserv Inc.	3,107,716	1%
21	Big River Zinc	3,073,655	1%
22	Farmland Industries	2,780,934	1%
23	Chesapeake Products/royster Agricultural	1,947,974	1%
24	Occidental Chemical Corp.	1,457,748	1%
25	Industrial And Agricultural Chemicals	1,269,614	1%

Source: Environmental Working Group. Compiled from EPA Toxics Release Inventory Data (1990-1995).

taminants. The extent and level of this contamination, however, has not been thoroughly evaluated.

Many of the chemicals that travel from industry to the fertilizer manufacturers appear on the surface to be logical raw materials in the making of fertilizers. Examples of this include ammonia, sulfuric acid, and phosphoric acid. Unfortunately the exact contents of these transfers are not always available in the TRI. Many of these wastes come from scrubbers, devices used to remove pollutants from industrial smokestacks. Others are spent or used cleaning materials. As a result, it is quite possible that they contain toxic chemicals other than those that manufacturers reported. An excellent example of this is seen in the case study (see sidebar) where Potlatch Pulp and Paper Company found high levels of mercury in sulfuric acid they purchased from a chemical supplier. The supplier, in turn, had purchased the sulfuric acid from a lead smelter that was "recycling" it. Workers were unaware that the acid contained mercury, and it ultimately ended up in the local sewage treatment plant. From there it likely ended up in the sludge, or in the wastewater discharged to Lake Superior.

Table 12. Over 21 million pounds of toxic waste was applied on farms* as fertilizer.

Chemical	Pounds Received (1990-1995)
Ammonium Nitrate (solution)	10,823,202
Ammonia	7,135,970
Nitrate Compounds	2,714,204
Zinc And Zinc Compounds	362,108
Phosphoric Acid	361,974
Nitric Acid	129,308
Copper And Copper Compounds	5,151
Sulfuric Acid	2,280
Cobalt And Cobalt Compounds	120

**See sidebar, p. 2.*
Source: Environmental Working Group. Compiled from EPA Toxics Release Inventory Data (1990-1995).

Chemicals of Special Concern

Dioxin. One glaring omission in developing the K061 exemption was that EPA considered only metals data. More than just metals contaminate K061 waste. Steel mills are one of the major sources of dioxin, the most toxic chemical known to science; the smokestack dust from these mills is laden with dioxin, as are fertilizers that use K061 as an ingredient. EPA's most recent attempt to address fertilizer safety failed to consider dioxin in K061-derived fertilizers.

A recent study by the State of Washington found dioxin in K061-derived fertilizers at levels higher than allowed at a "cleaned up" Superfund site in the state of Washington.

A recent study by the State of Washington tested various fertilizers and their raw materials for dioxins. They found dioxin in K061-derived fertilizers at levels higher than allowed at a "cleaned up" Superfund site in the state of Washington (State of Washington, 1998). Using this fertilizer could turn farms into Superfund sites with farmers potentially holding the bag for cleaning up dioxin on their farms.

Using this fertilizer could turn farms into Superfund sites.

Table 13. Over 1 million pounds of toxic waste with no fertilizer value were sent from industrial sources directly to farms*.

Chemical	Pounds Received (1990-1995)
Methanol	446,832
Chromium And Chromium Compounds	173,424
Certain Glycol Ethers	140,111
Methylenebis(phenylisocyanate)	103,492
Ethylene Glycol	101,403
Lead And Lead Compounds	33,115
Acetone	9,345
1,2,4-trichlorobenzene	5,825
C.i. Basic Green 4	5,270
Manganese And Manganese Compounds	4,166
1,2,4-trimethylbenzene	2,255
Formaldehyde	1,839
Methyl Ethyl Ketone	1,745
Catechol	1,291
Xylene (mixed Isomers)	1,012
Chloroform	778
Sodium Nitrite	750
Acetaldehyde	580
Phenol	550
Propylene Oxide	490
Chlorine	275
N-butyl Alcohol	270
Biphenyl	270
Cresol (mixed Isomers)	250
Barium And Barium Compounds	176
Nickel And Nickel Compounds	97
Cumene	57
Ethylbenzene	48
Diethanolamine	29
Hydrochloric Acid	15
Dichloromethane	14
P-cresol	9
Chlorine Dioxide	5

**See sidebar, p. 2.*
Source: Environmental Working Group. Compiled from EPA Toxics Release Inventory Data (1990-1995).

Table 14. Over half of the 22 million pounds of toxic waste sent to farms* went to unspecified grasslands in Galena, Kansas.

Rank	Farm	City	State	Pounds Received (1990-1995)
1	Private Rural Grass Lands	Galena	KS	12,700,750
2	Madison Ranch	Echo	OR	806,218
3	Doug Hall	Neligh	NE	546,080
4	B & E Ranch & Grove	Okeechobee	FL	487,862
5	Farm Plots - Landspreading	Richton	MS	400,337
6	Clark Mills	Bloomfield	NE	279,480
7	Various Farmland Listed In Wpd	Juneau	WI	273,330
8	Gary Jessen	Bloomfield	NE	251,680
9	Dean Mackeprang	Bloomfield	NE	230,840
10	Scott Kincaid	Hartington	NE	215,840
11	Ottawa County Farms	Coopersville	MI	200,631
12	Lamb-Weston Inc. Farm	Hermiston	OR	197,000
13	Harkis Farms	Hudson	CO	196,400
14	Les Jessen	Bloomfield	NE	182,360
15	Agri-tech (local Farmers)	Albany	OR	172,860
16	Duane Stelling	Bloomfield	NE	172,440
17	Alvin Dechant	Hudson	CO	163,200
18	Stephen Saufley	Port Republic	VA	162,674
19	DNR Approved Agricultural Site		WI	159,389
20	Stelling Farms	Bloomfield	NE	155,280

**See sidebar, p. 2.*
Source: Environmental Working Group. Compiled from EPA Toxics Release Inventory Data (1990-1995).

Dioxin presents a serious health threat to the U.S. population. According to the most recent U.S. EPA assessment, the average American already consumes 300 to 600 times a safe daily dose of dioxin each day. Newborns receive a lifetime dose of dioxin through breast feeding alone.

