# Toxic Pollution and Health

An Analysis of Toxic Chemicals Released in Communities across the United States

**U.S. PIRG Education Fund** 

linden siddig: "

March 2007

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### **TABLE OF CONTENTS**

Executive Summary	4
Introduction	6
Toxic Releases in the United States	7
Toxic Releases to Air and Water	7
Carcinogens Developmental and Reproductive Toxicants	/ 10
Suspected Neurotoxicants	
Suspected Respiratory Toxicants	
_ Dioxins	
Toxic Releases to Land	24
Bush Administration Weakens the Toxics Release Inventory	27
Backaround: TRI Reporting Reguirements	
Bush Administration Weakens Toxic Release Reporting Requirements	28
Recommendations	30
Methodology	33
Appendices	34
End notes	63

A relatively small number of communities often experience the bulk of the air and water pollution.

- In 2004, almost a quarter (24 percent) of all air and water releases of carcinogens occurred within just 20 U.S. counties. Four Texas counties—Harris, Galveston, Brazoria, and Jefferson ranked in the top five counties for most carcinogenic emissions.
- Tennessee, Texas and Illinois accounted for more than 40 percent of the nation's developmental toxicant releases and more than 70 percent of the reproductive toxicant releases in 2004.
- Almost two-thirds (62 percent) of all air and water releases of dioxins reported to TRI in 2004 occurred within just 20 zip

Every day in America, industrial facilities release millions of pounds of toxic substances into the nation's air and water. Many Americans – especially those who live in dose proximity to industrial facilities – harbor deep concern about how those toxic releases may affect their health.

Congress established the Toxics Release Inventory (TR) program in 1986 as a part of the Emergency Planning and Community Right-to-Know Act (EPCRA). According to the Conference Report from the passage of EPCRA, Congress intended to "provide the public with important information on hazardous chemicals in their communities."<sup>1</sup> Under EPCRA, industrial facilities in specific sectors must disclose to the Environmental Protection Agency (EPA) their releases of approximately 650 toxic chemicals to air, water, and land, as well as the quantities of chemicals they recycle, treat, burn, or otherwise dispose of on-site and off-site.

The primary purpose of the TRI program is to inform citizens, emergency responders, and local and state governments of toxic hazards in communities<sup>2</sup> By providing information on toxic chemical releases, the TRI program

### INTRODUCTION

empowers citizens and local governments to hold companies accountable for how toxic chemicals are used and managed in their communities.

The TRI program has some limitations. Not all industries and facilities have to report their toxic pollution, and those that do report do not have to disclose releases of all chemicals. That said, the TRI program remains a critical tool for citizens and others who are concerned about toxic chemicals released, burned, and otherwise present in their communities. Unfortunately, as described later in this report, the Bush administration finalized a rule in December 2006 that will enable facilities to withhold currently reported toxic chemical information from the public.

This report uses the most recent TRI data available to show which industries are releasing carcinogens and other harmful substances, where, and in what amounts. In doing so, this report also demonstrates something else: the importance of the TRI program for understanding the problem of toxic chemicals in our communities.

### TOXIC RELEASES IN THE UNITED STATES

ndustries across the United States continue to pump billions of pounds of toxic chemicals into our air, land, and water. For some of these chemicals, scientists know little about their potential effects on public health and the environment. In the most recent government study on the subject, EPA found in 1998 that it had the full set of basic toxicity information for only seven percent of the high volume chemicals manufactured in the United States<sup>3</sup> For many chemicals, however, scientists have linked exposure to harmful health effects ranging from chronic bronchitis to developmental problems to cancer.

Using the most recent data from the Toxics Release Inventory, we examined which industries are releasing chemicals known or suspected to cause serious health problems and which communities are bearing the brunt of this pollution. Specifically, we looked at:

Releases of known carcinogens and chemicals known to cause developmental and reproductive problems. California maintains the most comprehensive list available of chemicals known to cause cancer, birth defects or other reproductive problems as part of Proposition 65, an initiative passed by voters in 1986 to inform Californians about their exposure to toxic chemicals.

Releases of suspected neurotoxicants and respiratory toxicants. No government agency maintains an authoritative list of toxic chemicals that are known to cause neurological or respiratory problems. Environmental Defense, however, has compiled a comprehensive list of substances suspected by government or academic researchers to damage the neurological and respiratory systems.

Communities would not know about these toxic chemical releases without the Toxics Release Inventory program, unless facilities opted to voluntarily disclose this information.

#### **TOXIC RELEASES TO AIR AND WATER**

Industries reporting to the Toxics Release Inventory released 1.8 billion pounds of toxic pollution to our air and water in 2004.<sup>4</sup> Scientists have linked exposure to many of these toxic chemicals to severe health effects, including cancer; many more remain understudied and their health effects poorly understood. Since not all industries and facilities report to TRI and those that do report do not have to disclose releases of all chemicals, the following likely understates the problem of toxic pollution in the United States.

#### CARCINOGENS

A carcinogen is a substance that causes cancer, including malignant tumors and other cancerous diseases such as leukemia. The risk of cancer accumulates over a lifetime. In the United States, men have about a 1 in 2 lifetime risk of developing cancer; for women, the lifetime risk is slightly more than 1 in 3.<sup>5</sup> Scientists estimate that exposure to carcinogens in the workplace or the general environment account for at least six percent of cancer deaths, or 33,900 people each year.<sup>6</sup>

Scientists know a great deal about cancer risks from exposure to some substances. Studies have shown that workers exposed to asbestos, for example, have a greater risk of developing lung cancer and malignant mesothelioma.7 Similarly, many studies have shown that radon, which develops from the decay of naturally-occurring uranium in soil and rock and can accumulate in basements and underground unventilated spaces, can cause lung cancer.<sup>8</sup> Based on extensive scientific research, the state of California has listed almost 500 substances as known to cause cancer under Proposition 65. The TR program does not require industries to report their releases of all of these substances

#### **FINDINGS**

In 2004, U.S. facilities reporting to TR released more than 70 million pounds of recognized carcinogens directly to the air and water. Acetaldehyde was the most frequently released carcinogen, with total air and water releases of almost 14 million pounds (Table 1). Acetaldehyde is used primarily as a chemical intermediate, principally for the production of certain acids and other chemicals. Human exposure occurs most often through inhalation, especially in urban areas or near other sources of combustion.<sup>9</sup>

### Table 3. Facilities Releasing the Most Carcinogens to Air and Water, 2004 (pounds)

				Total Air
				and
				Water
Rank	Facility	City	State	Emissions

In 2004, almost one-fifth (18 percent) of all air and water releases of carcinogens reported to TRI occurred within just 20 zip codes Zip code 77590 in Texas City, Texas, the site of several chemical facilities and refineries, ranked first for total releases of carcinogens to air and water, followed by zip code 29440 in Georgetown, South Carolina and 98632 in Longview, Washington (Table 4).

