Wasting Our Waterways 2012
Toxic Industrial Pollution and the Unfulfilled Promise of the Clean Water Act

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# Table of Contents

Executive Summary 1

Introduction 5

Toxic Releases to Waterways Threaten the Environment and Public Health 6

Toxic Releases and the Environment 6

Toxic Releases and Human Health 8

Toxic Releases to U.S. Waterways in 2010 9

226 Million Pounds of Toxic Chemicals Released to Waterways in 2010 10

Releases of Toxic Chemicals Linked to Human Health Problems Are Widespread 15

Releases of Small-Volume Toxic Chemicals Also Pose Concern 19

Protecting America’s Waterways from Toxic Releases: Chemical Policy and the Clean Water Act 22

The Clean Water Act: Ensuring Strong Protection for All of America’s Waterways 22

A New Chemical Policy in the U.S.: Protecting the Environment and Public Health 24

Methodology 27

Notes 29
Industrial facilities continue to dump millions of pounds of toxic chemicals into America’s rivers, streams, lakes and ocean waters each year—threatening both the environment and human health. According to the U.S. Environmental Protection Agency (EPA), pollution from industrial facilities is responsible for threatening or fouling water quality in more than 14,000 miles of rivers and streams, more than 220,000 acres of lakes, ponds and estuaries nationwide.

The continued release of large volumes of toxic chemicals into the nation’s waterways shows that the nation needs to do more to reduce the threat posed by toxic chemicals to our environment and our health and to ensure that our waterways are fully protected against harmful pollution.

**Industrial facilities dumped 226 million pounds of toxic chemicals into American waterways in 2010, according to the federal government’s Toxic Release Inventory.**

- Toxic chemicals were discharged to more than 1,900 waterways in all 50 states. The Ohio River ranked first for toxic discharges in 2010, followed by the Mississippi River and the New River in Virginia and North Carolina.

- This represents a small (2.6 percent) decrease in the overall volume of toxic releases since the previous edition of this report, released in 2009 and based on data from 2007.

- Nitrate compounds—which can cause serious health problems in infants if found in drinking water and which contribute to oxygen-depleted “dead zones” in waterways—were by far the largest toxic releases in terms of overall volume.

- Small as well as large waterways received heavy doses of toxics. Because of a single, large release of arsenic and metal compounds from a Nevada gold mine into three small creeks, the combined discharges of developmental toxicants in those creeks were larger than the discharges of such toxicants to the Ohio and Mississippi Rivers combined.
Toxic releases continued in already damaged waterways. The Calumet River system in Indiana and Illinois—home to five different Superfund toxic waste sites, and at one time so polluted that not even sludge worms could live there—ranked high on the list of developmental and reproductive toxic releases due to ongoing discharges from steel mills and an oil refinery.

Toxic chemicals linked to serious health effects were released in large amounts to America’s waterways in 2010.

Industrial facilities discharged approximately 1.5 million pounds of chemicals linked to cancer to more than 1,300 waterways during 2010. Nevada’s Burns Creek received the largest volume of carcinogenic releases, with a small neighboring creek placing third. The Mississippi River, Ohio River, and Tennessee River also suffered large releases of carcinogens. Pulp and paper mills, gold mines and chemical manufacturers were the industries that released the greatest volume of carcinogenic chemicals in 2010.
Executive Summary

• About 619,000 pounds of chemicals linked to developmental disorders were discharged into more than 1,200 waterways. Burns Creek in Nevada, a small waterway near a gold mine, suffered the greatest amount of developmental toxicant discharges, followed by the Kanawha River in West Virginia and the Mississippi River. Gold mining was the largest source of developmental toxicants, followed by pesticide manufacturing and chemical manufacturing.

• Approximately 342,000 pounds of chemicals linked to reproductive disorders were released to more than 1,100 waterways. West Virginia's Kanawha River received the heaviest dose of reproductive toxicants, followed by the Mississippi, Ohio, and Brazos rivers.

• Discharges of persistent bioaccumulative toxins (including dioxin and mercury), organochlorines, and phthalates are also widespread. Safer industrial practices can reduce or eliminate discharges of these and other dangerous substances to America's waterways.

To protect the public and the environment from toxic releases, the United States should prevent pollution by requiring industries to reduce their use of toxic chemicals and restore and strengthen Clean Water Act protections for all of America’s waterways.

The United States should restore Clean Water Act protections to all of America's waterways and improve enforcement of the Clean Water Act.

• The Obama Administration should clarify that the Clean Water Act applies to headwater streams, intermittent waterways, isolated wetlands and other waterways for which Clean Water Act protection has been called into question as a result of recent Supreme Court decisions.

• EPA and the states should strengthen enforcement of the Clean Water Act by, among other things, ratcheting down permitted pollution levels from industrial facilities, ensuring that permits are renewed on time, and requiring mandatory minimum penalties for polluters in violation of the law.

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Table ES-1. Top 10 Waterways for Total Toxic Discharges

<table>
<thead>
<tr>
<th>Waterway Name</th>
<th>Toxic Releases (lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OHIO RIVER (IL, IN, KY, OH, PA, WV)</td>
<td>32,116,310</td>
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<td>ROCK RIVER (IL, WI)</td>
<td>3,370,652</td>
</tr>
</tbody>
</table>
• EPA should eliminate loopholes—such as the allowance of “mixing zones” for persistent bioaccumulative toxic chemicals—that allow greater discharge of toxic chemicals into waterways.

The United States should revise its strategy for regulating toxic chemicals to encourage the development and use of safer alternatives. Specifically, the nation should:

• Require chemical manufacturers to test all chemicals for their safety and submit the results of that testing to the government and the public.

• Regulate chemicals based on their intrinsic capacity to cause harm to the environment or health, rather than basing regulation on resource-intensive and flawed efforts to determine “safe” levels of exposure to those chemicals.

• Require industries to disclose the amount of toxic chemicals they use in their facilities—safeguarding local residents’ right to know about potential public health threats in their community and creating incentives for industry to reduce its use of toxic chemicals.

• Require safer alternatives to toxic chemicals, where alternatives exist.

• Phase out the worst toxic chemicals.
Water is fundamental to life. Without a supply of safe, clean water, humans and most other plants and animals cannot survive.

For many Americans, water is also fundamental to our quality of life. It shapes the landscapes we live in and enjoy, provides us with opportunities to relax and recreate, and supports healthy ecosystems.

In 1972, America adopted the Clean Water Act with the aim of making all of our nation’s waterways safe for fishing and swimming by 1983, and of eliminating toxic discharges into waterways altogether by 1985. Sadly, the goals of that law remain unrealized. Nationwide, 53 percent of our assessed rivers and streams and 69 percent of assessed lakes remain unsafe for fishing, swimming or other uses.¹

This pollution means that Americans who enjoy fishing have to avoid certain waterways, steer clear of certain fish, and limit the amounts of fresh-caught fish that they eat in order to protect themselves against mercury and other harmful substances that are present in some waterways. Other waterways are unsafe for drinking and swimming, or lose their value as hiking and boating destinations because of pollution.

One contributor to this problem is the direct release of toxic chemicals into waterways by industrial facilities. Forty years after the passage of the Clean Water Act, industrial facilities dumped 226 million pounds of toxic chemicals into waterways in 2010. These pollutants—from carcinogens such as arsenic to developmental toxicants such as mercury and lead to chemicals such as nitrates that destabilize aquatic ecosystems and render water unsafe to drink—contribute substantially to the degradation of America’s waterways.

This pollution can be prevented. Common sense measures to reduce the use of toxic chemicals and prevent unchecked toxic dumping into threatened waterways can ensure that the vision of the Clean Water Act is realized, and that of our nation’s rivers, lakes, and streams can be enjoyed by all.
Toxic Releases to Waterways Threaten the Environment and Public Health

The direct industrial discharge of toxic substances into waterways has a variety of impacts on our environment. Once in our waterways, toxic chemicals can contaminate sediments, pollute the bodies of aquatic organisms, and infiltrate drinking water supplies, creating a wide variety of problems for humans and the environment.

Toxic Releases and the Environment
Pollution from industrial facilities is a leading cause of water quality problems in our nation’s rivers, streams, and lakes. According to the U.S. Environmental Protection Agency (EPA), industrial discharges are thought to be responsible for threatening or fouling water quality in more than 14,000 miles of rivers and more than 220,000 acres of lakes, ponds and estuaries nationwide.²

Impacts on Local Waterways
Perhaps the most immediate and severe result of toxic chemical releases on local waterways is the death of wildlife. Toxic chemical releases—whether deliberate or accidental—can trigger fish kills. In Maryland, for example, industrial discharges were responsible for 47 separate fish kill events between 1984 and 2010.³

Dramatic fish kills may attract headlines, but routine toxic chemical discharges can have subtle and long-lasting impacts on aquatic life. In the Potomac River, for instance, 80 percent of all male bass—both large and smallmouth—captured by scientists carried female eggs, a sign that their reproductive development had been altered by chemicals in the water.⁴ The scientists attributed the developmental abnormalities to a “toxic stew” of chemicals in the river. Exposure to these hormone-disrupting chemicals can cause serious reproductive, developmental, and immune system problems.

Some chemicals that are toxic also pose other, more indirect threats to the health of waterways. Nitrate compounds—which come from agricultural runoff as well as industrial sources—are toxic, but mainly threaten wildlife and ecosystems because they feed the growth of algae, which can deplete oxygen levels in local waterways.
Persistent Bioaccumulative Toxics—Local Pollutants with a Global Impact

Some toxic substances are long-lived and accumulate in animal tissue, becoming more and more concentrated further up the food chain. Decades after scientists first pointed to the dangerous impacts of persistent bioaccumulative toxics (PBTs)—a class of chemicals that includes such notorious chemicals as DDT and PCBs—those substances continue to turn up in the tissues of animals great distances from any known source of pollution, and industries continue to produce, use and discharge PBTs into America’s waterways.

Discharges of persistent bioaccumulative toxics to waterways (along with discharges to the land and air) can not only harm wildlife in those waterways, but also impact wildlife thousands of miles away. Some persistent chemicals released to local waterways, for example, eventually evaporate and are carried by rain or snow to locations far away. In the early 1990s, for example, the Great Lakes, which had long received discharges of PCBs from industrial facilities, were a significant net source of PCBs to the air—contributing to contamination elsewhere.5

PCBs continue to be found in the tissues of polar bears three decades after the United States banned their manufacture.6 PCB contamination has been linked to immune system and reproductive problems in the bears, which already face threats from another problem caused by pollution: global warming.7 PCBs have also been linked to a mass die-off of North Sea and Baltic seals during the 1980s, and are among the environmental pollutants linked to health problems in salmon, mink, and other species.8

Since the last edition of this report was released in 2009, new federal regulations have been put in place that are likely to significantly reduce one of the largest pathways through which PBTs enter waterways—airborne mercury emissions. In late 2011, EPA issued strong new standards aimed at reducing airborne emissions of mercury and other toxics from power plants and other large sources, which will begin to take effect in the next few years.9 Although these standards do not affect the toxic releases described in this report, they will significantly reduce the quantity of PBTs present in American waterways, since deposition of airborne mercury through rainfall is a leading source of PBT contamination in American waterways. (Separately, EPA is proceeding with a rulemaking on water discharges from power plants, which could lead to further reductions in emissions described in this report.)10

While governments, including the U.S. government, have taken action to reduce or eliminate production of notorious toxic chemicals such as DDT and PCBs, other toxic chemicals continue to be produced in large quantities and show up in the tissues of wildlife around the globe. Brominated flame retardants (BFRs), which have been commonly used in furniture, computer circuit boards and clothing, share some common characteristics with persistent bioaccumulative toxics. BFRs have been shown to cause a variety of health problems in animals during laboratory studies, and are accumulating rapidly in humans and animals. BFRs have been found in sperm whales, Arctic seals, birds, and fish.11 Direct industrial releases of BFRs, including discharges to waterways, are among the many ways that BFRs can find their way into the environment and into the bodies of animals and humans.12

The recent experience with brominated flame retardants shows the dangers of public policy that treats all chemicals as “innocent until proven guilty”—allowing widespread release to consumers and the environment before they are demonstrated to be safe. As the story of PCBs shows, the impacts of toxic chemical releases can last
for generations and be felt far away from the original source of the pollution.