Whether or not the use of K061-derived fertilizers has contributed or will contribute to high dietary intake levels is not known. However, not using K061 to make fertilizers could reduce this source of dioxin exposure.

Metals of Concern

Manufacturers transferred more than 6.2 million pounds of lead to fertilizer companies and "farms" during 1990-1995 (Table 17). While we can not be entirely sure that the companies that received these wastes are not also in another business, such as secondary lead smelting, we are sure that manufacturing agricultural

Manufacturers transferred more than 6.2 million pounds of lead to fertilizer companies and farms during 1990-1995.

Table 15. Farms* in Mississippi, Michigan, Missouri, and Florida received the most toxic waste.

Rank	"Farm"	City	State	Pounds of Non-Beneficial Toxic Waste Received (1990-1995)	Cumulative Percent
1	Farm Plots - Landspreading	Richton	MS	400,332	38.6
2	Ottawa County Farms	Coopersville	MI	199,367	57.9
3	Various Farms In Dekalb County		MO	125,200	70.0
4	Coca-cola Foods Florida Gold	Polk City	FL	77,113	77.4
5	Various Farms In Buchanan County		MO	49,700	82.2
6	Various Farms In Andrew County		MO	40,200	86.1
7	Puddin River Farms	Aurora	OR	12,023	87.3
8	Various Farms In Clinton County		MO	11,800	88.4
9	Rosengreen Farms	Boone	IA	9,942	89.4
10	W.k. Doran (farm)	Boone	IA	6,499	90.0
11	Farmers Within 25 Miles Of Gay	Bogalusa	LA	5,598	90.5
12	Rodgerson Farm	Hamilton	NC	5,549	91.1
13	Farms Throughout Eau Claire County		WI	5,422	91.6
14	Hennepin Paper Co. Farm	Royalton	MN	5,270	92.1
15	Farm Land Sites In Georgia		GA	5,000	92.6
16	Various Farmlands In Clarke County		AL	4,655	93.0
17	Bob Johnson Farms	Boone	IA	4,514	93.5
18	Anderson Farms	Boone	IA	4,456	93.9
19	Darrell Crouse Farms	Boone	IA	3,709	94.3
20	Tess Brothers Farms T-1	Almond	WI	3,565	94.6

**See sidebar, p. 2.*
Source: Environmental Working Group. Compiled from EPA Toxics Release Inventory Data (1990-1995).

In addition to lead, manufacturers transferred 1.3 million pounds of chromium, 233,000 pounds of cadmium and 16,000 pounds of mercury to fertilizer companies and farms.

chemicals is at least part of their business.

In addition to lead, manufacturers transferred 1.3 million pounds of chromium, 233,000 pounds of cadmium and 16,000 pounds of mercury to fertilizer companies and farms.

The top companies sending these chemicals to fertilizer companies and facilities that appear to be farms are Nucor Steel in Nebraska, Oregon Steel Mills, in Portland, and Atlantic Steel Industries in Georgia. Together these three companies sent nearly four million pounds of heavy metals to fertilizer companies and facilities that appear to be farms (Table 18).

Fertilizer facilities that received the greatest amount of the chemicals of concern between 1990 and 1995 include a Frit Industries plant in Norfolk, NE (2.2 million pounds), a Bay Zinc plant in Moxee, WA (1.9 million pounds), and a Tri-Chem plant in Atlanta, GA (970 thousand pounds) (Table 19).

Table 16. Farms* and fertilizer companies received more than 270 million pounds of toxic waste from 1990 through 1995.

Rank	Chemical	Pounds Received (1990-1995)
1	Zinc And Zinc Compounds	90,374,599
2	Copper And Copper Compounds	48,820,033
3	Sulfuric Acid	34,590,979
4	Ammonia	25,348,640
5	Phosphoric Acid	17,647,789
6	Ammonium Nitrate (solution)	13,014,399
7	Hydrochloric Acid	6,850,444
8	Diethyl Sulfate	6,317,400
9	Lead And Lead Compounds	6,210,260
10	Manganese And Manganese Compounds	5,322,546
11	Ammonium Sulfate (solution)	3,916,260
12	Nitrate Compounds	3,143,933
13	Chlorine	2,347,346
14	Chromium And Chromium Compounds	1,348,537
15	Nitric Acid	1,223,204
16	Methanol	892,632
17	Ethylene Glycol	555,678
18	Toluene	461,221
19	Tetrachloroethylene	337,353
20	1,1,1-trichloroethane	305,048
21	Biphenyl	272,460
22	Cadmium And Cadmium Compounds	233,106
23	Nickel And Nickel Compounds	212,672
24	Acetone	183,555
25	Certain Glycol Ethers	181,016
26	Dichloromethane	144,477
27	Methyl Ethyl Ketone	138,966
28	Xylene (mixed Isomers)	113,003
29	Aluminum (fume or dust)	103,999
30	Methylenebis(phenylisocyanate)	103,742

*See sidebar, p. 2.
Source: Environmental Working Group. Compiled from EPA Toxics Release Inventory Data (1990-1995).