Smilarly, almost a quarter (24 percent) of all air and water releases of carcinogens reported to TRI occurred within just 20 U.S. counties. Four Texas counties—Harris, Galveston, Brazoria, and Jefferson—ranked in the top five counties for most carcinogenic air and water emissions in 2004 (Table 5).

See Appendix B for the 100 U.S. zip codes and Appendix C for the 100 U.S. counties reporting the most carcinogens released to air and water in 2004.

Table 4. Top 10 U.S. Zip Codes for Air and Water Releases of Carcinogens, 2004 (pounds)

				Total Air and
	Zip			Water
Rank	Code	City	State	

system, leading to sterility, spontaneous abortion or stillbirth. The state of California currently lists 40 substances as known to cause reproductive disorders in females and 57 substances known to cause reproductive disorders in males. Again, the TRI program does not require industries to report their releases of all of these substances.

Few chemicals have been fully tested for their impact on the developing fetus In fact, of the nearly 3,000 high production volume chemicals studied by EPA in 1998, threefourths (77 percent) did not have publidy available screening-level information on developmental or reproductive toxicity.<sup>11</sup> In The chemical industry released the most developmental and reproductive toxicants to air and water in 2004, accounting for almost a third (31 percent) of developmental toxicant releases and more than half (57 percent) of reproductive toxicant releases (Tables 8 and 10). Within the chemical industry, the cellulosic manmade fibers sector

Table 11. Facilities Releasing the Most Reproductive Toxicants to Air and Water, 2004 (pounds)

Rank	Facility	City	State	Total Air and Water Emissions
1	LIBERTY FIBERS CORP	LOWLAND	TN	14,410,776
2	TEEPAK LLC	DANVILLE	IL	3,555,300
3	VISKASE CORP	LOUDON	TN	2,226,146
4	VISKASE CORP	OSCEOLA	AR	1,428,423
5	SPONTEX INC.	COLUMBIA	TN	1,308,128
6	INNOVIA FILMS INC	TECUMSEH	KS	951,757
7	U.S. AIR FORCE DYESS AFB	DYESS AFB	TX	524,899
8	COLUMBIAN CHEMICALS CO	PROCTOR	WV	486,973
9	3M CO TONAWANDA	TONAWANDA	NY	406,000
10	COLUMBIAN CHEMICALS CO	ULYSSES	KS	359,006

Tennessee ranked first in overall releases of both developmental and reproductive toxicants, followed by Texas and Illinois (Figures B and C). These three states accounted for more than 40 percent of the nation's developmental toxicant releases and more than 70 percent of the reproductive toxicant releases. Tennessee, home to several facilities in the rubber and printing industries fadility releasing the most and the developmental and reproductive toxicants, contributed almost a quarter (24 percent) of the nation's releases of developmental toxicants and almost half (48 percent) of the nation's releases of reproductive toxicants. See Appendices D and E for a list of all states with facilities releasing developmental and reproductive toxicants to air and water in 2004.

Figure B. Air and Water Releases of Developmental Toxicants by State, 2004



Note: Hawaii reported 32,000 pounds of developmental toxicants released to air and water in 2004; Alaska reported almost 58,000 pounds.

See Appendices F and G for a list of the 100 zip codes reporting the most releases of developmental and reproductive toxicants, respectively, to air and water in 2004.

Table 13. Top 10 U.S. Zip Codes for Air and Water Releases of Reproductive Toxicants, 2004 (pounds)

Rank	Zip Code	City	State	Total Air and Water Emissions
1	37778	LOWLAND	TN	14,410,776
2	61832	DANVILLE	IL	3,555,300
3	37774	LOUDON	TN	2,226,209
4	72370	OSCEOLA	AR	1,428,423
5	38401	COLUMBIA	TN	1,308,478
6	66542	TECUMSEH	KS	951,849
7	79607	DYESS AFB	TX	524,899
8	26055	PROCTOR	WV	486,973
9	14150	TONAWANDA	NY	416,892
10	67880	ULYSSES	KS	359,006

Smilarly, 43 percent of all air and water releases of developmental toxicants reported to TRI occurred within just 20 U.S. counties. Four Tennessee counties-Hamblen, Loudon, Dickson, and Maury-ranked in the top 10 counties for most air and water emissions of developmental toxicants in 2004 (Table 14). Almost 80 percent of all air and water releases of reproductive toxicants occurred within just 20 U.S. counties. Three counties in Tennessee and three in Texas landed in the top 10 for most releases of reproductive toxicants (Table 15).

See Appendices H and I for a list of the 100 counties releasing the most developmental and reproductive toxicants, respectively, to air and water in 2004.

Table 14. Top 10 U.S. Counties(Tab

irritability, and other behavioral changes as well as degenerative diseases of the brain (encephalopathy). Chemicals that harm the peripheral nervous system may affect how nerves carry sensory information and motor impulses from the brain to the rest of the body, leading to weakness or tingling in the limbs and loss of coordination.<sup>15</sup>

No government agency maintains an authoritative list of neurotoxicants.