Toxic Releases and Human Health

Toxic chemicals also have the ability to impact human health, with the potential to trigger cancer, reproductive and developmental problems, and a host of other health effects.

The state of California has developed a list of more than 500 chemicals and substances known to cause cancer, as well as more than 250 chemicals linked to developmental problems and more than 75 chemicals linked to reproductive disorders in men, women, or both. It is likely that others among the 80,000 chemicals registered for commercial use in the United States trigger these or other health effects, as only a small percentage of chemicals have been fully tested for their impact on health.

Once released into waterways, there are many potential pathways for toxic chemicals to impact human health. One pathway is through food. Bioaccumulative toxics build up in animal tissue and find their way into our bodies when we eat animal products. Mercury and dioxin contamination of fish are examples. Mercury enters waterways both directly, through the discharge of mercury-tainted wastewater from power plants and other industrial facilities, and indirectly through emissions from power plant smokestacks that precipitate back into waterways. Once in water, mercury can undergo a series of transformations that enable it to be absorbed and accumulated up the food chain. Similarly, dioxin from sources such as pulp and paper mills that use chlorine can find its way into sediment, where it can be ingested by fish, becoming part of the food chain.

Another route of exposure is through drinking water. A 2009 report by the Environmental Working Group found that 315 pollutants had been found in drinking water between 2004 and 2009; 49 pollutants were found at levels in excess of federal safety standards for the substance in question. For instance, more than 11 million people are served by drinking water systems that exceeded EPA’s maximum level for arsenic compounds between 2004 and 2009; 9 million people are served by systems where concentrations of chloroform, a known carcinogen, exceeded EPA’s maximum limit during that time period. Other industrial pollutants—including heavy metals such as lead and solvents such as tetrachloroethylene (perc), a carcinogen—have been found in the drinking water consumed by millions of Americans. A 2009 investigative report by the New York Times found that roughly one in 10 Americans has been exposed to drinking water that either contained dangerous chemicals or failed to meet federal health standards.

People can even be exposed to toxic chemicals before they are born and as newborns. Brominated flame retardants—which can enter the environment either via direct discharges from industrial plants or emissions from consumer products containing the chemicals—have been found in breast milk, with women in the United States showing the highest concentrations in the world. Many chemicals also can cross the placental barrier, with the potential to disrupt the development of the fetus, creating problems that may be difficult to detect (for example, neurological problems) or may not manifest themselves until years later.
The discharge of toxic chemicals to U.S. waterways has left a legacy of environmental damage and impacts on human health. While industrial pollution of rivers, streams and lakes has decreased over the last several decades as a result of the Clean Water Act, industrial facilities continue to discharge millions of pounds of toxic chemicals to our waterways each year.

This report uses data from the federal government’s Toxics Release Inventory (TRI) to estimate releases of toxic chemicals to American waterways in 2010. It is the second report in a series; our last report on this topic, released in 2009, was based on TRI data from 2007.

Under TRI, industrial facilities are required to release information about their discharges of a limited number of specific toxic chemicals. (See “The Toxic Release Inventory: What it Tells Us About Toxic Pollution ... and What it Leaves Out” on page 10.) Industrial facilities that report to TRI reported the release of 231 toxic chemicals or classes of toxic pollutants to American waterways in 2010. Those chemicals vary greatly in their toxicity and the impacts they have on the environment and human health. Some pollutants that are released in large volumes, for example, may have less of an impact on the environment or human health than other highly toxic pollutants released in smaller volumes.

This report also takes advantage of the fact that, for the first time ever, EPA released TRI data from 2010 with information on the watersheds into which chemicals were released, in the form of hydrological unit codes (HUCs) which identify waterways by the watershed region to which they belong. Using these data, we have been able to aggregate releases not only by the individual waterway to which chemicals were released, but also by the broader watershed regions to which those waterways belong. In cases where multiple neighboring waterways receive discharges that then accumulate as streams flow together, aggregating data at the watershed region level can capture the extent of the environmental and public health risks involved in a way that aggregating only at the level of individual waterways may not.

In this report, we examine data on toxic discharges through several lenses, presenting information on the volume of releases to American waterways of:

* Data in this section of the report have been revised as of May 2012.
• All toxic chemicals listed under TRI;

• Toxic chemicals linked to specific health effects—cancer, reproductive disorders, and developmental harm; and

• Certain chemicals that can have a significant impact on the environment and human health in small quantities—including persistent bioaccumulative toxics, organochlorines and phthalates.

226 Million Pounds of Toxic Chemicals Were Released to Waterways in 2010

Approximately 226 million pounds of toxic chemicals were released to America’s waterways in 2010. Toxic chemicals were released into more than 1,900 different waterways in all 50 states. Total toxic releases were 6 million pounds less than in 2007, the year covered in the previous edition of this report—a 2.6 percent decrease.

The state of Indiana led the nation in

The Toxics Release Inventory: What it Tells Us About Toxic Pollution … and What it Leaves Out

The Environmental Protection Agency’s Toxics Release Inventory (TRI) is the most comprehensive source of information available on the industrial release of toxic substances to America’s environment. TRI plays a critical role in informing communities about the potential environmental impacts of nearby industrial facilities and has been used time and again to encourage companies to reduce their toxic discharges and adopt safer practices.

While TRI is an important source of information, it is not perfect. TRI only covers industrial facilities, meaning that many other sources of toxic pollution—from wastewater treatment plants to agricultural facilities—are not reported. Industrial facilities are required to report only the releases of chemicals on the TRI list—meaning that releases of newer chemicals or those of more recent concern might not be reported at all. In addition, industrial facilities must report to TRI only if they meet certain thresholds for the amount of toxic chemicals they manufacture, process or use in a particular year. As a result, some toxic releases to waterways by covered industries are not reported to the public.

In other words, TRI data do not provide a complete picture of the amount of toxic chemicals that flow into the nation’s environment. But the TRI is the best and most complete set of data available. In this report, we use TRI data for 2010 to calculate the amount of toxic chemicals discharged by industrial facilities to America’s waterways. For important details on how we analyzed the data to derive our conclusions, please see the “Methodology” section at the end of this report.
total volume of toxic discharges to waterways, with more than 27 million pounds of toxic discharges. Indiana was followed by Virginia, Nebraska, Texas and Georgia for total toxic discharges. (See Table 1.)

Nitrates Accounted for the Largest Share of Toxic Releases in 2010
Releases of nitrate compounds represented just under 90 percent of the total volume of discharges to waterways reported under the TRI. Nitrates are toxic, particularly to infants consuming formula made with nitrate-laden drinking water, who may be susceptible to methemoglobinemia, or “blue baby” syndrome, a disease that

Table 1: Top Ten States by Toxic Releases in 2010

<table>
<thead>
<tr>
<th>State</th>
<th>Toxic Releases (lbs.)</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indiana</td>
<td>27,384,933</td>
<td>1</td>
</tr>
<tr>
<td>Virginia</td>
<td>18,078,000</td>
<td>2</td>
</tr>
<tr>
<td>Nebraska</td>
<td>14,727,942</td>
<td>3</td>
</tr>
<tr>
<td>Texas</td>
<td>14,325,126</td>
<td>4</td>
</tr>
<tr>
<td>Georgia</td>
<td>12,620,709</td>
<td>5</td>
</tr>
<tr>
<td>Louisiana</td>
<td>10,903,183</td>
<td>6</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>10,121,165</td>
<td>7</td>
</tr>
<tr>
<td>Alabama</td>
<td>9,857,668</td>
<td>8</td>
</tr>
<tr>
<td>Ohio</td>
<td>9,192,337</td>
<td>9</td>
</tr>
<tr>
<td>North Carolina</td>
<td>9,168,645</td>
<td>10</td>
</tr>
</tbody>
</table>

Figure 1. Total Toxic Releases to Waterways Reported to the TRI

Toxic Releases to U.S. Waterways in 2010
reduces the ability of blood to carry oxygen throughout the body. Nitrates have also been linked in some studies to organ damage in adults. Industrial pollution is only one source of nitrate discharges; fertilizer and other agricultural runoff (which are not accounted for in the Toxics Release Inventory) also account for a large volume of nitrate pollution.

Nitrates are also a major environmental threat as one of the leading sources of nutrient pollution to waterways. Nitrates and other nutrients can fuel the growth of algal blooms. As the algae decay, decomposition can cause the depletion of oxygen levels in the waterway, triggering the formation of “dead zones” in which aquatic life cannot be sustained. The dead zone that forms each summer in the Gulf of Mexico has been attributed to the massive flow of nutrients, including nitrates, from the Mississippi River basin. While fertilizer runoff from agricultural activities is the leading source of nitrates in the Mississippi, industrial discharge plays a small but significant role.

The Chesapeake Bay is another waterway heavily impacted by nitrate pollution; dead zones form there every summer as a result of industrial, agricultural, and residential runoff. In late 2010, EPA released new rules on the amount of pollution that can be released into the Chesapeake Bay watershed, which will both improve the condition of the bay and provide an example for other major watersheds suffering from heavy pollution discharges.

### Table 2. Top 20 Waterways for Total Toxic Discharges, 2010

<table>
<thead>
<tr>
<th>Waterway Name</th>
<th>Toxic Releases (lbs.)</th>
</tr>
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<tbody>
<tr>
<td>OHIO RIVER (IL, IN, KY, OH, PA, WV)</td>
<td>32,116,310</td>
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<tr>
<td>CAPE FEAR RIVER (NC)</td>
<td>3,364,823</td>
</tr>
<tr>
<td>ILLINOIS RIVER (IL)</td>
<td>3,206,211</td>
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<tr>
<td>BIG SIOUX RIVER (SD)</td>
<td>2,949,940</td>
</tr>
<tr>
<td>TENNESSEE RIVER (AL, KY, TN)</td>
<td>2,812,843</td>
</tr>
<tr>
<td>ROANOKE RIVER (NC, VA)</td>
<td>2,762,330</td>
</tr>
<tr>
<td>HOUSTON SHIP CHANNEL (TX)</td>
<td>2,715,239</td>
</tr>
<tr>
<td>MONONGAHELA RIVER (PA, WV)</td>
<td>2,627,192</td>
</tr>
<tr>
<td>SNAKE RIVER (ID, OR)</td>
<td>2,491,684</td>
</tr>
<tr>
<td>MORGES CREEK (NJ)</td>
<td>2,409,387</td>
</tr>
<tr>
<td>AROOSTOOK RIVER (ME)</td>
<td>2,271,733</td>
</tr>
</tbody>
</table>
Unsurprisingly, the waterways that rank high for total toxic releases are those with large releases of nitrate compounds. Among the major industrial sources of nitrate compounds are food and beverage manufacturing (slaughterhouses, rendering plants, etc.), primary metals manufacturing, chemical plants, and petroleum refineries. Waterways receiving discharges from these types of facilities, therefore, will tend to rank high on the list for total toxic releases.

The Ohio River topped all waterways for toxic discharges in 2010, with over 32 million pounds of discharges. It was followed by two other large rivers—the Mississippi (of which the Ohio is a tributary) and the New River in North Carolina and Virginia.

Large waterways are not the only ones that receive large amounts of toxic discharges. Several smaller waterways, such as Nebraska’s Shonka Ditch and Tricounty Canal, rank among the top waterways for receiving toxic discharges nationwide.

Large Polluters Can Have a Major Impact on Individual Waterways

For 15 of the 50 top waterways by total volume of toxic releases, one company was responsible for all of the toxic discharges. In most cases, the company in question was an agriculture or food company; Tyson Foods, for instance, was the responsible party in three cases, including Nebraska’s Tricounty Canal (9th on the list for total discharges). Cargill Inc. was the sole company discharging into the Shonka Ditch (8th on the list); Smithfield Farms was the sole discharger in the case of South Dakota’s Big Sioux River (13th); and McCain Foods was the only company discharging into Maine’s Aroostook River (20th).