Table 17. Farms* and fertilizer companies received over 8 million pounds of toxic heavy metals from industrial polluters between 1990 and 1995.

Metal	Pounds Received (1990-1995)
Lead And Lead Compounds	6,210,260
Chromium And Chromium Compounds	1,348,537
Cadmium And Cadmium Compounds	233,106
Nickel And Nickel Compounds	212,672
Mercury And Mercury Compounds	16,666
Arsenic And Arsenic Compounds	223

**See sidebar, p. 2.*
Source: Environmental Working Group. Compiled from EPA Toxics Release Inventory Data (1990-1995).

Table 18. Five steel mills were the source of half of all the toxic heavy metals shipped to fertilizer companies and farms.

Rank	Company Name	City	State	Pounds Sent (1990-1995)
1	Nucor Steel	Norfolk	NE	2,189,481
2	Oregon Steel Mills Inc.	Portland	OR	986,823
3	Atlantic Steel Ind. Inc.	Cartersville	GA	970,000
4	Cascade Steel Rolling Mills	Mc Minnville	OR	905,789
5	Gilbert & Bennett Mfg. Co.	Blue Island	IL	316,250
6	H. Kramer & Co.	Chicago	IL	260,508
7	Law Tanning Co.	Milwaukee	WI	211,556
8	Du Pont	Newport	DE	175,000
9	Macalloy Corp.	North Charleston	SC	168,280
10	Roanoke Electric Steel Corp.	Roanoke	VA	156,403
11	Energizer Power Sys.	Alachua	FL	127,000
12	Law Tanning Co.	Milwaukee	WI	126,958
13	A. L. Gebhardt Co. Inc.	Milwaukee	WI	109,000
14	Saft America Inc.	Valdosta	GA	94,949
15	Blueside Co. Inc.	Saint Joseph	MO	90,300
16	Blackhawk Leather Ltd.	Milwaukee	WI	88,124
17	Florida Steel Corp.	Tampa	FL	72,699
18	Donnelly Corp. JFD S.	Holland	MI	71,585
19	Kearny Smelting & Refining	Kearny	NJ	70,420
20	Nucor-Yamato Steel Co.	Blytheville	AR	64,690

Source: Environmental Working Group. Compiled from EPA Toxics Release Inventory Data (1990-1995).

Table 19. Ten fertilizer plants received more than 90 percent of the total amount of toxic heavy metals.

Rank	Company Name	City	State	Pounds Received (1990-1995)	Percent of Total
1	Frit Industries	Norfolk	NE	2,189,481	27%
2	Bay Zinc	Moxee	WA	1,897,556	24%
3	Tri Chem	Atlanta	GA	970,000	12%
4	Hynite Corp	Oak Creek	WI	595,523	7%
5	Stoller Chemical Co. Inc.	Jericho	SC	462,782	6%
6	Midwest Zinc	Chicago	IL	365,170	5%
7	American Microtrace Corporation	Fairbury	NE	336,867	4%
8	Big River Zinc	Sauget	IL	304,204	4%
9	Old Bridge Chemical Company	Old Bridge	NJ	210,936	3%
10	Occidental Chemical Corp.	Castle Hayne	NC	175,000	2%
11	Industrial And Agricultural Chemicals	Red Springs	NC	82,746	1%
12	Ottawa County Farms	Coopersville	MI	71,585	1%
13	Nutra-flo	Sioux City	IA	57,792	1%
14	Various Farms In Dekalb County		MO	48,400	1%
15	Frit Industries	Walnut Ridge	AR	39,620	1%

Source: Environmental Working Group. Compiled from EPA Toxics Release Inventory Data (1990-1995).

The Recycling Loophole
The Case of Potlatch Pulp and Paper Mill

Many wastes sent to fertilizer companies are chemicals that are necessary raw materials for making certain types of fertilizers. For example, sulfuric acid and ammonia may be used to make ammonium sulfate fertilizer, a source of nitrogen for plants; however, such chemicals are not guaranteed to be pure. Since companies do not always provide data on the purity of their waste chemicals, it is difficult to know whether a transfer of sulfuric acid, for instance, is safe.

To demonstrate the potential problems associated with even the most basic chemicals, we need to step away from fertilizers, and examine the case of Potlatch, a pulp and paper mill in Minnesota. When faced with a potential violation of their Clean Water Act permit due to the high mercury levels in their wastewater, the company audited their production processes in search of the source. As a result of the audit, Potlatch learned that the mercury originated not from their own activities, but from one of the feedstock chemicals, sulfuric acid, used in the bleaching process (Kangas et al. 1996).

If a factory had been directly shipping sulfuric acid to Potlatch to be "recycled", then manifesting would have been required and the problem would have been easily discerned. However, Potlatch had purchased the sulfuric acid from a chemical supplier, which in turn, had received the chemical from a lead smelter for purposes of "recycling" it. Since the waste was recycled, RCRA testing requirements did not apply and Potlatch did not have any easy way of finding the origin of the acid.

According to Potlatch, sulfuric acid can be produced using raw sulfur, but it is also widely produced from the byproduct sulfur dioxide that is captured in "scrubbers" used to reduce air pollution in the petroleum and metal smelting industries (Kangas et al 1996).