Figure D. Air and Water Releases of Suspected Neurotoxicants by State, 2004

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(pounas)

				Total Air and
Rank	Zip Code	Citv	State	Water Emissions

#### SUSPECTED RESPIRATORY TOXICANTS

Exposure to certain toxic substances can cause adverse effects on the respiratory system ranging in severity from irritation to bronchitis to cancer. The link between exposure to asbestos fibers and cigarette smoke and disorders such as lung cancer and emphysema is well documented. In addition, exposure to ground ozone, a common air pollutant, has been linked to the onset of asthma attacks and to the development of asthma itself.20 As is the case with neurological disorders, the respiratory impacts of most toxic substances have been subject to less study, and no government agency has compiled a definitive list of respiratory toxicants. Environmental Defense, however, has compiled a list of suspected respiratory toxicants based on a variety of scientific sources<sup>21</sup> The TR program does not require industries to report their releases of all of these substances.

#### FINDINGS

In 2004, facilities reporting to TR released almost 1.5 billion pounds of suspected respiratory toxicants directly to the air. Aerosols of hydrochloric add were released in the greatest quantities, representing more than one of every three pounds of suspected respiratory toxicants released in 2004 (Table 21). Hydrochloric acid is used for deaning, pickling, and electroplating metals in refining mineral ores, in petroleum well extraction; in leather tanning; and in producing polymers and plastics, rubber, fertilizers, dyes, and pigments<sup>22</sup> Bectric power plants also release hydrochloric acid to the air in large quantities. Hydrochloric acid is highly corrosive and irritating to the eyes and the respiratory tract. Chronic occupational exposure has been linked to gastritis, chronic bronchitis and dermatitis in workers, while long-term, low-level exposure has been linked to dental erosion.23

Table 21. Suspected Respiratory Toxicants Released
in the Highest Volume to the Air, 2004 (pounds)

Rank	Chemical	Total Air Emissions
1	HYDROCHLORIC ACID AEROSOLS	558,372,304
2	METHANOL	166,647,387
3	SULFURIC ACID AEROSOLS	140,715,422
4	Ammonia	129,307,197
5	HYDROGEN FLUORIDE	71,954,379

The electric services industry, which indudes electric power plants, was responsible for greatest releases of suspected the respiratory toxicants in 2004 (Table 22). This industry accounted for 46 percent of all suspected respiratory toxicant releases nationwide and 90 percent of all releases of hydrochloric acid. Nine of the 10 facilities releasing the most respiratory toxicants were power plants (Table 23). Since coal contains trace amounts of chloride, coal-burning electric utilities release chloride into the air. which can combine with hydrogen in the air to form hydrogen chloride. Upon contact with water, the hydrogen chloride forms hydrochloric acid.<sup>24</sup>

Table 22. Industries Releasing the Most Suspected Respiratory Toxicants to Air, 2004 (pounds)

		Total Air and Water
Rank	Industry	Emissions

Table 23. Facilities Releasing the Most Suspected Respiratory Toxicants to Air, 2004 (pounds)

Rank	Facility	City	State	Total Air Emissions
		NEW	TN	17.010.00/
1	U.S. IVA JOHNSONVILLE FOSSIL PLANI	JOHN2ONVILLE	IN	17,048,396
2	RELIANT ENERGY KEYSTONE POWER PLANT	SHELOCTA	PA	16,403,890
3	AMERICAN ELECTRIC POWER AMOS PLANT	WINFIELD	WV	15,708,386
4	BOWEN STEAM ELECTRIC GENERATING PLANT	CARTERSVILLE	GA	15,457,168
5	LIBERTY FIBERS CORP	LOWLAND	TN	14,769,926
6	AMERICAN ELECTRIC POWER KAMMER/ MITCHELL PLANTS	MOUNDSVILLE	WV	14,272,016
7	DUKE ENERGY BELEWS CREEK STEAM STN	BELEWS CREEK	NC	13,661,595
8	MARSHALL STEAM STATION	TERRELL	NC	13,571,617
9	CAROLINA POWER & LIGHT CO ROXBORO Steam electric plant	SEMORA	NC	12,160,544
10	PROGRESS ENERGY CRYSTAL RIVER ENERGY Complex	CRYSTAL RIVER	FL	11,960,774

Ohio, North Carolina, Tennessee, Texas and Pennsylvania ranked highest in respiratory toxicant releases to air in 2004 (Figure E). Zip code 37134 in New Johnsonville,

leasing the Most Dioxins to er, 2004 (grams)

	Total Air
	and
	Water
ustry	Emissions
roducts	1,291.33
ary Services	606.55
cts	208.30
es	192.70
lucts, Except Furniture	189.77

easing the Most Dioxins to er, 2004 (grams)



These dioxin releases are quite concentrated within a relatively small number of localities, especially in the Gulf of Mexico region. In 2004, almost two-thirds (62 percent) of all air and water releases of dioxins reported to TR occurred within just 20 zip codes (Table 28). Zip code 77541 in Freeport, Texas saw the highest releases of dioxins to air and water, followed by zip codes in Plaquemine, Louisiana, La Porte, Texas, and Dixville Notch, New Hampshire. Similarly, almost 65 percent of all air and water releases of dioxins occurred within just 20 counties, half of which are located in the Gulf region (Table 29).

See Appendix Q for a list of the 100 zip codes and Appendix R for the 100 counties reporting the most dioxin releases to the air and water in 2004. Table 28. Top 10 U.S. Zip Codes for DioxinReleases to Air and Water, 2004 (grams)

				Total Air
				and
	Zip			Water
Rank	Code	City	State	Emissions

The mining industry dominates land releases of carcinogens, developmental toxicants and reproductive toxicants - largely due to the on-site land disposal of hundreds of millions of pounds of compounds including lead, arsenic and chromium. We decided to separate the toxic releases to air and water from the toxic releases to land because most mining facilities are in remote locations with a small surrounding population. Although the mining industry's pollution poses long-term threats to the environment and public health, the massive releases of toxic substances to land would have deemphasized the threats posed by less voluminous air and water discharges nationwide.

In 2004, facilities reporting to TR released more than 608 million pounds of cardinogens. developmental toxicants or reproductive toxicants to land. Land releases indude all the chemicals disposed on land within the boundaries of the reporting facility and can indude landfills, on-site surface impoundments (uncovered holding ponds), land treatment, and accidental spills or leaks. The metal mining industry, led by the lead and zinc, gold, silver, and copper sectors, was responsible for about 485 million pounds (80 percent) of these releases (Table 30). The electric services sector had the largest non-mining sector releases to land.