The chemical, petroleum, and manufacturing industries were also represented among the companies solely responsible for polluting a waterway. Morses Creek in New Jersey (19th on the list) was polluted by Conoco Philips’ Bayway Refinery. Further down the list, the Little Attapulgus Creek in Georgia received over 1 million pounds of toxics solely from a plant in Attapulgus operated by major chemical manufacturer BASF.

Pollution of large water bodies may have the broadest impact on the public and receive the greatest attention. But as these examples show, small streams receive vast amounts of pollution as well—often from just a single large polluter—creating the potential for significant harm to local ecosystems and for pollution to be carried downstream to larger waterways.

For some larger waterways, the amount of direct discharges may not tell the whole story of the impact of toxic pollution. Many of these rivers flow into one another, aggregating pollution so that by the time the Mississippi reaches the ocean, for instance, it is carrying a portion of the toxics dumped into many other rivers farther upstream (although some of those toxics will have also evaporated, settled into sediment, or otherwise ceased to flow downstream). Examining discharges by watershed region (using the United States Geological Survey’s Hydrological Unit Classification system) shows that many of the waterways in which toxic releases take place flow together before reaching the ocean (see Table 3).

The Ohio River, for instance, received 32 million pounds of toxics in 2010. Its tributaries, meanwhile, received an additional 26 million pounds. In total, more than 25 percent of the toxics released into waterways in 2010 were released into the Ohio River or its tributaries.

The Mississippi, meanwhile, which drains much of the North American continent, captures an even larger share of the nation’s toxic releases in its watershed. Over 125 million pounds of toxics were released into waterways tributary to the Mississippi in 2010—more than half the total released in the entire United States.
The Grand Calumet River: Showcasing the Impacts of Toxic Pollution

In 1985, biologist Thomas Simon spotted a finless, bloody carp swimming in Indiana’s Grand Calumet River. “It looked like someone had beaten it up,” he told the New York Times. Even such an unhealthy carp’s presence was good news, however; it was the first living fish seen in the river in years. The Grand Calumet highlights the damage that industrial pollution can do to a waterway, and the ongoing damage being done by industrial pollution.

The Grand Calumet and its neighboring waterways, including the Little Calumet, Burns Ditch (which drains the river to Lake Michigan), and various shipping and industrial canals form one of the most polluted networks of rivers in the country. At one point in the 1960s, before the passage of the Clean Water Act, the river was so polluted that even sludge worms (extremely hardy animals that survive in sewage and heavily polluted waters where other animal life cannot) were unable to live there.

Much of the pollution there accumulated decades ago, through industrial discharges that left the river bottom covered in sediments containing highly toxic PCBs and other severely dangerous chemicals, and through leaks from five different Superfund toxic waste sites that border the river. Cleanup efforts are ongoing, at significant cost; in 2011 alone, the government spent $50 million to remove highly toxic sediments from the Grand Calumet.

Even as millions of dollars are dedicated to restoring the Grand Calumet and its neighboring waters to health, new discharges to those waters placed the watershed high in the ranks of polluted waters. The Little Calumet-Galien watershed region, containing the Grand Calumet, closely linked rivers, and a portion of the shore of Lake Michigan, ranked 20th in the nation for overall toxic discharges, 14th for discharges of developmental toxicants, and 9th for discharges of reproductive toxicants in 2010—a heavy concentration of pollution even if the waterways in question had been pristine to begin with.

Three metals plants discharged toxics into the Grand Calumet and its connected waterways in 2010—U.S. Steel’s Gary Works and Midwest plant (a sheet and tin finishing facility) and ArcelorMittal USA’s Indiana Harbor plant. Those facilities released a range of metal wastes and other toxics into the waterways, including chromium and benzene – both of which act as carcinogens and developmental and reproductive toxicants – and arsenic compounds, which are carcinogenic and act as developmental toxins.

As those chemicals flow into Lake Michigan, they join benzene, ethylbenzene and other refinery byproducts released by a BP Products of North America oil refinery in Whiting, Indiana, and nitrates released by a Cargill corn mill directly into the lake.

The Grand Calumet and its neighboring waterways are exactly the type of waters the Clean Water Act was intended to restore to a usable state. The ongoing pollution problem in those rivers—produced by a combination of accumulated pollution from previous decades and new toxics deposited into the rivers every year—shows how that vision has yet to be met.
Releases of Toxic Chemicals Linked to Human Health Problems Are Widespread

The high volume of toxic discharges to America's waterways is a tremendous concern for the ongoing health of our rivers, streams and lakes. But toxic chemicals vary in the impacts they have on human health, as well as in their toxicity. To gain a fuller understanding of the impact of toxic discharges, it is helpful to examine the releases of chemicals that, while released in smaller volumes, are linked to severe and chronic health problems.

Table 3: Toxic Releases by Watershed Region

<table>
<thead>
<tr>
<th>Watershed Region</th>
<th>Toxic Releases (lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ohio</td>
<td>58,538,931</td>
</tr>
<tr>
<td>South Atlantic-Gulf</td>
<td>40,370,911</td>
</tr>
<tr>
<td>Mid Atlantic</td>
<td>24,378,351</td>
</tr>
<tr>
<td>Missouri</td>
<td>19,509,654</td>
</tr>
<tr>
<td>Upper Mississippi</td>
<td>18,637,428</td>
</tr>
<tr>
<td>Lower Mississippi</td>
<td>12,456,995</td>
</tr>
<tr>
<td>Texas-Gulf</td>
<td>12,368,918</td>
</tr>
<tr>
<td>Arkansas-White-Red</td>
<td>10,927,949</td>
</tr>
<tr>
<td>Great Lakes</td>
<td>9,692,222</td>
</tr>
<tr>
<td>Pacific Northwest</td>
<td>5,579,141</td>
</tr>
</tbody>
</table>

Several of these watershed areas (the South Atlantic-Gulf, Texas-Gulf, and Pacific Northwest) contain multiple outlets to the ocean. Toxics released in these regions do not all follow the same path to the sea.

Figure 2: Toxic Discharges by Watershed Region, Contiguous United States, 2010
Cancer

In 2010, manufacturing facilities discharged approximately 1.5 million pounds of cancer-causing chemicals into waterways.26 Nevada’s Burns Creek received the largest volume of carcinogens in 2010, while neighboring Mill Creek placed third. The Mississippi River received the second largest volume of releases, while the Ohio and Tennessee rivers rounded out the top five.

Cancer-causing chemicals were discharged into more than 1,300 waterways nationwide in 2010. Several industries discharge large amounts of cancer-causing chemicals to waterways. The pulp and paper industry was the largest emitter of cancer-causing chemicals to waterways, discharging more than 539,000 pounds of those substances to waterways, more than one-third of the total amount released nationwide. The metal ore mining industry released the second-largest amount of carcinogens; 328,000 pounds, or 22 percent of the national total, largely due to the release of 315,000 pounds of arsenic compounds and other carcinogenic compounds from the Jerritt Canyon Mine in Nevada.

Regionally, releases of carcinogenic chemicals are concentrated in the Mississippi watershed and in the Southeast. Waterways draining to the Mississippi received 558,000 pounds of carcinogens in 2010, more than a third of the total volume of such chemicals released nationally; the lower Mississippi, home to a number of

<table>
<thead>
<tr>
<th>Waterway Name</th>
<th>Releases of Cancer-Causing Chemicals (lbs.)</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>BURNS CREEK (NV)</td>
<td>198,152</td>
<td>1</td>
</tr>
<tr>
<td>MISSISSIPPI RIVER (AR, IA, IL, KY, LA, MN, MO, MS, TN, WI)</td>
<td>181,697</td>
<td>2</td>
</tr>
<tr>
<td>MILL CREEK (NV)</td>
<td>85,150</td>
<td>3</td>
</tr>
<tr>
<td>OHIO RIVER (IL, IN, KY, OH, PA, WV)</td>
<td>69,398</td>
<td>4</td>
</tr>
<tr>
<td>TENNESSEE RIVER (AL, KY, TN)</td>
<td>62,393</td>
<td>5</td>
</tr>
<tr>
<td>COOPER RIVER (SC)</td>
<td>45,327</td>
<td>6</td>
</tr>
<tr>
<td>RED RIVER (AR, LA, OK)</td>
<td>38,552</td>
<td>7</td>
</tr>
<tr>
<td>SAMPIT RIVER (SC)</td>
<td>34,407</td>
<td>8</td>
</tr>
<tr>
<td>AMELIA RIVER (FL)</td>
<td>33,824</td>
<td>9</td>
</tr>
<tr>
<td>ALABAMA RIVER (AL)</td>
<td>31,906</td>
<td>10</td>
</tr>
<tr>
<td>WINTERS CREEK (NV)</td>
<td>31,826</td>
<td>11</td>
</tr>
<tr>
<td>COLUMBIA RIVER (OR, WA)</td>
<td>27,557</td>
<td>12</td>
</tr>
<tr>
<td>PEARL RIVER (LA, MS)</td>
<td>24,097</td>
<td>13</td>
</tr>
<tr>
<td>OUACHITA RIVER (AR, LA)</td>
<td>21,782</td>
<td>14</td>
</tr>
<tr>
<td>BRAZOS RIVER (TX)</td>
<td>21,069</td>
<td>15</td>
</tr>
<tr>
<td>ARKANSAS RIVER (AR, CO, KS, OK)</td>
<td>19,687</td>
<td>16</td>
</tr>
<tr>
<td>HOLSTON RIVER (TN)</td>
<td>19,450</td>
<td>17</td>
</tr>
<tr>
<td>LAKE CHAMPLAIN (NY)</td>
<td>15,963</td>
<td>18</td>
</tr>
<tr>
<td>CHATTahooCHEE RIVER (AL, GA)</td>
<td>15,550</td>
<td>19</td>
</tr>
<tr>
<td>WHEELER RESERVOIR (AL)</td>
<td>14,841</td>
<td>20</td>
</tr>
</tbody>
</table>
Toxic Releases From the Jerritt Canyon Mine: The Outsized Impact of Large Polluters

Jerritt Canyon Mine in Nevada has made headlines for its contributions to environmental contamination in the past. The facility, which includes a roaster that processes ore in addition to a mine, was the subject of an investigation in which environmental regulators found that the roasters had been emitting large amounts of mercury, and that the mine’s operators had failed to take required steps to reduce emissions.10

The mine was allowed to reopen briefly in early 2009, but failed to meet deadlines for improving its emissions control equipment, and was shut down again that summer, reopening in October of that year.11

Prior to 2010, the Jerritt Canyon Mine had emitted large amounts of toxics into the atmosphere and onto dry land. It had not, however, reported releasing toxics into waterways.12 In 2010, however, the facility reported a massive discharge—more than 1.2 million pounds—of arsenic, nickel, zinc, and copper compounds into three small streams near the mine. (This release was accompanied by a significant increase in the volume of air emissions from the facility.)

The creeks affected by the discharge from the Jerritt Canyon facility are small, but received several of the largest pollutant loads of any waterway in the United States. The Jerritt Canyon mine is located in an arid region, within the Great Basin (the major region of the United States in which water does not flow to either ocean, instead leaving through evaporation). As such, pollution that damages the limited water resources of the region can have an outsized ecological impact.

Developmental and Reproductive Toxicants

Among the toxic chemicals discharged to America’s waterways are those shown to impede the proper physical and mental development of fetuses and children. Among the potential health effects of these chemicals are fetal death, structural defects such as cleft lip/cleft palate and heart abnormalities, as well as neurological, hormonal, and immune system problems.

In 2010, industrial facilities released approximately 619,000 pounds of developmental toxicants to more than 1,200 of America’s waterways. The largest dose of these chemicals went into Burns Creek in Nevada, in the form of a 123,000 pound discharge of arsenic compounds from Yukon Nevada Gold’s Jerritt Canyon Mine. (The streams that received the fourth and sixth largest discharges, Mill Creek and Winter Creek, were also the recipients of arsenic compound discharges from the Jerritt Canyon facility.)
creeks received more developmental toxicants than the Mississippi and Ohio rivers combined. West Virginia’s Kanawha River received the second-largest volume of discharges, from a pesticide manufacturing plant operated by the Bayer Group. The Mississippi River received the third largest volume of discharges.