There is no way of knowing how frequently situations arise whereby a chemical being "recycled" is severely contaminated with toxic metals or carcinogens like dioxin. Accordingly, the effects of such contaminants on workers, and consumers are even less clear; however, this situation demonstrates that chemicals sent off-site for "recycling" to fertilizer manufacturers and farms may not be as benign as their names might suggest.

How did we get here?

When EPA promulgated recycling rules in 1985, commercial fertilizers derived from hazardous wastes were granted a complete exemption (EPA 1985). At that time, fertilizer companies could use hazardous wastes instead of natural materials to make fertilizers without being subject to regulation under RCRA. In addition, it gave industries like the steel industry a cheap and convenient waste disposal method.

As a result, regulations defined wastes from steel mills, paper mills and other types of facilities depending upon their destination, rather than their chemical content. If wastes were sent to hazardous waste treatment and disposal, they were classified as hazardous waste. But if the wastes were sent to a fertilizer company, destined for somebody's field or garden, the hazardous wastes were categorized as raw materials for making fertilizer.

It was not until after the promulgation of these recycling rules that the EPA solicited comments on whether certain wastes were safe for use in making fertilizer (EPA 1988). Later that year, EPA revised the rules to subject most waste-derived fertilizers to Best Demonstrated Available Technology standards prior to their application to land as a condition of remaining exempt from additional RCRA requirements. After pressure from fertilizer manufacturers, however, K061 waste remained fully exempt from any testing or reporting requirements.

The "Stakeholders"

Most, if not all, of the responses to EPA's request for comments on whether to require testing before wastes are made into fertilizer came from the industries that make fertilizer and their trade association, The Fertilizer Institute (TFI). These companies provided the small amount of data EPA used to decide whether to continue this exemption.

By comparing a small number of fertilizer samples that were made with K061 to a few samples that were not made with K061, the companies argued that both contain high levels of lead and other toxic metals.

What little data were available indicated that fertilizers made with toxic waste were more contaminated with toxic metal impurities than those made without it.

> "As you can tell from the totals, K061 is just as 'pure' and 'safe' as the crude zinc oxide which could be utilized as zinc fertilizer" (Frit Industries 1988).

However, the number of samples of each type of fertilizer were few and highly variable. As a result, no statistically rigorous conclusions could be drawn. The agency averaged the metal levels, and found that in fact, the K061-derived wastes generally contained higher levels of lead, cadmium, and chromium than those made without K061. In fact, the mean concentration of lead in K061-derived samples was over 10,000 parts-per-million higher than the non-K061-derived samples, a difference that was greater than the total lead concentration in many of the non-K061-derived samples. In the case of chromium, the K061-derived fertilizers contained 5 times more chromium than those that the industry claimed were not made from K061 (EPA 1988a). In total, the science in hand at the time of EPA's decision was sparse, but what little data were available indicated that fertilizers made with toxic waste were more contaminated with toxic metal impurities than those made without it.

Fertilizers not made with K061 may still contain toxic chemical contaminants. According to our analysis, many wastes other than K061 are shipped to fertilizer companies. Furthermore, companies shipping K061 occasionally mislabel wastes as K061. For example, Spring Grove Resource Recovery, Inc. in Cincinnati, Ohio sent more than 21 thousand pounds of PCB-laden waste to waste treatment plants across the country, calling it "K061" waste (BRS 1991-1995). This waste was clearly not derived from electric arc furnaces in steel mills and this was probably an administrative mistake; however, the number of facilities that mislabel their waste as K061 and then claim exemption from manifesting remains a mystery.

EPA acknowledges that K061 that comes from steel mill furnaces can contain a wide range of metals (EPA 1988e). In their "BDAT Background Document for K061" they show that the amount of zinc can vary from 3% to 32% of the K061 dust. Metals like chromium can range from less than 1% to 10.6% of the dust (EPA 1988e). While the material with high zinc tends to have lower chromium, and vice versa, EPA does not specify in RCRA that K061 used in fertilizers that are exempt from testing requirements should be the high zinc, low toxic metals variety.

Notably, the Fertilizer Institute (TFI) initially contradicted the claims of individual fertilizer companies that K061 could meet EPA standards. Indeed, TFI was unequivocal in its view that K061 waste would be contaminated with toxic materials at levels deemed unsafe by the EPA.

According to initial comments by The Fertilizer Institute, safety

standards for toxic metal levels in products:

> "cannot be met [by K061] and are, in fact, orders of magnitude away from meeting the proposed standards" (TFI comments as summarized by EPA 1988b)
>
> and
>
> "Even after the K061 is blended with nitrogen, phosphorus, and potassium it will not meet the BDAT leachate concentration levels" (TFI comments as summarized by EPA 1988b).

These comments suggest that the final fertilizer products are so contaminated that if they were wastes, they would require treatment prior to land disposal. K061-derived zinc supplements, however, are exempt from those treatment requirements.

And, no industry comments would be complete without claims of economic collapse:

> "There is not enough 'virgin' zinc material to meet the demand for zinc based fertilizer" (TFI comments as summarized by EPA 1988b)
>
> and
>
> "If the proposed rule, as it now stands, were to go final without changes, it would virtually put them [fertilizer companies] out of business and ... there would be no near term source of similar material at anything close to a reasonable price" (TFI comments as summarized by EPA 1988b).

Comments from the various companies that make these materials, however, disagreed with the Fertilizer Institute. The companies believed that their products would, in fact, meet the required standards:

> "They [Tri-Chem Company] are reasonably certain, however, that once the K061 is blended with other substances to make the zinc fertilizer, it would not fail the proposed BDAT total constituent levels" (Cochrane, 1988c).