The 10 facilities releasing the most toxic substances to land belong to the metal mining industry, led by the Red Dog mine in Kotzebue, Alaska and the Coeur Rochester mine in Lovelock, Nevada (Table 31).

#### Table 30. Industries with Most Land Releases of Carcinogens, Developmental Toxicants and Reproductive Toxicants, 2004 (pounds)

		Total On- Site Land
Rank	Industry	Releases
1	Metal Mining	485,420,236
2	Electric, Gas, and Sanitary Services	85,267,251
3	Primary Metal Industries	21,476,222
4	Chemicals and Allied Products	9,439,722
5	National Security and International Affairs	2,279,833
6	Coal Mining	1,420,598
7	Stone, Clay, Glass, and Concrete Products	1,050,941
8	Nonclassifiable Establishments	889,779
9	Paper and Allied Products Electronic and Other Electrical Equipment/	449,465

10

hyperactivity disorder, and deficits in vocabulary, fine motor skills, reaction time, and hand-eye coordination.<sup>26</sup> The developing brains and nervous systems of children are particularly sensitive to the damaging effects of lead.

Table 32. Carcinogens, Developmental Toxicants and Reproductive Toxicants Released in the Highest Volume to Land, 2004 (pounds)<sup>27</sup>

Rank	Chemical

The largest land releases of cardinogens, developmental toxicants and reproductive toxicants occurred in relatively remote areas. As shown in Table 33, zip code 99752, located 90 miles north of Kotzebue, Alaska and home to the Red Dog zinc and lead mine, ranked first for total releases of these substances to land, followed by zip code 89419 in Lovelock, Nevada (home to the Coeur Rochester silver mine) and 84006 in Copperton/ Bingham Canyon, Utah (home to the Kennecott Utah copper mine). Four Nevada counties-Pershing, Humboldt, Eko, and Eureka-fell in the top 10 counties with the most land releases of cardinogens, developmental toxicants and reproductive toxicants (Table 34).

See Appendix T for a list of the 100 zip codes and Appendix U for the list of the 100 counties reporting the most land releases of carcinogens, developmental toxicants and reproductive toxicants in 2004.

#### Table 33. Top 10 U.S. Zip Codes for Land Releases of Carcinogens, Developmental Toxicants and Reproductive Toxicants, 2004 (pounds)

Rank	Zip Code	City	State	Total On- Site Land Releases
1	99752	KOTZEBUE	AK	135,329,476
2	89419	LOVELOCK	NV	85,322,626
		BINGHAM CANYON/		
3	84006	COPPERTON	UT	53,818,352
4	89414	GOLCONDA/MIDAS	NV	42,382,733
5	89803	ELKO	NV	35,016,558
6	89438	VALMY	NV	23,485,855
7	89822	CARLIN	NV	18,790,206
8	63629	BUNKER	MO	13,358,616
9	65440	BOSS	MO	12,435,901
10	84044	MAGNA	UT	11,398,156

Table 34. Top 10 U.S. Counties for Land Releases of Carcinogens, Developmental Toxicants and Reproductive Toxicants, 2004 (pounds)



energy recovery), while the Form A does not." $^{31}$ 

The Form R reports supply the critical data that enables TRI users to assess when toxic substances are released, where releases occur and in what amounts. Form A only serves to warn the public that a toxic chemical is present at a facility without providing any additional information.

FORM A CERTIFICATION STATEMENT EE

substance disposed or released to the environment does not exceed 2,000 pounds<sup>36</sup> The new reporting threshold increases by a factor of ten the point at which facilities must report to EPA and will allow facilities to release four times the amount of a toxic chemical without reporting the release to EPA. Accordingly, the raised have improved the reliability and reduced the cost of continuous monitoring devices, and many facilities already use such devices to monitor pollution.

#### **REFORM CHEMICALS POLICY**

Chemicals that are untested or known to be hazardous to human health should not be on the market or in widespread use and distribution. U.S. chemicals policy should ensure that manufacturers and industrial users provide regulatory agencies and the public with adequate information about their products so that agencies can act to protect public health from potentially dangerous substances before damage is done. All data analyzed for this report are from the EPA's Toxics Release Inventory. Subsequent amendments to TRI reports made by industry following EPA's release of the 2004 reporting year data may not be reflected in this analysis. We only looked at releases in the 50 states and the District of Columbia and excluded releases in U.S. territories.

#### Health Effects

We looked at all of the chemicals and substances reported in 2004 to TRI and categorized them by health effect. We used California's Proposition 65 list, current as of December 8, 2006, to categorize chemicals as carcinogens, developmental toxicants and/or reproductive toxicants. To identify suspected neurological and respiratory toxicants, we used Environmental Defense's Scorecard.org website. Environmental Defense's lists are based primarily on information compiled by EPA, the National Institute for Occupational Safety and Health, the states of California, Massachusetts and New Jersey, and European government agencies, as well as toxicological studies published in scientific journals. In a small number of cases, Environmental Defense conducted supplementary review to identify any remaining potential human health hazards<sup>39</sup> See Appendix V for a list of the chemicals included in this report and associated health effects.

Not all chemicals reported to TRI in 2004 fell into these five categories of health concern and therefore are excluded from this report. Some of the excluded chemicals may cause other health effects, ranging from skin disorders to endocrine disruption; other chemicals have little toxicity data available.

In cases in which a single chemical was listed, but TRI reports only releases by chemical

### METHODOLOGY

dass, we assumed the entire dass causes the listed health effect. For example, releases of polycydic aromatic compounds are reported to TRI as a dass, even though they are listed separately on California's Proposition 65 list. Also, some chemicals are listed as toxic in certain forms on the Proposition 65 list, but their releases are reported to TRI in the aggregate. For "technical example. several grade" chemicals are listed as cardinogens under Proposition 65, but TRI does not make a similar distinction. Because there is no way to resolve this mismatch, we assumed all substances reported to TRI that are listed on Proposition 65 cause the listed health effect.