Regionally, releases of developmental toxicants were concentrated in the Mississippi watershed and in the Great Basin (again, because of the Jerritt Canyon Mine release). A total of 291,000 pounds of developmental toxicants were released in the Mississippi watershed. The Ohio River basin and Lower Mississippi were the sites of the largest releases within the Mississippi watershed. Gold mining, pesticide and fertilizer manufacturing, and basic chemical manufacturing were the leading industries for developmental toxicant releases.

Releases of reproductive toxicants into waterways totaled 342,000 pounds in 2010, with discharges occurring to more than 1,100 waterways nationwide. Because some high-volume developmental toxicants also have the potential to interfere with reproductive health, many of the same waterways that have received large amounts of developmental toxicants also rank high for reproductive toxicant releases. The Kanawha River received the largest dose

### Table 5. Top 20 Waterways for Releases of Developmental Toxicants, 2010

<table>
<thead>
<tr>
<th>Waterway Name</th>
<th>Releases of Developmental Toxics (lbs.)</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>BURNS CREEK (NV)</td>
<td>123,081</td>
<td>1</td>
</tr>
<tr>
<td>KANAWHA RIVER (WV)</td>
<td>86,296</td>
<td>2</td>
</tr>
<tr>
<td>MISSISSIPPI RIVER (AR, IA, IL, KY, LA, MN, MO, MS, TN, WI)</td>
<td>74,549</td>
<td>3</td>
</tr>
<tr>
<td>MILL CREEK (NV)</td>
<td>49,964</td>
<td>4</td>
</tr>
<tr>
<td>OHIO RIVER (IL, IN, KY, OH, PA, WV)</td>
<td>46,816</td>
<td>5</td>
</tr>
<tr>
<td>WINTERS CREEK (NV)</td>
<td>31,826</td>
<td>6</td>
</tr>
<tr>
<td>KANSAS RIVER (KS)</td>
<td>10,485</td>
<td>7</td>
</tr>
<tr>
<td>BRAZOS RIVER (TX)</td>
<td>10,404</td>
<td>8</td>
</tr>
<tr>
<td>JAMES RIVER (VA)</td>
<td>9,432</td>
<td>9</td>
</tr>
<tr>
<td>TENNESSEE RIVER (AL, KY, TN)</td>
<td>7,430</td>
<td>10</td>
</tr>
<tr>
<td>CAPE FEAR RIVER (NC)</td>
<td>7,124</td>
<td>11</td>
</tr>
<tr>
<td>GALVESTON BAY (TX)</td>
<td>4,415</td>
<td>12</td>
</tr>
<tr>
<td>HERRINGTON LAKE (KY)</td>
<td>4,122</td>
<td>13</td>
</tr>
<tr>
<td>COOSA RIVER (AL, GA)</td>
<td>4,013</td>
<td>14</td>
</tr>
<tr>
<td>LAKE ERIE (MI, NY, OH, PA)</td>
<td>3,983</td>
<td>15</td>
</tr>
<tr>
<td>COLUMBIA RIVER (OR, WA)</td>
<td>3,714</td>
<td>16</td>
</tr>
<tr>
<td>CROOKED CREEK (MO)</td>
<td>3,455</td>
<td>17</td>
</tr>
<tr>
<td>BEE FORK CREEK (MO)</td>
<td>3,346</td>
<td>18</td>
</tr>
<tr>
<td>ALABAMA RIVER (AL)</td>
<td>3,332</td>
<td>19</td>
</tr>
<tr>
<td>BLOCKHOUSE HOLLOW RUN (OH)</td>
<td>3,310</td>
<td>20</td>
</tr>
</tbody>
</table>
of reproductive toxicants, followed by the Mississippi, Ohio, and Brazos rivers.

Pesticide and fertilizer manufacturing and basic chemical manufacturing were the leading industrial sources of reproductive toxicants; each accounted for approximately one quarter of the nation’s total volume of releases. Fossil fuel power generation was the third largest source of such discharges, producing just over 10 percent of the nation’s total releases. Seven out of every ten pounds released nationwide went into waterways in the broader Mississippi basin; the Ohio River basin and Lower Mississippi area saw the largest releases.

Releases of Small-Volume Toxic Chemicals Also Pose Concern

As noted earlier, toxic chemicals vary greatly in their toxicity and effects on the environment and health. Some toxic chemicals trigger severe health effects at low levels of exposure.

Some particular groups of relatively small-volume chemicals worthy of concern are the following:

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**Table 6. Top 20 Waterways for Releases of Reproductive Toxicants, 2010**

<table>
<thead>
<tr>
<th>Waterway Name</th>
<th>Releases of Reproductive Toxics (lbs.)</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>KANAWHA RIVER (WV)</td>
<td>85,653</td>
<td>1</td>
</tr>
<tr>
<td>MISSISSIPPI RIVER (AR, IA, IL, KY, LA, MN, MO, MS, TN, WI)</td>
<td>70,934</td>
<td>2</td>
</tr>
<tr>
<td>OHIO RIVER (IL, IN, KY, OH, PA, WV)</td>
<td>36,505</td>
<td>3</td>
</tr>
<tr>
<td>BRAZOS RIVER (TX)</td>
<td>12,870</td>
<td>4</td>
</tr>
<tr>
<td>KANSAS RIVER (KS)</td>
<td>10,485</td>
<td>5</td>
</tr>
<tr>
<td>TENNESSEE RIVER (AL, KY, TN)</td>
<td>5,342</td>
<td>6</td>
</tr>
<tr>
<td>GALVESTON BAY (TX)</td>
<td>4,415</td>
<td>7</td>
</tr>
<tr>
<td>BEE FORK CREEK (MO)</td>
<td>3,346</td>
<td>8</td>
</tr>
<tr>
<td>CROOKED CREEK (MO)</td>
<td>3,309</td>
<td>9</td>
</tr>
<tr>
<td>ALABAMA RIVER (AL)</td>
<td>3,282</td>
<td>10</td>
</tr>
<tr>
<td>ARKANSAS RIVER (AR, CO, KS, OK)</td>
<td>3,110</td>
<td>11</td>
</tr>
<tr>
<td>EVERETT HARBOR (WA)</td>
<td>2,700</td>
<td>12</td>
</tr>
<tr>
<td>DELAWARE RIVER (DE, NJ, PA)</td>
<td>2,510</td>
<td>13</td>
</tr>
<tr>
<td>CHATTAHOOCHEE RIVER (AL, GA)</td>
<td>2,240</td>
<td>14</td>
</tr>
<tr>
<td>LAKE MICHIGAN (IL, IN, MI, WI)</td>
<td>2,041</td>
<td>15</td>
</tr>
<tr>
<td>HOLSTON RIVER (TN)</td>
<td>2,006</td>
<td>16</td>
</tr>
<tr>
<td>PACIFIC OCEAN (CA, HI, OR, WA)</td>
<td>1,991</td>
<td>17</td>
</tr>
<tr>
<td>CUYAHOGA RIVER (OH)</td>
<td>1,896</td>
<td>18</td>
</tr>
<tr>
<td>LAKE ERIE (MI, NY, OH, PA)</td>
<td>1,847</td>
<td>19</td>
</tr>
<tr>
<td>MUSKINGUM RIVER (OH)</td>
<td>1,814</td>
<td>20</td>
</tr>
</tbody>
</table>
Persistent Bioaccumulative Toxics
Persistent bioaccumulative toxicants (PBTs) are those that persist in the environment (that is, are difficult or impossible to destroy) and accumulate up the food chain. As humans are generally at the top of the food chain, PBTs pose particular problems for us. Consuming fish contaminated with mercury, for example, can impair the neurological development of fetuses and small children.33

Direct surface water discharges of PBTs are common across the United States. Over 90,000 pounds of PBTs were released to more than 1,000 waterways in 2010.

Lead and lead compounds were, by both volume and range of distribution, the primary PBTs released to waterways in the United States in 2010. More than 900 waterways across the country received direct discharges of lead compounds in 2010; over 82,000 pounds of lead and lead compounds were released. Polycyclic aromatic compounds, a family of cancer-causing chemicals released primarily by chemical plants and oil refineries, were discharged into more than 140 waterways. And dioxins, which are mainly released by the chemical industry, were discharged into more than 90 waterways nationwide.

The leading industries discharging PBTs were pulp and paper mills, electric power plants, metal ore mining facilities, and oil refineries. The Ohio River, Mississippi River, and Alabama River received the heaviest discharges. Two small Missouri waterways, Bee Fork Creek and Crooked Creek, ranked fourth and fifth because of heavy discharges of lead from mines and smelters operated by the Renco Group and Doe Run Resources Corp.

Discharges of even small amounts of PBTs can have serious consequences. For example, industrial facilities reported releasing approximately 35 pounds of dioxin and dioxin-like compounds into waterways nationwide in 2010—a small fraction of the 226 million pounds of toxics released. However, given that the World Health Organization guidelines for dioxin recommend exposure of less than one-billionth of a gram per day, even this relatively small amount of dioxin discharges can have serious implications for public health.34

Organochlorines and Phthalates
Organochlorine pesticides and phthalates are both classes of chemicals with serious implications for health—and for which safer alternatives are available. Organochlorines, the family of pesticides that includes DDT, have been linked to a wide variety of impacts on the environment and human health, including cancer, interference with the endocrine system, immune system problems, and developmental and reproductive disorders.35 While DDT and some other organochlorines have been banned, others remain in use today.

Phthalates are added to plastic products such as food wrapping and children’s toys to make them flexible. Some phthalates have been linked to reproductive and developmental problems.36 Organochlorines and phthalates are not as widely released as many of the other toxic substances discussed in this report, but still impact waterways nationwide. Releases of organochlorines were reported to 10 waterways nationwide, with the Des Plaines River in Illinois receiving the greatest amount of total discharges. A large portion of the total discharges were in the form of hexachlorobenzene, a now-banned pesticide that is produced as a byproduct of certain chemical processes.37 Phthalates were released to 11 waterways nationwide, with two waterways in Tennessee—a tributary of Little Nixon Creek and the Holston River—leading the way for total releases.

Direct discharges of organochlorines and phthalates by industrial facilities are not necessarily the most important routes of exposure to these chemicals—people are more likely to be exposed to phthalates,
for example, in consumer products. The continued discharge of these chemicals to waterways, however, underscores the many ways in which these substances, once produced, find their way into our environment, and reinforces the need for pollution prevention to be the primary approach to reducing toxic health threats.
Wasting Our Waterways

The millions of pounds of toxic discharges to America’s waterways—coupled with the continued discharge of smaller amounts of hazardous substances such as lead, mercury and dioxin—suggest that there are deep flaws in the policy tools the United States uses to keep toxic chemicals out of our waterways.

Environmental policy in the United States has several weaknesses. It too often takes an “innocent until proven guilty” approach to potential health hazards. It focuses more on stopping pollution at the end of the pipe rather than encouraging inherently safer products and industrial practices. And it fails even in the task of stopping pollution at the end of the pipe because of gaping loopholes in environmental laws and inadequate enforcement. The result is the continued release of toxic chemicals into America’s rivers, streams, and lakes.

The Clean Water Act: Ensuring Strong Protection for All of America’s Waterways

The federal Clean Water Act is the nation’s primary bulwark against pollution of our waterways. Yet, for too long, implementation of the Clean Water Act has failed to live up to the vision of pollution-free waterways embraced by its authors. Moreover, the Clean Water Act is facing perhaps the most important test in its history as a result of judicial decisions that have limited the law’s scope.

To protect the environment and human health from releases of toxic chemicals into our waterways, federal and state governments should take several steps to strengthen implementation of the Clean Water Act.

Protections for Small Waterways

A series of court decisions, culminating in the U.S. Supreme Court’s 2006 decision in the case of 

\textit{Rapanos v. United States}, have threatened the protection that intermittent and headwater streams and isolated
wetlands have traditionally enjoyed under the Clean Water Act. These waterways play important roles in local ecology, while protection of headwaters and intermittent streams is critical for maintaining water quality downstream.