As discussed earlier, the EPA decided to continue to allow hazardous K061 waste to be packaged into fertilizers based on a small amount of rather unscientific data provided by the fertilizer industry. The fertilizer companies argued that fertilizers made with natural sources of zinc contained equally high levels of toxic metals; however, even the EPA acknowledged that the data were inconclusive:

> "Because of the large variability in these total metal concentrations, particularly those for lead, and the small data set, the Agency does not feel that it can make a determination as to whether the K061-derived zinc-based fertilizers are product-like based on

The Fertilizer Institute was unequivocal in its view that K061 waste would be contaminated with toxic materials at levels deemed unsafe by the EPA.

> total concentrations of heavy metals without more conclusive data" (EPA 1988a).

And while this should be reason enough to ban the practice of mixing these wastes into fertilizer, the agency concluded:

> "In light of the above, the Agency has decided to continue the exemption for land applications of fertilizers until it receives and/or develops, more data on these fertilizers" (EPA 1988a).

In the meantime, the potential risks of both types of fertilizers to workers, the public, and the environment, were not addressed.

Chapter 5

Conclusions

The goal of RCRA is to manage waste in a manner that protects the environment and the public health. The current regulation of fertilizers clearly fails to meet these objectives.

Factory Farming documents transfers of over 271 million pounds of toxic waste from industry to entities identified in the TRI as farms and fertilizer companies. Unfortunately, the lack of federal reporting requirements makes it impossible to estimate how many pounds of those toxins were actually mixed with fertilizers, where those fertilizers were used, and what effects those fertilizers have had on the food supply.

Test results from a small sample of the fertilizer supply in the State of Washington showed elevated levels of heavy metals and dioxin in fertilizer that was derived from toxic waste, proof that these toxins are being incorporated into the fertilizer supply and creating a potential health hazard. The State of Washington found lead concentrations of up to 11,300 parts-per-million, over 10 times the industry limit for micronutrient fertilizers (CPM 1996). The State also found levels of chromium—a known carcinogen—that were nearly three times the industry limit.

Data from the TRI also support the claim that heavy metals from toxic waste are being incorporated into fertilizer products. Without toxic use reporting requirements, it is impossible, to know for sure how much of a toxic substance is incorporated into fertilizer; however, existing data allow us to perform a simple mass balance analysis.

Table 20 lists the number of pounds of heavy metals that industries reportedly transferred to Bay Zinc in Washington and the number of pounds of these same heavy metals that Bay Zinc reportedly transferred off-site. Because Bay Zinc only makes fertilizers, the difference between the two figures should equal the number of pounds of heavy metals sold in the fertilizer product. According to this analysis, farmers and backyard gardeners received over 300 tons of lead, 41 tons of chromium, 9 tons of nickel, and 41 tons from copper from Bay Zinc between 1991 and 1995.

According to this analysis, farmers and backyard gardeners received over 300 tons of lead, 41 tons of chromium, 9 tons of nickel, and 41 tons from copper from Bay Zinc between 1991 and 1995.

Table 20. Chemicals Bay Zinc received and released (1991-1995).

Chemical	Pounds Received	Pounds Released	Difference
Aluminum and Aluminum Compounds	88,434	0	88,434
Chromium and Chromium Compounds	86,171	0	86,171
Copper and Copper Compounds	91,538	8,322	83,216
Lead and Lead Compunds	1,791,840	212,922	1,578,918
Manganese and Manganese Compounds	2,478,962	4,352	2,474,610
Nickel and Nickel Compounds	19,545	0	19,545
Zinc and Zinc Compounds	16,303,954	102,105	16,201,849

Source: Environmental Working Group. Compiled from EPA Toxics Release Inventory Data (1990-1995).

There is evidence that the toxic materials found in toxic waste-derived fertilizers could make their way from the fertilizer into the crops that are grown on those fields.

Except for cadmium, food has generally not been considered a major source of heavy metal exposure for the general public. However, there is evidence that the toxic materials found in toxic waste derived fertilizers could make their way from the fertilizer into the crops that are grown on those fields (Gavi 1997). This toxic uptake is especially troubling for livestock grazing lands treated with dioxin-laden fertilizers, since cattle easily absorb dioxin and transfer it to milk and beef.

There are many questions surrounding the impacts that toxics in fertilizers may have on the food supply; however, the EPA's recent draft summary of the potential impacts of toxic fertilizers was silent on the issue of food safety. It was also silent on the issue of worker safety and the safety of communities that might be inundated with potentially toxic leachate from poison-treated croplands.

Recommendations

Anyone who uses fertilizer has the right to know what is in it, and whether is was made from toxic industrial waste. But beyond this basic public right to know, health officials need to know what is in the nation's fertilizer in order to protect the nation's food supply, rural communities, and farmers, from toxic chemical contamination. Agricultural authorities, in turn, need an efficient means to monitor possible contamination of the nation's cropland with toxic metals and industrial chemicals.

To achieve these goals we recommend:

- **Expansion of the Toxics Release Inventory** to include full chemical use reporting for all manufacturing, utility, and waste-treatment facilities. The EPA is considering expanding the Toxics Release In-

ventory to include materials accounting requirements as done in New Jersey and Massachusetts. This would be an important first step toward fulfilling the public's right to know about toxic chemicals in their homes, workplaces, and communities.

- **Elimination of the RCRA exemption for K061 waste.** This would close a recycling loophole that allows millions of pounds of heavy metals, carcinogens, and dioxin to be incorporated into fertilizer and applied to farmland.