In cases in which an elemental form of a substance was on the Proposition 65 list, we assumed compounds including the substance also cause the listed health effect. Two specific examples bear mentioning. Proposition 65 indudes lead and cadmium as developmental and reproductive toxicants. but not their compounds. Environmental Defense lists lead compounds as recognized developmental and reproductive toxicants and cadmium compounds as suspected developmental and reproductive toxicants based on the indusion of their elemental forms on the Proposition 65 list. This analysis indudes both lead compounds and cadmium compounds in our list of developmental and reproductive toxicants.

#### Industry Analysis

Industry analysis is based on the primary, four-digit Standard Industrial Classification (SIC) codes reported by the facilities to TRI. We grouped each facility by its major industry (the first two numbers of the SIC code) as defined by the U.S. Department of Labor.<sup>40</sup> Some facilities did not report primary SIC codes and were excluded from the industry analysis Appendix A. Air and Water Releases of Recognized Carcinogens, 2004: By State



Appendix B. 100 U.S. Zip Codes Reporting the Most Air and Water Releases of Carcinogens, 2004



## Appendix C. 100 U.S. Counties Reporting the Most Air and Water Releases of Carcinogens, 2004

Donk	Country	Stata	Total Air and Water Emissions
Kdlik 1		State	(pounds)
1			2,007,944
2	GALVESTUN	17	2,383,244
3		3U TV	1,032,990
4 E			928,811
5	JEFFERSON	IX	927,624
6	JEFFERSON	KY	832,951
/		WA	/56,248
8	PALM BEACH	FL	/26,365
9	MORGAN	AL	/0/,188
10	MONROE	NY	672,782
11	MONIGOMERY	PA	619,606
12	ORANGEBURG	SC	567,681
13	POSEY	IN	531,148
14	TAYLOR	TX	524,899
15	SEDGWICK	KS	518,739
16	CHESTER	SC	503,832
17	СООК	IL	500,006
18	SUFFOLK	MA	492,223
19	FLATHEAD	MT	475,987
20	LINN	OR	464,337
21	GASTON	NC	458,712
22	MACON	L	448,962
23	NUECES	TX	436,117
24	ST CHARLES	LA	426,739
25	ASCENSION	LA	423,132
26	BERKELEY	SC	421,875
27	FREDERICK	VA	416,317
28	ST JOHN THE BAPTIST	LA	415,422

## Appendix D. Air and Water Releases of Recognized Developmental Toxicants, 2004: By State

Rank	State	Total Air Emissions (pounds)	Total Surface Water Emissions (pounds)	Total (pounds)	Rank	State	Total Air Emissions (pounds)	Total Surface Water Emissions (pounds)	Total (pounds)
1	TN	23,549,316	36,574	23,585,890	27	NJ	572,522	1,682	574,204
2	TX	9,040,947	265,430	9,306,377	28	CT	530,142	250	530,392
3	IL	6,481,819	11,021	6,492,840	29	MA	467,136	178	467,314
4	IN	4,083,409	16,769	4,100,178	30	OR	449,738	6,054	455,792
5	NC	3,752,033	7,718	3,759,751	31	NV	336,982	30,017	366,999
6	SC	3,731,802	15,055	3,746,857	32	WA	338,866	3,930	342,796
7	VA	3,623,611	15,040	3,638,651	33	UT	220,318	6,783	227,101
8	LA	3,238,219	33,892	3,272,111	34	MD	225,541	568	226,109
9	MS	3,182,851	1,771	3,184,622	35	NE	197,842	112	197,954
10	MI	3,113,824	6,557	3,120,381	36	AZ	175,633	44	175,677
11	КҮ	2,917,524	12,174	2,929,698	37	CO	171,688	26	171,714
12	PA	2,802,885	6,994	2,809,879	38	NM	158,597	576	159,173
13	OH	2,524,573	12,940	2,537,513	39	SD	156,905	693	157,598
14	AR	2,436,581	2,219	2,438,800	40	NH	123,183	118	123,301
15	KS	2,346,709	4,698	2,351,407	41	RI	108,911	33	108,944

## Appendix E. Air and Water Releases of Recognized Reproductive Toxicants, 2004: By State

			Total					Total	
		Total Air	Water				Total Air	Water	
Rank	State	Emissions (pounds)	Emissions (pounds)	Total (pounds)	Rank	State	Emissions (pounds)	Emissions (pounds)	Total (pound
1	TN	18,114,657	10,533	18,125,190	27	WA	64,670	3,834	68,
2	TX	4,838,506	17,520	4,856,026	28	UT	51,455	1,523	52,
3	IL	3,929,176	7,358	3,936,534	29	NM	47,187	571	47,
4	AR	1,479,094	2,130	1,481,224	30	ND	38,706	485	39,
5	KS	1,393,391	4,399	1,397,790	31	AK	32,674	196	32,
6	LA	1,274,970	33,217	1,308,187	32	MN	29,503	3,274	32,
7	WV	741,012	23,650	764,662	33	WY	32,108	20	32,
8	OH	636,324	4,485	640,809	34	CO	30,771	26	30,
9	NY	492,074	3,268	495,342	35	MT	26,015	399	26,
10	AL	443,222	11,115	454,337	36	AZ	21,018	4	21,
11	PA	424,530	3,975	428,505	37	DE	13,225	6,969	20,
12	FL	422,603	1,664	424,267	38	MD	18,042	254	18,
13	MI	387,123	4,456	391,579	39	MA	17,029	77	17,
14	MO	352,081	8,871	360,952	40	HI	16,559	51	16,
15	IN	304,433	7,687	312,120	41	OR	11,454	3,116	14,
16	КҮ	289,125	3,362	292,487	42	NE	14,151	110	14,
17	VA	256,627	3,316	259,943	43	ID	10,676	686	11,
18	NJ	76,323	131,130	207,453	44	NV	7,878	0	7,
19	ОК	181,813	352	182,165	45	ME	4,878	1,390	6,
20	WI	165,414	1,345	166,759	46	CT	5,567	242	5,
21	GA	150,555	2,256	152,811	47	RI	3,380	21	3,
22	SC	132,031	11,159	143,190	48	SD	2,308	693	3,
23	IA	114,113	5,957	120,070	49	NH	1,913	118	2,
24	CA	104,540	567	105,107	50	VT	37	15	
25	MS	90,267	1,849	92,116	51	DC	0	0	
26	NC	77,407	2,232	79,639	Natior	nal	37,372,615	331,927	37,704,5