The Rapanos decision left unclear exactly which waterways do enjoy protection under the Clean Water Act. Navigable waterways and those that cross state boundaries, along with their tributaries, retain their traditional protections. But the Supreme Court's unusual 4-1-4 ruling in the Rapanos case has left the courts and EPA torn between two different standards for Clean Water Act jurisdiction—the strict standard, embraced by four of the court's members, that eliminates protection for intermittent streams and those without a surface connection to covered waterways, and the less stringent legal standard, outlined in a concurring opinion by Justice Anthony Kennedy, that requires a “significant nexus” to exist with a navigable waterway for a waterbody to enjoy protection under the Clean Water Act.

The Rapanos decision and other previous decisions threaten the protection enjoyed by thousands of waterways nationwide—with real consequences for the environment. In much of the American West, for example, perennial streams are uncommon. Only 3 percent of all streams in Arizona, for example, are perennial, along with 8 percent in New Mexico and 9 percent in Nevada. Furthermore, across the country 58 percent of all streams are at risk of increased pollution due to these court decisions. Nationwide, EPA estimates that 117 million people are served by drinking water systems that draw their water from headwaters streams or intermittent waterways. These important waterways could completely lose protection under the federal Clean Water Act, leaving discharges to those waterways unregulated by EPA. The administration should ensure that the Clean Water Act applies to headwater streams, intermittent waterways, isolated wetlands and other waterways by finalizing proposed guidelines and conducting a rulemaking this year.

Improve Enforcement of the Clean Water Act

The Clean Water Act is America’s main source of protection against water pollution, but it has not always been adequately enforced. States (who are primarily responsible for enforcing the law in most of the country) have often been unwilling to tighten pollution limits on industrial dischargers and have often let illegal polluters get away with exceeding their permitted pollution levels without penalty or with only a slap on the wrist.

EPA and states should tighten implementation of the Clean Water Act by:

- Ensuring that pollution permits are renewed on schedule and ratcheting down permitted pollution levels with each successive five-year permit period with the goal of achieving zero pollution discharge wherever possible. As of December 2009, nearly one out of every five discharge permits for major industrial facilities had expired. Timely renewal of permits, coupled with reductions in the amount of pollution allowed at each permit renewal, can move the nation closer to achieving the original zero-discharge goal of the Clean Water Act.

- Eliminating “mixing zones” for persistent bioaccumulative toxics. Mixing zones are areas of waterways near discharge points where the level of pollution can legally exceed water quality criteria without triggering action to reduce pollution levels. The idea behind mixing zones is that water from a discharge pipe might not meet water quality criteria, but that with
dilution, the level of pollution would not harm the overall quality of the waterway. Mixing zones are a dubious concept at best from the perspective of protecting waterways from pollution and are wholly inappropriate for certain types of pollutants. Persistent bioaccumulative toxics—which have the capacity to contaminate sediment and/or accumulate in aquatic organisms—are among those for which mixing zones are particularly problematic. States should eliminate the use of mixing zones for PBTs and consider elimination for other toxic chemical discharges as well.

• Establishing mandatory minimum penalties for Clean Water Act violations. Often, violators of the Clean Water Act escape serious penalty. State and EPA officials are often resistant to penalizing polluters, even after multiple violations of the law. Establishing mandatory minimum penalties for violations of the Clean Water Act would ensure that illegal pollution does not go unpunished and act as a deterrent to illegal polluters. Congress should also ensure that EPA receives adequate funding for enforcement staff to ensure that the nation keeps a sufficient number of environmental “cops on the beat.”

Reducing the use of toxic chemicals will not only reduce discharges to waterways, but can also reduce other forms of exposure to toxic chemicals, including releases to the air and land and exposure through consumer products.

**Switching to Safer Alternatives**

Safer alternatives exist for many toxic chemicals. Replacing these chemicals with safer alternatives can reduce threats at all stages of a product’s lifespan—from manufacturing to use to disposal.

Many examples exist of safer alternatives to toxic chemicals released into America’s waterways:

• Tetrachloroethylene (also known as perchloroethylene or perc) is a toxic solvent used in dry cleaning and textile processing and is a cancer-causing chemical. Industrial facilities reported releasing more than 299 pounds of perc directly to U.S. waterways in 2010, but that figure does not include discharges by the thousands of smaller facilities nationwide that use the chemical but do not report to the TRI. Hundreds of dry cleaners across the country have switched to safer processes that do not rely on perc, including “wet” cleaning using water and the use of liquid carbon dioxide. With safer alternatives on the market, California has taken steps to phase out the use of perc at dry cleaners, with the chemical to be eliminated from use by 2023.

• Formaldehyde is used in a wide variety of consumer products and has been linked to health effects ranging from allergies to cancer. In 2010, industrial facilities reported releasing more than 191,000 pounds of formaldehyde to waterways. Safer alternatives for many uses of formaldehyde already exist, including adhesives based on non-toxic, natural ingredients.
• Phthalates are a class of chemicals used in hard plastics to make them flexible, as ingredients in personal care products, and in other applications. California has listed five phthalates as developmental and/or reproductive toxicants.46 A wealth of safer alternatives exist, including plastics other than PVC (which typically includes phthalates) and alternative plasticizers for PVC.47

• Changes in industrial processes can reduce releases of toxic byproducts, such as dioxins. Oxygen-based processes, for example, can eliminate the need for chlorine bleaching in paper production, thereby eliminating the creation of dioxins.48

The importance of pursuing inherently safer alternatives, rather than relying solely on pollution controls at the end of the pipe, is demonstrated by coal-fired power plants. For decades, emissions from power plant smokestacks have been a major public health concern. In an effort to clean up the nation’s air, power plants have increasingly been fitted with scrubbers that remove pollutants such as arsenic and heavy metals. However, these pollutants, once captured, can find their way into waterways, either via permitted liquid discharges from the plants themselves or the leaching of contaminants from coal ash into waterways.49

The use of inherently safer alternatives—such as renewable energy—can reduce these threats.

Reforming Chemical Policy
Manufacturers, however, will face little incentive to develop and use safer alternatives to toxic chemicals without clear guidance from government. Chemical policy must be based both on appropriate science and on the imperative to protect the public from harmful exposures before they occur.

Among the cornerstones of this new chemical policy should be the following:

Regulation of chemicals based on their intrinsic hazards. America’s system for testing and regulating toxic chemicals is based on time-consuming, resource-intensive and anachronistic forms of risk assessment. Much time and energy is wasted determining “safe” levels of exposure to toxic chemicals based on laboratory experimentation. These assessments often fail to investigate the impacts that chemical exposures can have on vulnerable populations or at vulnerable stages of development, nor do they assess the impact of cumulative exposures to a chemical over time, the synergistic effects of exposure to multiple chemicals, or the subtler potential impacts resulting from low-dose exposures. The result is that many chemicals with the potential to harm human health or the environment remain in use—and the process for evaluating all chemicals for safety is more difficult and time-consuming than it needs to be.

Instead, the United States should regulate chemicals based on their intrinsic hazards. That is, if evidence exists that a chemical causes cancer, for example, the presumption of public policy should be that public exposure to that chemical should be minimized, if not eliminated altogether.

Evaluation of all chemicals on the market. Chemical manufacturers should be required to test all of their chemicals for safety before they are put on the market. Manufacturers of existing chemicals should be required to disclose all relevant health and safety information to the public and to fill in the gaps in their health and safety assessments within a reasonable period of time.

Planned phase-out of hazardous chemicals. Once a chemical has been deemed hazardous, the goal of public policy should be to reduce, and then eliminate, exposures to that chemical. Chemicals for which safer alternatives already exist should be scheduled for phase out. Evaluations of
safer alternatives should include not only the potential for chemical-for-chemical substitutions but also changes in manufacturing processes and product design that can reduce or eliminate the need for toxic chemicals. For chemicals for which safer alternatives do not yet exist, there should be strict limits on use and exposure to protect the public, as well as a targeted timeline for ultimate phase-out.

**Required disclosure of industrial toxic chemical use.** Facilities that use significant amounts of toxic chemicals should be required to disclose which chemicals they are using and in what amounts, so that nearby communities can be aware of potential threats and to create incentives for industrial facilities to reduce their use of toxic chemicals. In addition, facilities should be required to develop plans to reduce toxic chemical use and adopt safer alternatives. States such as Massachusetts and New Jersey that have aggressively adopted this pollution prevention approach have experienced declines in toxic chemical use, the creation of toxic byproducts, and toxic discharges to the environment.\(^5\)

Setting clear standards designed to protect the public from toxic chemical exposures—and insisting upon the managed phase-out of dangerous chemicals—can unleash innovation in the design of safer products and industrial processes, while reducing threats to the public.
The data and analysis in this report are based on 2010 data from the federal Toxics Release Inventory, as downloaded from the Environmental Protection Agency’s Envirofacts database on 16 January 2012. The Toxics Release Inventory is frequently revised after the posting of the national public data release, which is the basis for this report. The most recently updated data can be found at EPA’s TRI Explorer Web site at www.epa.gov/triexplorer/.

**Totaling Toxic Releases by Waterway**

Facilities reporting to TRI self-report the names of the waterways to which they release toxic substances. These waterway names are sometimes misspelled or inconsistent. Some facilities report releases to unidentified tributaries of other waterways. Moreover, many waterways cross state boundaries, such that total emissions to a waterway must be calculated for facilities in different states. The following procedures were used to “clean” the waterway names in the TRI database, assign discharges to the proper waterways, and to identify waterways that cross state boundaries.

1) Obvious spelling errors or differences in the formatting of waterways receiving discharges were repaired manually on a case-by-case basis. Waterways with the same name, in the same watershed (as determined using the USGS’s Hydrological Unit Classification (HUC) system) were assumed to be the same waterway. Where two waterways with the same name were listed in different watersheds within a state (as determined using the USGS’s Hydrological Unit Code (HUC) classification system), they were examined manually to determine if they were, in fact, the same waterway or two separate waterways of the same name.

2) Where TRI records indicated that a chemical was released to an unnamed tributary of another waterway, the releases were classified with those of the named waterway. In addition, where records indicated that releases reached a larger waterway via a smaller waterway, the releases were classified with the larger waterway.

3) Releases to waterways identified as “forks” or “branches” of a larger waterway were classified with the larger waterway (e.g. “West Fork of the Susquehanna River”). Releases to waterways identified as
“Little” or “Big” rivers (e.g. “Little Beaver River,” “Beaver River”) were classified separately.

4) Waterway names that were common across the boundaries of two adjacent states were identified and reviewed manually using the USGS’s Hydrological Unit Classification system. In cases where it was clear that the waterways listed were either within the same hydrological unit in both states, or located in adjacent hydrological units in the two states, the waterway was assumed to cross state lines and discharges to that waterway from facilities in both states were summed. In cases in which it was unclear whether the discharges were to the same waterway, the discharges to the waterway(s) were listed separately by state.

**Linking Toxic Chemicals with Health Effects**

Chemicals were determined to cause cancer or developmental or reproductive disorders based on their presence on the state of California’s Proposition 65 list of *Chemicals Known to the State to Cause Cancer or Reproductive Toxicity*, last updated on 3 February 2012. Chemicals on the Proposition 65 list were matched to those in the TRI database using their Chemical Abstracts Service (CAS) identification numbers. Several classes of chemicals (e.g. dioxins, various metal compounds) are not identified by CAS number—these chemical classes in the TRI database were linked to the Proposition 65 list by manual comparison. In some cases, a particular chemical compound was listed in the Proposition 65 database, but there was no corresponding listing of that particular compound in the TRI database. In these cases, it was assumed that every individual member of a TRI chemical class exhibited the health effects of the corresponding chemical from the Proposition 65 list. In some cases, we assumed that all compounds of a given substance (such as lead) exhibited the same health effects as the substance itself. Finally, some substances on the Proposition 65 list only cause health effects in particular chemical configurations. In cases where we could not determine the chemical configuration from the TRI database, we assumed that all releases exhibited the health effects of the corresponding chemical on the Proposition 65 list.

Chemicals in other classifications of substances analyzed in this report were identified as follows:

- Persistent bioaccumulative toxics were identified based on their presence on the EPA’s list of PBTs requiring reporting at lower thresholds under TRI, obtained from U.S. EPA, *TRI PBT Chemical List*, downloaded from www.epa.gov/tri/trichemicals/pbt%20chemicals/pbt_chem_list.htm, 7 February 2012.