- **A ban on the use of any hazardous waste in fertilizer production** that could possibly be contaminated with dioxin. At a minimum this ban would prohibit use of waste from the steel industry, hazardous and municipal waste incinerators (including pulp incinerators) and cement kilns as a raw feed stock for fertilizer production.

- **A moratorium on all waste incorporation into fertilizers** until standards for non-degradation of the soil can be designed and enforced. A policy of non-degradation would limit application of materials to the soil that would result in a net increase of toxics in the soil over a 40 year or longer time period.

- **All raw materials used to produce fertilizers should be tested for toxic constituents.** This requirement would include but would not be limited to cement kiln dust and mining waste.

- **Full labeling of fertilizers.** Fertilizers derived from toxic waste should be tested for heavy metals, persistent organic poisons, and other toxics and the results of those tests should be printed on labels on the fertilizer containers. This requirement, and only this requirement, will ensure that individual farmers and gardeners have the information that they need to make informed decisions.

- **Monitoring farms treated with toxic waste derived fertilizers** for leaching of materials from the cropland into the surrounding environment. In addition, landowners should retain, as an addendum to the land deed, a record of use of these chemicals on the land in order to inform and protect future purchasers. Farms treated with toxic waste-derived fertilizers could contain high levels of heavy metals and other persistent poisons. These chemicals are some of the most commonly found pollutants at Superfund sites and could create a toxic legacy for generations to come.

Chapter 6

Methodology

In order to determine the magnitude and geographical extent of transfers of industrial wastes to fertilizers and farms, the Environmental Working Group took advantage of information available in the Toxics Release Inventory (TRI) and the RCRA Biennial Reporting System (BRS).

Unfortunately, no government database exists that contains data on toxic constituents in products such as fertilizers. The analysis is therefore limited in its ability to predict the actual levels of metals and other chemicals in fertilizers. In addition, other limitations in the TRI, including a lack of current data on transfers from utilities, waste incinerators and other exempt industries, small facilities, and facilities using less chemicals than the thresholds for reporting, all contribute to information gaps in this analysis.

Furthermore, the TRI does not require that dioxins in waste be tested for inclusion in TRI, and as a result, dioxins sent off-site for recycling or land application are not accounted for and could not be quantified in this report. Recent studies in Washington state, however, have demonstrated that dioxin is present in fertilizers made with industrial wastes. It is likely that waste from combustion sources such as incinerators and automobile reclamation plants would contain a considerable amount of dioxins.

Data for this analysis were acquired from EPA's TRI database based on off-site transfers for recycling between 1990 and 1995. All receiving facilities having SIC codes pertaining to fertilizers or agricultural chemicals were included in the analysis. In addition, firms that have permits to sell fertilizers in the State of California were also included. Transfers to differently named facilities at the same address were aggregated if it appeared that they were the same company. Facilities were called if there was any doubt as to whether the it handled agricultural chemicals.

We considered toxic waste to either be waste that is considered to be toxic according to the TRI (chemicals that were listed in the TRI during the study period).

There were 381 facilities that received waste and were either listed as "farms" or appeared to be farms based on the pattern of

transfers by a particular generator and the wastes that were transferred. Unfortunately, the TRI data do not include any information on non-manufacturing industries; therefore, it is impossible to say what these "farms" did with these chemicals or if food crops or livestock are grown on these lands. Most of the transfers to these "farms" were for land treatment, though wastes were also sent for "other" recycling and for "other land disposal". No guidance regarding what would qualify as "other land disposal" was available from the EPA. The lack of information concerning where many of these highly toxic chemicals are going is certainly an issue that deserves more investigation.

References

Bowman, Philip, James F. Collins, Gregory Livelli, Joseph Mayer, Dale Peters, James Skillen, and J. Thomas Wolfe. "Letter to EPA Administrator Carol Browner on Behalf of the Metals Industry." 10 June 1997.

"What you get in Micronutrients." CPM: Crop Protection Manager (Midwest Edition). January, 1996.

Environmental Protection Agency. "Hazardous Waste Management System; Definition of Solid Waste." Final Rule. Federal Register, January 4, 1985.

Environmental Protection Agency. 1988a. "Memorandum: background Information/Data on Use of EAF Dust (K061) in zinc-based fertilizers." From Steve Cochran, Environmental Protection Specialist, Review Section, to Land Ban First Third Docket.

Environmental Protection Agency. 1988b. "Memorandum of Meeting with the Fertilizer Institute to Discuss Proposed BDAT standards for K061." From Steve Cochrane, Environmental Protection Specialist, to Land Ban First Third Docket.

Environmental Protection Agency. 1988c. "Memorandum of Meeting with TRI CHEM Company to Discuss Proposed BDAT Standards for K061." From Steve Cochrane, Environmental Protection Specialist, to Land Ban First Third Docket.

Environmental Protection Agency. 1988d. "Land Disposal Restrictions"; Correction. Federal Register, September 6, 1988.

Environmental Protection Agency. 1988e. "Best Demonstrated Available Technology (BDAT) Background Document for K061". James Berlow, John Keenan. EPA/530-SW-88-0130. August 1988.

Environmental Protection Agency. Fertilizers: A Background and Characterization of Use, Contaminants and Regulations. Draft Report. Prepared by Batelle. Office of Pollution Prevention and Toxics. December, 1997.

Fields, Timothy Jr. "Letter to Mr. J Thomas Wolfe Regarding Metals Industry." 1997.