Appendix F. 100 U.S. Zip Codes Reporting the Most Air and Water Releases of Developmental Toxicants, 2004

## Appendix G. 100 U.S. Zip Codes Reporting the Most Air and Water Releases of Reproductive Toxicants, 2004

Rank	Zip Code	City	State	Total Air and Water Emissions (pounds)
1	37778	LOWLAND	TN	14,410,776
2	61832	DANVILLE	IL	3,555,300
3	37774	LOUDON	TN	2,226,209
4	72370	OSCEOLA	AR	1,428,423
5	38401	COLUMBIA	TN	1,308,478
6	66542	TECUMSEH	KS	951,849
7	79607	DYESS AFB	TX	524,899
8	26055	PROCTOR	WV	486,973
9	14150	TONAWANDA	NY	416,892
10	67880	ULYSSES	KS	359,006
11	77530	CHANNELVIEW	TX	340,276
12	77536	DEER PARK	TX	323,715
13	33439	BRYANT	FL	288,050
14	35601	DECATUR	AL	274,209
15	79066	PAMPA	TX	245,776
16	77511	ALVIN	TX	239,873
17	70079	NORCO	LA	239,052
18	48131	DUNDEE	MI	231,924
19	70538	FRANKLIN/LOUISA	LA	188,064
20	77017	HOUSTON	TX	187,996

Appendix H. 100 U.S. Counties Reporting the Most Air and Water Releases of Developmental Toxicants, 2004



## Appendix I. 100 U.S. Counties Reporting the Most Air and Water Releases of Reproductive Toxicants, 2004

			Total Air and Water Emissions
Rank	County	State	(pounds)
1	HAMBLEN	TN	14,410,776
2	VERMILION	IL	3,593,888
3	LOUDON	TN	2,226,211
4	MISSISSIPPI	AR	1,429,962
5	HARRIS	TX	1,351,884
6	MAURY	TN	1,309,932
7	SHAWNEE	KS	951,860
8	JEFFERSON	TX	588,806
9	TAYLOR	TX	524,899
10	MARSHALL	WV	494,578
11	BRAZORIA	TX	489,610
12	ERIE	NY	422,397
13	GRANT	KS	359,006
14	ST CHARLES	LA	297,427
15	PALM BEACH	FL	288,288
16	ORANGE	TX	285,062
17	MORGAN	AL	274,651
18	NUECES	TX	253,922
19	GRAY	TX	246,229
20	MONROE	MI	233,019
22	ST MARY	LA	206,417
23	HUTCHINSON	TX	193,225
24	BEDFORD	VA	166,292
25	SMITH	TX	156,549
26	LORAIN	OH	148,553
27	PIKE	MO	141,343
28	SALEM	NJ	136,154
29	CALCASIEU	LA	124,039
30	PLEASANTS	WV	120,637
31	EAST BATON ROUGE	LA	120,473
32	ALLEGHENY	PA	117,034
33	HOWARD	TX	112,847
34	HARRISON	TX	106,413
35	WEST BATON ROUGE	LA	105,225
36	EVANGELINE	LA	95,363
37	HENDRY	FL	88,782
38	IBERVILLE	LA	87,815
39	JEFFERSON	KY	87,807
40	LAKE	IN	84,995
41	MADISON	IL I	80,998
42	CLINTON	IA	80,863
43	WOOD	OH	77,441
44	MONTGOMERY	KY	77,250
45	PORTER	IN	74,577
46	BROOKE	WV	71,149
47	ASHTABULA	OH	70,236
48	IRON	MO	66,138
49	ASCENSION	LA	65,276
50	DELAWARE	PA	63,999
51	REYNOLDS	MO	63 266

5		o	Total Air and Water Emissions
Rank	County	State	(pounds)
52	WAUPACA	WI	62,594
53	ST BERNARD	LA	62,181
54	ELLIS	TX	60,326
55	DAVIDSON	TN	60,115
56	PLAQUEMINES	LA	58,944
57	MOBILE	AL	54,889
58	LOS ANGELES	CA	54,292
59	WAYNE	MI	53,775
60	JEFFERSON	MO	53,774
61	JACKSON	MS	52,013
62	PHILADELPHIA	PA	51,718

PINE BLUFF Tc1.6878	T <b>U</b> 7.7s8	AR 0.218(6A4,6T)2.2(	4,610,770 )1V132395.8(	)-8(LA)56	BL-1443.2(\$,397	) <b>]</b> J6(670.98	537.66	20827401	47998	ref70.98	528.

Appendix L. 100 U.S. Counties Reporting the Most Air and Water Releases of Suspected Neurotoxicants, 2004



Appendix N. 100 U.S. Zip Codes Reporting the Most Air Releases of Suspected Respiratory Toxicants, 2004

	Zip			Total Air Emissions
Rank	Code	City	State	(pounds)
1	37134	NEW JOHNSONVILLE	TN	17,185,681
2	15774	SHELOCTA	PA	16,403,890
3	25213	WINFIELD	WV	15,708,386
4	30120	CARTERSVILLE	GA	15,476,036
5	37778	LOWLAND	TN	14,769,926
6	26041	MOUNDSVILLE	WV	14,312,502
7	27009	BELEWS CREEK	NC	13,661,597
8	28682	TERRELL	NC	13,571,617
9	45144	MANCHESTER	OH	12,977,392
10	25265	NEW HAVEN	WV	12,526,073
11	27343	SEMORA	NC	12,160,544
12	34428	CRYSTAL RIVER	FL	11,960,774
13	21226	BALTIMORE/CURTIS BAY	MD	11,817,842
14	43961	STRATTON	OH	11,729,787
15	30170	ROOPVILLE	GA	10,377,850
16	43913	BRILLIANT	OH	10,049,602
17	37050	CUMBERLAND CITY	TN	9,984,805
18	45620	CHESHIRE	OH	9,474,147
19	47670	PRINCETON	IN	8,679,874
20	31061	MILLEDGEVILLE	GA	8,678,131
21	45715	BEVERLY	OH	8,638,437