- Organochlorines and phthalates were identified based on their listing in Centers for Disease Control and Prevention, *Fourth National Report on Human Exposure to Environmental Chemicals*, July 2010.
Notes


2  Ibid.


8  Ibid.


11  See note 7.


13  California Office of Environmental Health Hazard Assessment, *Chemicals Known to the State to Cause Cancer or Reproductive Toxicity* (Microsoft Excel document), 3 February 2012.


17 Ibid.

18 Ibid.


28 See note 26.

29 Cancer-causing chemicals were identified as those listed on California’s Proposition 65 list of substances known to cause cancer, as well as some compounds associated with cancer-causing chemicals. See “Methodology” for a complete description of how chemicals were identified for this report.


34 WHO guidelines from U.S. Agency for Toxic Substances and Disease Registry, *ToxFAQs: Chemical Agent Briefing Sheets: Dioxin*, March 2006. Note: the WHO guidelines are for total daily intake of 1 to 4 picograms (trillionths of a gram) per kilogram of body weight per day.


36 Centers for Disease Control and


39 U.S. Environmental Protection Agency, Table 1: State-by-State NHD Analyses of Stream Categories and Drinking Water Data, Attachment to letter from EPA Assistant Administrator Benjamin H. Grumbles to Jeanne Christie, Executive Director, Association of State Wetland Managers, 9 January 2005.

40 U.S. Environmental Protection Agency, Geographic Information System Analyses of the Surface Drinking Water Provided by Intermittent, Ephemeral, and Headwater Streams in the U.S., downloaded from water.epa.gov/lawsregs/guidance/wetlands/surface_drinking_water_index.cfm on 27 February 2012.

41 See note 39.


43 See note 14.


## Appendix: Detailed Data on Toxic Discharges to Waterways*

Table A-1: Toxic Discharges to Waterways by State, 2010

<table>
<thead>
<tr>
<th>State</th>
<th>All toxic releases (lb.)</th>
<th>Cancer-causing chemicals (lb.)</th>
<th>Developmental toxics (lb.)</th>
<th>Reproductive toxics (lb.)</th>
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</thead>
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<td>Rank</td>
<td>Releases</td>
<td>Rank</td>
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* Data in this section revised May 2012.
Table A-1: Toxic Discharges to Waterways by State, 2010 (cont’d)

<table>
<thead>
<tr>
<th>State</th>
<th>All toxic releases</th>
<th>Cancer-causing chemicals</th>
<th>Developmental toxics</th>
<th>Reproductive toxics</th>
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<td>Releases (lb.) Rank</td>
<td>Releases (lb.) Rank</td>
<td>Releases (lb.) Rank</td>
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<td>315,147 1</td>
<td>204,885 1</td>
<td>0 49</td>
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<td>Colorado</td>
<td>720,881 35</td>
<td>25 48</td>
<td>25 48</td>
<td>22 46</td>
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<tr>
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<td>1,760 33</td>
<td>1,482 30</td>
<td>1,427 29</td>
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<td>63 44</td>
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<td>315,147 1</td>
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<td>600,283 36</td>
<td>1,760 33</td>
<td>1,482 30</td>
<td>1,427 29</td>
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Table A-2. Top 50 Waterways for Total Toxic Releases, 2010

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<tr>
<th>Waterway</th>
<th>Toxic Releases (lbs.)</th>
<th>Rank</th>
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<tr>
<td>Ohio River (IL, IN, KY, OH, PA, WV)</td>
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<td>New River (NC, VA)</td>
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<td>Kalamazoo River (MI)</td>
<td>1,647,360</td>
<td>25</td>
</tr>
<tr>
<td>Brazos River (TX)</td>
<td>1,558,414</td>
<td>26</td>
</tr>
<tr>
<td>Cottonwood Branch (TX)</td>
<td>1,533,000</td>
<td>27</td>
</tr>
<tr>
<td>Corpus Christi Inner Harbor (TX)</td>
<td>1,497,542</td>
<td>28</td>
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<tr>
<td>Arkansas River (AR, CO, KS, OK)</td>
<td>1,474,020</td>
<td>29</td>
</tr>
<tr>
<td>Tankersley Creek (TX)</td>
<td>1,452,257</td>
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<tr>
<td>Tehuscan Creek (TX)</td>
<td>1,438,000</td>
<td>31</td>
</tr>
<tr>
<td>Genesee River (NY)</td>
<td>1,393,996</td>
<td>32</td>
</tr>
<tr>
<td>Seneca River (NY)</td>
<td>1,383,423</td>
<td>33</td>
</tr>
<tr>
<td>Sipsey Creek (MS)</td>
<td>1,339,293</td>
<td>34</td>
</tr>
<tr>
<td>Grand Neosho River (OK)</td>
<td>1,310,621</td>
<td>35</td>
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<tr>
<td>Wisconsin River (WI)</td>
<td>1,277,510</td>
<td>36</td>
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<tr>
<td>Graves Creek (AL)</td>
<td>1,276,298</td>
<td>37</td>
</tr>
<tr>
<td>Hyde Run Ditch (OH)</td>
<td>1,246,449</td>
<td>38</td>
</tr>
<tr>
<td>Little Attapulgus Creek (GA)</td>
<td>1,234,500</td>
<td>39</td>
</tr>
<tr>
<td>Willamette River (OR)</td>
<td>1,208,155</td>
<td>40</td>
</tr>
<tr>
<td>Wateree River (SC)</td>
<td>1,206,878</td>
<td>41</td>
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Table A-2. Top 50 Waterways for Total Toxic Releases, 2010 (cont’d.)

<table>
<thead>
<tr>
<th>Waterway</th>
<th>Toxic Releases (lbs.)</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama River (AL)</td>
<td>1,158,007</td>
<td>42</td>
</tr>
<tr>
<td>Sandy Bottom Branch (VA)</td>
<td>1,154,357</td>
<td>43</td>
</tr>
<tr>
<td>Tombigbee River (AL)</td>
<td>1,150,458</td>
<td>44</td>
</tr>
<tr>
<td>James River (VA)</td>
<td>1,144,239</td>
<td>45</td>
</tr>
<tr>
<td>Little River (OK)</td>
<td>1,143,858</td>
<td>46</td>
</tr>
<tr>
<td>Des Moines River (IA)</td>
<td>1,141,003</td>
<td>47</td>
</tr>
<tr>
<td>San Pablo Bay (CA)</td>
<td>1,090,256</td>
<td>48</td>
</tr>
<tr>
<td>Schuylkill River (PA)</td>
<td>1,043,922</td>
<td>49</td>
</tr>
<tr>
<td>Susquehanna River (NY, PA)</td>
<td>1,036,108</td>
<td>50</td>
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</table>
## Table A-3 Top 50 Waterways for Releases of Cancer-Causing Chemicals, 2010

<table>
<thead>
<tr>
<th>Waterway</th>
<th>Releases of Cancer-causing Chemicals (lbs.)</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>BURNS CREEK (NV)</td>
<td>198,152</td>
<td>1</td>
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<tr>
<td>MISSISSIPPI RIVER (AR, IA, IL, KY, LA, MN, MO, MS, TN, WI)</td>
<td>181,697</td>
<td>2</td>
</tr>
<tr>
<td>MILL CREEK (NV)</td>
<td>85,150</td>
<td>3</td>
</tr>
<tr>
<td>OHIO RIVER (IL, IN, KY, OH, PA, WV)</td>
<td>69,398</td>
<td>4</td>
</tr>
<tr>
<td>TENNESSEE RIVER (AL, KY, TN)</td>
<td>62,393</td>
<td>5</td>
</tr>
<tr>
<td>COOPER RIVER (SC)</td>
<td>45,327</td>
<td>6</td>
</tr>
<tr>
<td>RED RIVER (AR, LA, OK)</td>
<td>38,552</td>
<td>7</td>
</tr>
<tr>
<td>SAMPIT RIVER (SC)</td>
<td>34,407</td>
<td>8</td>
</tr>
<tr>
<td>AMELIA RIVER (FL)</td>
<td>33,824</td>
<td>9</td>
</tr>
<tr>
<td>ALABAMA RIVER (AL)</td>
<td>31,906</td>
<td>10</td>
</tr>
<tr>
<td>WINTERS CREEK (NV)</td>
<td>31,826</td>
<td>11</td>
</tr>
<tr>
<td>COLUMBIA RIVER (OR, WA)</td>
<td>27,557</td>
<td>12</td>
</tr>
<tr>
<td>PEARL RIVER (LA, MS)</td>
<td>24,097</td>
<td>13</td>
</tr>
<tr>
<td>OUACHITA RIVER (AR, LA)</td>
<td>21,782</td>
<td>14</td>
</tr>
<tr>
<td>BRAZOS RIVER (TX)</td>
<td>21,069</td>
<td>15</td>
</tr>
<tr>
<td>ARKANSAS RIVER (AR, CO, KS, OK)</td>
<td>19,687</td>
<td>16</td>
</tr>
<tr>
<td>HOLSTON RIVER (TN)</td>
<td>19,450</td>
<td>17</td>
</tr>
<tr>
<td>LAKE CHAMPLAIN (NY)</td>
<td>15,963</td>
<td>18</td>
</tr>
<tr>
<td>CHATTAHOOCHEE RIVER (AL, GA)</td>
<td>15,550</td>
<td>19</td>
</tr>
<tr>
<td>WHEELER RESERVOIR (AL)</td>
<td>14,841</td>
<td>20</td>
</tr>
<tr>
<td>DELAWARE RIVER (DE, NJ, PA)</td>
<td>14,805</td>
<td>21</td>
</tr>
<tr>
<td>TURTLE RIVER (GA)</td>
<td>14,300</td>
<td>22</td>
</tr>
<tr>
<td>SAVANNAH RIVER (GA, SC)</td>
<td>13,982</td>
<td>23</td>
</tr>
<tr>
<td>DAN RIVER (NC)</td>
<td>13,253</td>
<td>24</td>
</tr>
<tr>
<td>TOMBIGBEE RIVER (AL)</td>
<td>12,319</td>
<td>25</td>
</tr>
<tr>
<td>SNAKE RIVER (ID, OR)</td>
<td>11,335</td>
<td>26</td>
</tr>
<tr>
<td>WILLAMETTE RIVER (OR)</td>
<td>10,691</td>
<td>27</td>
</tr>
<tr>
<td>CAPE FEAR RIVER (NC)</td>
<td>9,920</td>
<td>28</td>
</tr>
<tr>
<td>ROANOKE RIVER (NC, VA)</td>
<td>9,811</td>
<td>29</td>
</tr>
<tr>
<td>NECHES RIVER (TX)</td>
<td>8,944</td>
<td>30</td>
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<tr>
<td>ALTAMAHA RIVER (GA)</td>
<td>8,801</td>
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<tr>
<td>CONEUCUH/ESCAMBIA RIVER (AL)</td>
<td>8,574</td>
<td>32</td>
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<tr>
<td>FENHOLLOWAY RIVER (FL)</td>
<td>8,426</td>
<td>33</td>
</tr>
<tr>
<td>PORT TOWNSSEND BAY (WA)</td>
<td>7,451</td>
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<tr>
<td>CATAWBA RIVER (NC, SC)</td>
<td>7,274</td>
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<tr>
<td>ST. CROIX RIVER (ME)</td>
<td>7,000</td>
<td>36</td>
</tr>
<tr>
<td>PUGET SOUND (WA)</td>
<td>6,958</td>
<td>37</td>
</tr>
<tr>
<td>BEAVER CHANNEL (IA)</td>
<td>6,917</td>
<td>38</td>
</tr>
<tr>
<td>GREAT PEE DEE RIVER (SC)</td>
<td>6,757</td>
<td>39</td>
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<tr>
<td>COOSA RIVER (AL, GA)</td>
<td>6,634</td>
<td>40</td>
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<tr>
<td>YORK RIVER (VA)</td>
<td>6,524</td>
<td>41</td>
</tr>
<tr>
<td>LAKE ERIE (MI, NY, OH, PA)</td>
<td>6,407</td>
<td>42</td>
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<tr>
<td>PAINT CREEK (OH)</td>
<td>6,364</td>
<td>43</td>
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<tr>
<td>PIGEON RIVER (NC, TN)</td>
<td>5,423</td>
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</tr>
<tr>
<td>MUSKINGUM RIVER (OH)</td>
<td>5,136</td>
<td>45</td>
</tr>
<tr>
<td>HOUSTON SHIP CHANNEL (TX)</td>
<td>5,011</td>
<td>46</td>
</tr>
<tr>
<td>CLARION RIVER (PA)</td>
<td>4,997</td>
<td>47</td>
</tr>
<tr>
<td>ELEVEN MILE CREEK (FL)</td>
<td>4,946</td>
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<tr>
<td>HERRINGTON LAKE (KY)</td>
<td>4,706</td>
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<tr>
<td>PACIFIC OCEAN (CA, HI, OR, WA)</td>
<td>4,468</td>
<td>50</td>
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Table A-4. Top 50 Waterways for Releases of Developmental Toxics, 2010