Gavi, F., N.T. Basta, and W.R. Raun. "Wheat Grain Cadmium as Affected by Long-Term Fertilization and Soil Acidity." Journal of Environmental Quality. 26:265-271, 1997.

Horstmeier, Greg D. "Viewpoint: Zinc's Problems are Many." Farm Journal. January, 1998.

Kangas, Kevin W., Tim Tuominen, and Dr. Dianne Dorland. "Mercury Pollution Prevention at a Bleached Kraft Pulp and Paper Mill." Proceedings of the 1996 Technical Association of the Pulp and Paper Industry International Environmental Conference: Volume 1.

Myers, Gary D. "Letter to EPA Administrator Browner from The Fertilizer Institute." 9 May 1997.

State of Connecticut. 1997. "Letter Re: Exeter Energy Limited Partnership, Sterling, Connecticut." To: Laurie Valeriano, Washington Toxics Coalition, From: Richard Barlow, Bureau of Waste Management. December 3, 1997.

State of Washington, 1998. Fact Sheet. "Controlling Metals and Dioxins in Fertilizers." Department of Ecology.

United States General Accounting Office. 1991. "EPA's Toxics Release Inventory is Useful but Can be Improved." GAO/RCED-91-121. 89pp.

Wilson, Duff. "States Expected to Regulate Fertilizer Ingredients." The Seattle Times. 20 February 1988.

Wilson, Duff. "Product or Waste." The Seattle Times. 23 November 1997.

Environmental Working Group Publications

Ordering Information

Please include $3 shipping and handling per report. Washington DC residents add 7% sales tax. Please send a check or money order to EWG, 1718 Connecticut Avenue, NW, Suite 600, Washington, DC 20009 noting which publications you would like to receive. We reserve the right to limit the number of copies of free publications to one per address. Most EWG reports can be downloaded free of charge from EWG's World Wide Web site: www.ewg.org

Pesticides

Overexposed: Organophosphate Insecticides in Children's Food. January 1998. $20.00
Air Monitoring Detects High Levels of Methyl Bromide Near Elementary School in Watsonville. November 1997. Free of Charge.
State's Internal Sudy Showed Danger of Methyl Bromide. August 1997. Free of Charge.
California Study Admits Methyl Bromide Standard Inadequate. May 1997. Free of Charge.
Something's in the Air: Californians Need Better Protection Against Methyl Bromide. March 1997. $20.00.
Toxic Farm Fumigants Drifting Into California Neighborhoods - Study Finds Methyl Bromide in Air in Ventura and Castroville. August 1996. Free of charge.
Heavy Methyl Bromide Use Near California Schools. February 1996. Free of charge.
A Shoppers' Guide to Pesticides in Produce. November 1995. $18.00.
Pesticides in Baby Food. July 1995. $13.00.
Pesticide Industry Propaganda: The Real Story. May 1995. $8.00.
Forbidden Fruit: Illegal Pesticides in the U.S. Food Supply. February 1995. $23.00.
Washed, Peeled, Contaminated: Pesticide Residues in Ready-to-Eat Fruits and Vegetables. May 1994. $10.00.
Trading Away U.S. Food Safety. April 1994. $23.00.
Stemming the Flow: Agrichemical Dealers and Pollution Prevention—Case Studies from the Great Lakes Basin. August 1993. $23.00.

Drinking Water Reports

Tough to Swallow: How Pesticide Companies Profit from Poisoning America's Tap Water. August 1997. $20.00.
Just Add Water. (51) May 1996. $23.00.
Reforming the Safe Drinking Water Act - Violations of Federal Drinking Water Health Standards; 1994 -1995 Congressional District Summary. (46) April 1996. $10.00.
Pouring It On: Nitrate Contamination of Drinking Water. (17) February 1996. $23.00.
Weed Killers by the Glass: Update. September 1995. Free of charge.
Weed Killers by the Glass: A Citizens' Tap Water Monitoring Project in 29 Cities. August 1995. $23.00.
In the Drink. (51) June 1995. $13.00.
Slashing Safe Drinking Water Funds: Losing Jobs & Harming Human Health. March 1995. Free of charge.
Tap Water Blues: Herbicides in Drinking Water. October 1994. $43.00.

Money & Environmental Politics

Last Gasp: Can Polluters buy Congress in the Clean Air Fight? (10) October 1997. $20.00.
New Clean Air Standards Are No Sweat in Florida. September 1997. Free of Charge.
Take More Money... and Run: Will money and politics in the senate have environmental consequences? February 1997. (co-released with Sierra Club) Call Sierra Club at 415-977-5747 to order a copy.
Pay to Spray: Campaign Contributions and Pesticide Legislation. June 1996.

Contributing to Extinction: Political contributions and the attack on the Endangered Species Act. March 1996. $20.00.
Swamped with Cash: Political campaign contributions and the assault on America's wetlands laws. February 1996. $12.00.
Moneyed Waters: Political Contributions and the Attack on the Clean Water Act. May 1995. $13.00.
How Do You Spell Relief? "P-A-C C-A-S-H." PAC Contributions from Project Relief Member Companies and Trade Associations. March 1995. Free of charge.
Pesticide PACs: Campaign Contributions and Pesticide Policy. October 1994. $13.00.