## Appendix O. 100 U.S. Counties Reporting the Most Air Releases of Suspected Respiratory Toxicants, 2004

Rank	Count	y	State	Total Air Emissions (pounds)
1	JEFFERSON		OH	21,850,211
2	ARMSTRONG		PA	19,514,515
3	HUMPHREYS		TN	18,805,656
4	HARRIS		TX	17,672,267
5	PERSON		NC	16,396,477
6	MARSHALL		WV	16,017,366
7	PUTNAM		WV	15,716,564
8	BARTOW		GA	15,660,124
9	CATAWBA		NC	15,016,129
10	HAMBLEN		TN	15,009,961
11	STOKES		NC	13,664,898
12	ADAMS		OH	12,977,392
13	MASON		WV	12,659,702
14	BALTIMORE CITY		MD	12,349,782
15	CITRUS		FL	12,127,099
16	INDIANA		PA	11,941,498
17	WASHINGTON		OH	11,931,256
18	MONROE	256	MI	

### Appendix P. Air and Water Releases of Dioxins, 2004: By State

			Total Surface					Total Surface	
		Total Air	Water				Total Air	Water	
		Emissions	Emissions	Total			Emissions	Emissions	Total
Rank	State	(grams)	(grams)	(grams)	Rank	State	(grams)	(grams)	(grams)
1	TX	87.44	751.81	839.24	27	IA	17.05	0.00	17.05
2	LA	49.46	365.28	414.74	28	MD	15.86	0.22	16.08
3	AL	42.05	124.19	166.24	29	AZ	13.34	0.00	13.34
4	NH	153.79	0.00	153.79	30	MA	13.09	0.17	13.26
5	AR	26.76	53.55	80.31	31	UT	11.69	0.00	11.69
6	KS	69.19	0.00	69.19	32	NV	9.84	0.00	9.84
7	FL	58.86	3.29	62.15	33	ОК	9.18	0.28	9.46
8	IN	60.97	0.02	60.99	34	WY	9.44	0.00	9.44
9	MS	13.50	46.47	59.97	35	OR	8.24	0.68	8.92
10	PA	49.91	0.91	50.82	36	MN	8.74	0.00	8.74
11	IL	43.48	0.04	43.52	37	AK	8.18	0.00	8.18
12	TN	32.36	8.32	40.68	38	ME	7.15	0.99	8.14
13	OH	39.61	0.42	40.03	39	ND	7.02	0.00	7.02
14	КҮ	35.86	0.02	35.89	40	MT	5.67	0.00	5.67
15	NY	30.32	4.64	34.96	41	CO	5.54	0.04	5.57
16	MO	30.31	3.15	33.46	42	SD	5.52	0.00	5.52
17	NJ	31.64	0.18	31.82	43	CT	5.44	0.06	5.50
18	SC	29.16	1.28	30.44	44	ID	1.06	4.18	5.24
19	VA	27.17	2.28	29.45	45	DE	4.25	0.32	4.57
20	GA	24.52	4.63	29.14	46	HI	4.39	0.00	4.39
21	WI	28.84	0.05	28.89	47	NM	2.96	0.00	2.96
22	WV	13.97	14.25	28.21	48	NE	2.53	0.00	2.53
23	NC	21.94	2.69	24.63	49	DC	0.00	0.00	0.00
24	WA	15.80	8.33	24.13	49	RI	0.00	0.00	0.00
25	CA	16.37	1.55	17.92	49	VT	0.00	0.00	0.00
26	MI	16.13	1.57	17.70	Natior	nal	1,225.59	1,405.84	2,631.43

Appendix Q. 100 U.S. Zip Codes Reporting the Most Air and Water

Appendix R. 100 U.S. Counties Reporting the Most Air and Water Releases of Dioxins, 2004

			Total Air and Water Emissions
Rank	County	State	(grams)

Appendix S. Land Releases of Recognized Carcinogens, Developmental Toxicants, and Reproductive Toxicants, 2004: By State

		Total On-Site	
Rank	State	(pounds)	



## Appendix V. Substances Reported to TRI in 2004 with Known or Suspected Health Effects

R= Recognized S= Suspected

These substances may pose other health threats, such as damage to the endocrine or cardiovascular systems. In addition, some of the chemicals not noted as *recognized* carcinogens, for example, may be *suspected* carcinogens. Refer to the methodology for details about how we compiled the list of health effects.

Chemical Name	Carcinogen	Developmental Toxicant	Reproductive Toxicant	Neurotoxicant	Respiratory Toxicant
1,1,1,2-TETRACHLOROETHANE				S	
1,1,1-TRICHLOROETHANE				S	
1,1,2,2-TETRACHLOROETHANE	R			S	S

		Developmental	Reproductive		Respiratory
Chemical Name	Carcinogen	Toxicant	Toxicant	Neurotoxicant	Toxicant