<table>
<thead>
<tr>
<th>Waterway</th>
<th>Releases of Developmental Toxics (lbs.)</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>BURNS CREEK (NV)</td>
<td>123,081</td>
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<tr>
<td>KANAWHA RIVER (WV)</td>
<td>86,296</td>
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<tr>
<td>MISSISSIPPI RIVER (AR, IA, IL, KY, LA, MN, MO, MS, TN, WI)</td>
<td>74,549</td>
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<tr>
<td>MILL CREEK (NV)</td>
<td>49,964</td>
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<tr>
<td>OHIO RIVER (IL, IN, KY, OH, PA, WV)</td>
<td>46,816</td>
<td>5</td>
</tr>
<tr>
<td>WINTERS CREEK (NV)</td>
<td>31,826</td>
<td>6</td>
</tr>
<tr>
<td>KANSAS RIVER (KS)</td>
<td>10,485</td>
<td>7</td>
</tr>
<tr>
<td>BRAZOS RIVER (TX)</td>
<td>10,404</td>
<td>8</td>
</tr>
<tr>
<td>JAMES RIVER (VA)</td>
<td>9,432</td>
<td>9</td>
</tr>
<tr>
<td>TENNESSEE RIVER (AL, KY, TN)</td>
<td>7,430</td>
<td>10</td>
</tr>
<tr>
<td>CAPE FEAR RIVER (NC)</td>
<td>7,124</td>
<td>11</td>
</tr>
<tr>
<td>GALVESTON BAY (TX)</td>
<td>4,415</td>
<td>12</td>
</tr>
<tr>
<td>HERRINGTON LAKE (KY)</td>
<td>4,122</td>
<td>13</td>
</tr>
<tr>
<td>COOSA RIVER (AL, GA)</td>
<td>4,013</td>
<td>14</td>
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<tr>
<td>LAKE ERIE (MI, NY, OH, PA)</td>
<td>3,983</td>
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<tr>
<td>COLUMBIA RIVER (OR, WA)</td>
<td>3,714</td>
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<tr>
<td>CROOKED CREEK (MO)</td>
<td>3,455</td>
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<tr>
<td>BEE FORK CREEK (MO)</td>
<td>3,346</td>
<td>18</td>
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<tr>
<td>ALABAMA RIVER (AL)</td>
<td>3,332</td>
<td>19</td>
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<tr>
<td>BLOCKHOUSE HOLLOW RUN (OH)</td>
<td>3,310</td>
<td>20</td>
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<tr>
<td>ARKANSAS RIVER (AR, CO, KS, OK)</td>
<td>3,132</td>
<td>21</td>
</tr>
<tr>
<td>MUSKINGUM RIVER (OH)</td>
<td>3,122</td>
<td>22</td>
</tr>
<tr>
<td>HOLSTON RIVER (TN)</td>
<td>3,103</td>
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<tr>
<td>EVERETT HARBOR (WA)</td>
<td>2,703</td>
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<tr>
<td>TOMBIGBEE RIVER (AL)</td>
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<tr>
<td>DELAWARE RIVER (DE, NJ, PA)</td>
<td>2,587</td>
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<tr>
<td>CHATTahooochee RIVER (AL, GA)</td>
<td>2,561</td>
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<tr>
<td>CORPUS CHRISTI BAY (TX)</td>
<td>2,222</td>
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<tr>
<td>LAKE MICHIGAN (IL, IN, MI, WI)</td>
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<tr>
<td>GENESEE RIVER (NY)</td>
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<td>PACIFIC OCEAN (CA, HI, OR, WA)</td>
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<tr>
<td>ROUGE RIVER (MI)</td>
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<tr>
<td>CUYAHOGA RIVER (OH)</td>
<td>1,897</td>
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<tr>
<td>CLINCH RIVER (TN, VA)</td>
<td>1,835</td>
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<tr>
<td>MISSOURI RIVER (IA, KS, MO, ND, NE)</td>
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<tr>
<td>WARRIOR RIVER (AL)</td>
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<td>MONONGAHELA RIVER (PA, WV)</td>
<td>1,619</td>
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<tr>
<td>CUMBERLAND RIVER (KY, TN)</td>
<td>1,594</td>
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<tr>
<td>KASKASKIA RIVER (IL)</td>
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<tr>
<td>LITTLE CALUMET RIVER (IL, TN)</td>
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<td>41</td>
</tr>
<tr>
<td>MOBILE RIVER (AL)</td>
<td>1,448</td>
<td>42</td>
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<td>GREAT SALT LAKE (UT)</td>
<td>1,375</td>
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</tr>
<tr>
<td>CONNER RUN (WV)</td>
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<tr>
<td>GRAVELLY RUN (VA)</td>
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<td>45</td>
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<tr>
<td>YORK RIVER (VA)</td>
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<td>46</td>
</tr>
<tr>
<td>OUACHITA RIVER (AR, LA)</td>
<td>1,229</td>
<td>47</td>
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<tr>
<td>BILLS CREEK (MO)</td>
<td>1,210</td>
<td>48</td>
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<tr>
<td>INDIANA HARBOR SHIP CANAL (IN)</td>
<td>1,131</td>
<td>49</td>
</tr>
<tr>
<td>RED RIVER (AR, LA, OK)</td>
<td>1,127</td>
<td>50</td>
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</tbody>
</table>
Table A-5. Top 50 Waterways for Releases of Reproductive Toxics, 2010