Air Pollution

Catching the Limit: Mercury Contamination of America's Food. (41) December 1997. $10.00.
Last Gasp; Can Polluters buy Congress in the Clean Air Fight? (10) October 1997. $20.00.
New Clean Air Standards Are No Sweat in Florida. September 1997. Free of Charge.
Particle Pollution and Sudden Infant Death Syndrome in the United States. July 1997. $10.00.
Show me the Science. July 1997. Free of Charge.
Industry Deploys New Anti-Environmental Strategy. July 1997. Free of Charge.
Clearing the Air: Scare tactics plant farmers in middle of clean air fight but smokestacks— not plowing— are the Main Problem. June 12, 1997. Free of Charge
People of Color in California Breathe the Most Heavily Polluted Air. June 11,1997. Free of Charge
100,000 California Kids Breathe Unhealthy Air at School. June 4,1997. Free of Charge
Smoke Stacks and Smoke Screens: Big Polluters, Big Profits, and the Fight for Clean Air . (42 states and New England) May 1997. $20.00 for national, $10 per state
The BBQ Grill Gang: Who's opposing EPA's new air pollution rules? February 1997. Free of Charge
Particulate Air Pollution: Human Mortality, Pollution Sources, and the Case for Tougher Clean Air Standards. January 1997. Reports available for Boston, Chicago, Cincinnati, Salt Lake City, Raleigh/Durham and California. $25.00 each.

Farm Policy

Balanced Budget Amendment: Implications for Agriculture. January 1997. Free of Charge
"Freedom to Farm": An Analysis of Payments to Large Agribusiness Operations, Big City Residents, and the USDA Bureaucracy. February 1996. $23.00.
The Cash Croppers: The Top Two Percent of America's Farm Subsidy Recipients 1985-1994. (51) September 1995. $15.00.
District-Level Information on Agricultural Assistance & Impacts of the "3 years out of 5" Requirement in Freedom to Farm. (49) September 1995. Free of charge.
Fox in the Henhouse: Cash, Crime, and Conflict of Interest in Federal Farm Subsidy Programs. (51) June 1995. $15.00.
"Taking" the Taxpayer: Wetlands and Farm Subsidies in Perspective. April 1995. Free of charge.
City Slickers: Farm Subsidy Recipients in America's Big Cities. (52) March 1995. $13.00
Farm Program Payments and Farmland Value in the States Represented on the Senate Agriculture Committee. February 1995. Free of charge.
Faking Takings: Farm Subsidies and Private Property in Perspective. February 1995.
Blowin' in the Wind: How Much Soil Did the CRP Save? November 1994.
Sowing Disaster: The Implications of Farm Disaster Programs for Taxpayers and the Environment. July 1994. $20.00.
Looks Like America? Women, Minorities, and USDA's Farmer Committees. June 1994. $13.00.
So Long, CRP. February 1994. $13.00.
Countdown to Compliance: Implementation of the Resource Conservation Requirements of Federal Farm Law. March 1993. $17.00.

Anti-Environmental Backlash

Industry Deploys New Anti-Environmental Strategy. July 1997. Free of Charge.
Earth Day '97: Industry and organizations make "wise use" of Earth Day. May 1997. Free of Charge
LaRouche and "Wise Use": The fringe of the anti-environmental lobby. April 1997. Free of Charge.
Target Democracy: The effect of anti-environmental violence on community discourse. April 1997. Free of Charge
The BBQ Grill Gang: Who's opposing EPA's new air pollution rules? February 1997. Free of Charge.

How the Biodiversity Treaty Went Down: The Intersecting Worlds of Wise Use and Lyndon LaRouche. October 1994. Free of charge.
A CLEAR View. Monthly June 1994-current, E-mail newsletter on the anti-environmental movement. Free of charge for electronic delivery, $25 per year for faxed delivery.

Other/Transportation Issues

Blind Spot: The Big Three's Attack on the Global Warming Treaty. (51) November 1997. $20.00.
Potholes and Politics: How Congress Can Fix Your Roads. (39) September 1997. $20.00.
Share the Road: Let's Make America Bicycle Friendly. May 1997. (51) National Report $20.00, state reports $10.00 each.
Mean Streets: Pedestrian Safety and Reform of the Nation's Transportation Law. (51) April 1997. National report $20.00, states $10.00 each.
"Congress, We Have A Problem." Earth Day 1996. (38) April 1996. Free of charge.
Protecting Ohio: A New Look at Environmental Quality and Policy. May 1995. $23.00.
Review of the U.S. Environmental Protection Agency: Program Evaluation, Budget Analysis, and Funding Recommendations. May 1994. $43.00.

Toxic Pollutants

Factory Farming: Toxic Waste and Fertilizer in the United States, 1990-1995. (51) March 1998. $20.00 for national report, $10.00 for state editions.
The Other Clean Air Rule: This Time EPA Fails to Protect Public Health (medical waste rule). August 1997. Free of Charge.
First, Do No Harm: Reducing the Medical Waste Threat to Public Health and the Environment. (50) March 1997. $20.00 for national report, $10.00 for state editions.
Petroleum Storage Facilities Should Not be Exempted from the TRI. March, 1997. Free of Charge
Dishonorable Discharge - Toxic Pollution of America's Waters. (50) September 1996. $15.00 for national report, $10.00 for each state.

Wetlands Reports

Swamped with Cash: Campaign contributions and the assault on America's wetlands laws. February 1996. $12.00.
A Review of the Federal Wetlands Permit Program in Nebraska, 1988-1994. December 1995. $5.00.
Much Ado About Nothing: The Federal Wetlands Program in California. April 1995. Free of charge.

1718 Connecticut Avenue, N.W., Suite 600
Washington, DC 20009
tel 202-667-6982 • fax 202-232-2592
info@ewg.org • www.ewg.org