Chemical Name	Carcinogen	Developmental Toxicant	Reproductive Toxicant	Neurotoxicant	Respiratory Toxicant
BETA-NAPHTHYLAMINE	R				I
BIFENTHRIN				S	
BIPHENYL				S	S
BIS(2-CHLORO-1-METHYLETHYL) FTHER	R			S	-
BIS(2-CHLOROFTHYL) ETHER	R			S	S
	R			5	5
	ĸ			2	S
				5	5
				5 S	5
				5 C	3
	D			J C	c
	ĸ	D		<u> </u>	S
		ĸ		5	3
		D		3	
		K			
		K			0
BUTYL ACKYLATE	-				2
BUTYL BENZYL PHTHALATE		ĸ		2	
BUTYRALDEHYDE					S
C.I. ACID RED 114	R				
C.I. DIRECT BLUE 218	R				
C.I. FOOD RED 15	R				
C.I. SOLVENT YELLOW 14	R				
C.I. SOLVENT YELLOW 3	R				
C.I. SOLVENT YELLOW 34	R				
CADMIUM	R	R	R	S	S
CADMIUM COMPOUNDS	R	R	R		S
CALCIUM CYANAMIDE					S
CAPTAN	R			S	
CARBARYL				S	
CARBOFURAN				S	
CARBON DISULFIDE		R	R	S	S
CARBON TETRACHLORIDE	R			S	S
CARBONYL SULFIDE				S	
CARBOXIN				S	
CATECHOL	R			S	
CERTAIN GLYCOL ETHERS				S	S
CHLORDANE	R			S	S
CHI ORENDIC ACID	R				-
CHIORINE				S	S
CHLORINE DIOXIDE					S
CHLOROACETIC ACID				S	s
CHLOROBENZENE				S	
	P			5	
	ĸ			2	2
	D			5	5
	n D			5 C	6
	ĸ	p		5 C	<u>с</u>
	D	ĸ		3	3
	ĸ			C	<u> </u>
	n			2	5
	ĸ			5	5
	К			5	2
CHLORPYRIFOS METHYL				\$	
CHLOKSULFUKON		ĸ	ĸ		
	R				S
CHROMIUM COMPOUNDS	R			-	S
COBALI	R			S	S
COBALT COMPOUNDS	R				S
COPPER					S
COPPER COMPOUNDS					S
CREOSOTE	R			S	
CRESOL (MIXED ISOMERS)				S	S
CROTONALDEHYDE					S
CUMENE				S	

Chemical Name	Carcinogen	Developmental Toxicant	Reproductive Toxicant	Neurotoxicant	Respiratory Toxicant
CUMENE HYDROPEROXIDE					S
CUPFERRON	R				
CYANAZINE		R		S	S
CYANIO5 TANZINE 1812MEOU(E) O9NDS-590	29T7.	S			

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		Developmental	Reproductive		Respiratory
Chemical Name	Carcinogen	Toxicant	Toxicant	Neurotoxicant	Toxicant
FOLPET	R				
FORMALDEHYDE	R			S	S
FORMIC ACID				S	S
FREON 113				S	S
HEPTACHLOR	R	R		S	
HEXACHLORO-1,3-BUTADIENE				S	
HEXACHLOROBENZENE	R	R		S	
HEXACHLOROCYCLOPENTADIENE				S	S
HEXACHLOROETHANE	R			S	S
HEXACHLOROPHENE				S	S
HEXAMETHYLPHOSPHORAMIDE	R		R	S	S
Hydramethylnon		R	R		
HYDRAZINE	R			S	S
HYDRAZINE SULFATE	R			S	S
HYDROCHLORIC ACID AEROSOLS					S
HYDROGEN CYANIDE				S	S
HYDROGEN FLUORIDE				S	S
HYDROQUINONE				S	S
IRON PENTACARBONYL				S	S
ISOBUTYRALDEHYDE					S
ISOPROPYL ALCOHOL				S	S
LACTOFEN	R				
LEAD	R	R	R	S	S
LEAD COMPOUNDS	R	R	R	S	
LINDANE	R			S	S
LINURON		R			
LITHIUM CARBONATE		R		S	
MALATHION				S	S
MALEIC ANHYDRIDE					S
MALONONITRILE				S	S
MANEB	R			S	-
MANGANESE				S	S

Chemical Name	Carcinogen	Developmental Toxicant	Reproductive Toxicant	Neurotoxicant	Respiratory Toxicant
	carcinogen	TOXIGUITE	TOXIGUIT	Neurotoxicant	TOXIGUITE

Chamical Nama	Coroinogon	Developmental	Reproductive	Nourotovisont	Respiratory
	Carcinogen	TUXICALL	TUXILdIIL	Neurotoxicant	
	D			3	3
	K				C C
	-				5
IOLUENE		R		S	S
TOLUENE DIISOCYANATE (MIXED ISOMERS)	R			S	S
TOLUENE-2,4-DIISOCYANATE	R			S	S
TOLUENE-2,6-DIISOCYANATE	R				S
TOXAPHENE	R			S	S
TRANS-1,3-DICHLOROPROPENE	R				
TRANS-1,4-DICHLORO-2-BUTENE	R				
TRIADIMEFON		R	R	S	
TRIALLATE				S	
TRIBUTYLTIN METHACRYLATE		R		S	
TRICHLORFON				S	
TRICHLOROETHYLENE	R			S	S
TRICHLOROFLUOROMETHANE				S	S
TRIETHYLAMINE				S	S
TRIFORINE		R			
TRIPHENYI TIN HYDROXIDE	R	R			
TRIS(2 3-DIBROMOPROPYL) PHOSPHATE	R			S	
TRYPAN BILIF	R			Ŭ	
LIRETHANE	R	R			S
VANADILIM	K	K			S
	P	P			5
	K	K		2	s
	D			5	5
	D			5	c
	ĸ			5	5 C
		D		<u>з</u>	3
WARFARIN AND JOALTS		ĸ		3	C C
XYLEIVE (MIXED ISUMEKS)	ł			2	3
ZINC (FUME OK DUST)					5
ZINC COMPOUNDS				-	5
ZINEB				S	

### **END NOTES**

<sup>&</sup>lt;sup>1</sup> H.R. Conf. Rep. No. 962, 99th Cong., 2dSESS. (1986), "Joint explanatory statement of the Committee of Conference."

 <sup>&</sup>lt;sup>2</sup> U.S. Environmental Protection Agency, Toxics Release Inventory Program, "What is the Toxics Release Inventory (TR) Program?", accessed January 29, 2007 at http://www.epa.gov/tri/whatishtm.
<sup>3</sup> U.S. Environmental Protection Agency, Office of Pollution Prevention and Toxics, *Chemical Hazard Data Availability*

Study, April 1998.

<sup>&</sup>lt;sup>4</sup> U.S. Environmental Protection Agency, Toxics Release Inventory, calculated u