<table>
<thead>
<tr>
<th>Waterway</th>
<th>Releases of Reproductive Toxics (lbs.)</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>KANAWHA RIVER (WV)</td>
<td>85,653</td>
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<td>MISSISSIPPI RIVER (AR, IA, IL, KY, LA, MN, MO, MS, TN, WI)</td>
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<tr>
<td>OHIO RIVER (IL, IN, KY, OH, PA, WV)</td>
<td>36,505</td>
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</tr>
<tr>
<td>BRAZOS RIVER (TX)</td>
<td>12,870</td>
<td>4</td>
</tr>
<tr>
<td>KANSAS RIVER (KS)</td>
<td>10,485</td>
<td>5</td>
</tr>
<tr>
<td>TENNESSEE RIVER (AL, KY, TN)</td>
<td>5,342</td>
<td>6</td>
</tr>
<tr>
<td>GALVESTON BAY (TX)</td>
<td>4,415</td>
<td>7</td>
</tr>
<tr>
<td>BEE FORK CREEK (MO)</td>
<td>3,346</td>
<td>8</td>
</tr>
<tr>
<td>CROOKED CREEK (MO)</td>
<td>3,309</td>
<td>9</td>
</tr>
<tr>
<td>ALABAMA RIVER (AL)</td>
<td>3,282</td>
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<tr>
<td>ARKANSAS RIVER (AR, CO, KS, OK)</td>
<td>3,110</td>
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<tr>
<td>EVERETT HARBOR (WA)</td>
<td>2,700</td>
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<tr>
<td>DELAWARE RIVER (DE, NJ, PA)</td>
<td>2,510</td>
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<tr>
<td>CHATTahoochEE RIVER (AL, GA)</td>
<td>2,240</td>
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<tr>
<td>LAKE MICHIGAN (IL, IN, MI, WI)</td>
<td>2,041</td>
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<tr>
<td>HOLSTON RIVER (TN)</td>
<td>2,006</td>
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<tr>
<td>PACIFIC OCEAN (CA, HI, OR, WA)</td>
<td>1,991</td>
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<tr>
<td>CUYAHOGA RIVER (OH)</td>
<td>1,896</td>
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<tr>
<td>LAKE ERIE (MI, NY, OH, PA)</td>
<td>1,847</td>
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<tr>
<td>MUSKINGUM RIVER (OH)</td>
<td>1,814</td>
<td>20</td>
</tr>
<tr>
<td>COLUMBIA RIVER (OR, WA)</td>
<td>1,805</td>
<td>21</td>
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<tr>
<td>LITTLE CALUMET RIVER (IL, IN)</td>
<td>1,517</td>
<td>22</td>
</tr>
<tr>
<td>MONONGAHELA RIVER (PA, WV)</td>
<td>1,502</td>
<td>23</td>
</tr>
<tr>
<td>KASKASKIA RIVER (IL)</td>
<td>1,457</td>
<td>24</td>
</tr>
<tr>
<td>CUMBERLAND RIVER (KY, TN)</td>
<td>1,366</td>
<td>25</td>
</tr>
<tr>
<td>GRAVELLY RUN (VA)</td>
<td>1,340</td>
<td>26</td>
</tr>
<tr>
<td>CLINCH RIVER (TN, VA)</td>
<td>1,300</td>
<td>27</td>
</tr>
<tr>
<td>OUACHITA RIVER (AR, LA)</td>
<td>1,228</td>
<td>28</td>
</tr>
<tr>
<td>BILLS CREEK (MO)</td>
<td>1,210</td>
<td>29</td>
</tr>
<tr>
<td>TOMBIGBEE RIVER (AL)</td>
<td>1,142</td>
<td>30</td>
</tr>
<tr>
<td>INDIANA HARBOR SHIP CANAL (IN)</td>
<td>1,131</td>
<td>31</td>
</tr>
<tr>
<td>RED RIVER (AR, LA, OK)</td>
<td>1,124</td>
<td>32</td>
</tr>
<tr>
<td>YORK RIVER (VA)</td>
<td>1,104</td>
<td>33</td>
</tr>
<tr>
<td>WARRIOR RIVER (AL)</td>
<td>1,049</td>
<td>34</td>
</tr>
<tr>
<td>GREAT SALT LAKE (UT)</td>
<td>1,029</td>
<td>35</td>
</tr>
<tr>
<td>STROTHER CREEK (MO)</td>
<td>1,001</td>
<td>36</td>
</tr>
<tr>
<td>SAVANNAH RIVER (GA, SC)</td>
<td>995</td>
<td>37</td>
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<tr>
<td>Morses Creek (NJ)</td>
<td>991</td>
<td>38</td>
</tr>
<tr>
<td>ILLINOIS RIVER (IL)</td>
<td>989</td>
<td>39</td>
</tr>
<tr>
<td>CALCASIEU RIVER (LA)</td>
<td>969</td>
<td>40</td>
</tr>
<tr>
<td>LAKE SINCLAIR (GA)</td>
<td>900</td>
<td>41</td>
</tr>
<tr>
<td>WALNUT RIVER (KS)</td>
<td>872</td>
<td>42</td>
</tr>
<tr>
<td>Genesee RIVER (NY)</td>
<td>838</td>
<td>43</td>
</tr>
<tr>
<td>CAPE FEAR RIVER (NC)</td>
<td>832</td>
<td>44</td>
</tr>
<tr>
<td>Wood River (IL)</td>
<td>804</td>
<td>45</td>
</tr>
<tr>
<td>WISCONSIN RIVER (WI)</td>
<td>785</td>
<td>46</td>
</tr>
<tr>
<td>LITTLE NIXON CREEK (TN)</td>
<td>760</td>
<td>47</td>
</tr>
<tr>
<td>Cedar River (IA)</td>
<td>731</td>
<td>48</td>
</tr>
<tr>
<td>Neches River (TX)</td>
<td>717</td>
<td>49</td>
</tr>
<tr>
<td>Grand Calumet River (IN)</td>
<td>684</td>
<td>50</td>
</tr>
<tr>
<td>Watershed</td>
<td>Toxic Releases (lbs.)</td>
<td>Rank</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>-----------------------</td>
<td>------</td>
</tr>
<tr>
<td>Lower Ohio-Little Pigeon. Indiana.</td>
<td>24,450,588</td>
<td>1</td>
</tr>
<tr>
<td>Upper New. North Carolina, Virginia.</td>
<td>12,006,609</td>
<td>2</td>
</tr>
<tr>
<td>Middle Savannah. Georgia, South Carolina.</td>
<td>6,172,314</td>
<td>3</td>
</tr>
<tr>
<td>Muskingum. Ohio.</td>
<td>5,787,144</td>
<td>4</td>
</tr>
<tr>
<td>Cohansey-Maurice. New Jersey.</td>
<td>5,354,987</td>
<td>5</td>
</tr>
<tr>
<td>Blackbird-Soldier. Iowa, Nebraska.</td>
<td>4,727,380</td>
<td>6</td>
</tr>
<tr>
<td>Lower Platte-Shell. Nebraska.</td>
<td>4,623,017</td>
<td>7</td>
</tr>
<tr>
<td>Lower Savannah. Georgia, South Carolina.</td>
<td>3,465,170</td>
<td>8</td>
</tr>
<tr>
<td>Middle Platte-Buffalo. Nebraska.</td>
<td>3,386,537</td>
<td>9</td>
</tr>
<tr>
<td>Middle Ohio-Laughtery. Indiana, Kentucky, Ohio.</td>
<td>3,336,162</td>
<td>10</td>
</tr>
<tr>
<td>Lower Rock. Illinois, Wisconsin.</td>
<td>3,290,686</td>
<td>11</td>
</tr>
<tr>
<td>Bayou Sara-Thompson. Louisiana, Mississippi.</td>
<td>3,147,945</td>
<td>12</td>
</tr>
<tr>
<td>Eastern Lower Delmarva. Virginia.</td>
<td>3,118,357</td>
<td>13</td>
</tr>
<tr>
<td>Lower Big Sioux. Iowa, Minnesota, South Dakota.</td>
<td>2,949,940</td>
<td>14</td>
</tr>
<tr>
<td>Lower Illinois. Illinois.</td>
<td>2,812,570</td>
<td>15</td>
</tr>
<tr>
<td>Lower Roanoke. North Carolina.</td>
<td>2,762,301</td>
<td>16</td>
</tr>
<tr>
<td>Lumber. North Carolina, South Carolina.</td>
<td>2,743,689</td>
<td>17</td>
</tr>
<tr>
<td>Lower Monongahela. Pennsylvania, West Virginia.</td>
<td>2,617,727</td>
<td>18</td>
</tr>
<tr>
<td>Buffalo-San Jacinto. Texas.</td>
<td>2,519,168</td>
<td>19</td>
</tr>
<tr>
<td>Sandy Hook-Staten Island. New Jersey, New York.</td>
<td>2,417,862</td>
<td>21</td>
</tr>
<tr>
<td>Lake Walcott. Idaho.</td>
<td>2,299,380</td>
<td>22</td>
</tr>
<tr>
<td>Meduxnekeag. Maine.</td>
<td>2,271,733</td>
<td>23</td>
</tr>
<tr>
<td>Upper Pearl. Mississippi.</td>
<td>2,186,994</td>
<td>24</td>
</tr>
<tr>
<td>Lower Mississippi-Baton Rouge. Louisiana.</td>
<td>2,094,253</td>
<td>25</td>
</tr>
<tr>
<td>Middle Big Blue. Nebraska.</td>
<td>2,001,438</td>
<td>26</td>
</tr>
<tr>
<td>Schuylkill. Pennsylvania.</td>
<td>1,850,514</td>
<td>27</td>
</tr>
<tr>
<td>Flint-Henderson. Illinois, Iowa.</td>
<td>1,794,858</td>
<td>28</td>
</tr>
<tr>
<td>Upper Susquehanna-Tunkhannock. Pennsylvania.</td>
<td>1,711,983</td>
<td>29</td>
</tr>
<tr>
<td>East Central Louisiana Coastal. Louisiana.</td>
<td>1,706,474</td>
<td>30</td>
</tr>
<tr>
<td>Lower Iowa. Iowa.</td>
<td>1,691,343</td>
<td>31</td>
</tr>
<tr>
<td>Kalamazoo. Michigan.</td>
<td>1,656,576</td>
<td>32</td>
</tr>
<tr>
<td>Upper Ohio-Shade. Ohio, West Virginia.</td>
<td>1,573,128</td>
<td>33</td>
</tr>
<tr>
<td>Hudson-Hoosic. New York, Massachusetts, Vermont.</td>
<td>1,567,730</td>
<td>34</td>
</tr>
<tr>
<td>Lower Brazos-Little Brazos. Texas.</td>
<td>1,533,151</td>
<td>35</td>
</tr>
<tr>
<td>South Corpus Christi Bay. Texas.</td>
<td>1,532,770</td>
<td>36</td>
</tr>
<tr>
<td>Upper Ohio. Ohio, Pennsylvania, West Virginia.</td>
<td>1,490,086</td>
<td>37</td>
</tr>
<tr>
<td>Lake O the Pines. Texas.</td>
<td>1,485,297</td>
<td>38</td>
</tr>
<tr>
<td>Middle Brazos-Lake Whitney. Texas.</td>
<td>1,438,024</td>
<td>39</td>
</tr>
<tr>
<td>Seneca. New York.</td>
<td>1,395,344</td>
<td>40</td>
</tr>
<tr>
<td>Lower Genesee. New York.</td>
<td>1,394,006</td>
<td>41</td>
</tr>
<tr>
<td>Wheeler Lake. Alabama, Tennessee.</td>
<td>1,384,624</td>
<td>42</td>
</tr>
<tr>
<td>Lower Neosho. Arkansas, Oklahoma.</td>
<td>1,310,621</td>
<td>43</td>
</tr>
<tr>
<td>Upper Leaf. Mississippi.</td>
<td>1,301,219</td>
<td>44</td>
</tr>
<tr>
<td>Middle Green. Kentucky.</td>
<td>1,294,447</td>
<td>45</td>
</tr>
<tr>
<td>Upper Humboldt. Nevada.</td>
<td>1,293,527</td>
<td>46</td>
</tr>
<tr>
<td>Locust. Alabama.</td>
<td>1,287,866</td>
<td>47</td>
</tr>
<tr>
<td>Cedar-Portage. Ohio.</td>
<td>1,282,822</td>
<td>48</td>
</tr>
<tr>
<td>Lower Ochlockonee. Florida, Georgia.</td>
<td>1,234,500</td>
<td>49</td>
</tr>
<tr>
<td>Wateree. South Carolina.</td>
<td>1,207,525</td>
<td>50</td>
</tr>
</tbody>
</table>
Table A-7: Top 50 Watersheds for Releases of Cancer-Causing Chemicals, 2010

<table>
<thead>
<tr>
<th>Watershed</th>
<th>Releases of Cancer-causing Chemicals (lbs.)</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Humboldt, Nevada.</td>
<td>315,128</td>
<td>1</td>
</tr>
<tr>
<td>Lower Mississippi-Baton Rouge, Louisiana.</td>
<td>109,508</td>
<td>2</td>
</tr>
<tr>
<td>Cooper, South Carolina.</td>
<td>46,671</td>
<td>3</td>
</tr>
<tr>
<td>Wheeler Lake, Alabama, Tennessee.</td>
<td>43,945</td>
<td>4</td>
</tr>
<tr>
<td>Carolina Coastal-Sampit, North Carolina, South Carolina</td>
<td>34,565</td>
<td>5</td>
</tr>
<tr>
<td>St Marys, Florida, Georgia.</td>
<td>33,824</td>
<td>6</td>
</tr>
<tr>
<td>Lower Brazos, Texas.</td>
<td>20,496</td>
<td>7</td>
</tr>
<tr>
<td>East Central Louisiana Coastal, Louisiana.</td>
<td>20,107</td>
<td>8</td>
</tr>
<tr>
<td>Lower Columbia-Clatskanie, Oregon, Washington.</td>
<td>20,052</td>
<td>9</td>
</tr>
<tr>
<td>Lower Little Arkansas, Oklahoma.</td>
<td>19,514</td>
<td>10</td>
</tr>
<tr>
<td>South Fork Holston, Tennessee, Virginia.</td>
<td>19,477</td>
<td>11</td>
</tr>
<tr>
<td>Lake George, New York, Vermont.</td>
<td>15,963</td>
<td>12</td>
</tr>
<tr>
<td>Lower Alabama, Alabama.</td>
<td>15,098</td>
<td>13</td>
</tr>
<tr>
<td>Pickwick Lake, Alabama, Mississippi, Tennessee.</td>
<td>14,922</td>
<td>14</td>
</tr>
<tr>
<td>Lower Arkansas-Maumelle, Arkansas.</td>
<td>14,623</td>
<td>15</td>
</tr>
<tr>
<td>Cumberland-St. Simons, Georgia.</td>
<td>14,300</td>
<td>16</td>
</tr>
<tr>
<td>Middle Pearl-Silver, Mississippi.</td>
<td>13,918</td>
<td>17</td>
</tr>
<tr>
<td>Silver-Little Kentucky, Indiana, Kentucky.</td>
<td>13,736</td>
<td>18</td>
</tr>
<tr>
<td>Lower Ohio-Little Pigeon, Indiana.</td>
<td>13,554</td>
<td>19</td>
</tr>
<tr>
<td>Middle Ohio-Laughery, Indiana, Kentucky, Ohio.</td>
<td>13,271</td>
<td>20</td>
</tr>
<tr>
<td>Upper Dan, North Carolina, Virginia.</td>
<td>13,254</td>
<td>21</td>
</tr>
<tr>
<td>Upper Ohio-Shade, Ohio, West Virginia.</td>
<td>13,223</td>
<td>22</td>
</tr>
<tr>
<td>Bayou Pierre, Louisiana.</td>
<td>13,068</td>
<td>23</td>
</tr>
<tr>
<td>Bayou Macon, Arkansas, Louisiana.</td>
<td>12,822</td>
<td>24</td>
</tr>
<tr>
<td>Bayou De Chien-Mayfield, Kentucky, Tennessee.</td>
<td>12,596</td>
<td>25</td>
</tr>
<tr>
<td>Copperas-Duck, Illinois, Iowa.</td>
<td>12,517</td>
<td>26</td>
</tr>
<tr>
<td>Lower Savannah, Georgia, South Carolina.</td>
<td>11,457</td>
<td>27</td>
</tr>
<tr>
<td>Clearwater, Idaho, Washington.</td>
<td>11,317</td>
<td>28</td>
</tr>
<tr>
<td>Upper Alabama, Alabama.</td>
<td>11,303</td>
<td>29</td>
</tr>
<tr>
<td>Puget Sound, Washington.</td>
<td>11,302</td>
<td>30</td>
</tr>
<tr>
<td>Lower Ouachita-Bayou De Loutre, Arkansas, Louisiana.</td>
<td>10,834</td>
<td>31</td>
</tr>
<tr>
<td>Lower Ouachita, Louisiana.</td>
<td>10,731</td>
<td>32</td>
</tr>
<tr>
<td>Upper Black, Arkansas, Missouri.</td>
<td>10,564</td>
<td>33</td>
</tr>
<tr>
<td>Upper Willamette, Oregon.</td>
<td>10,535</td>
<td>34</td>
</tr>
<tr>
<td>Cohansev-Maurice, New Jersey.</td>
<td>10,420</td>
<td>35</td>
</tr>
<tr>
<td>Lower Pearl, Louisiana, Mississippi.</td>
<td>10,159</td>
<td>36</td>
</tr>
<tr>
<td>Bayou Sara-Thompson, Louisiana, Mississippi.</td>
<td>10,011</td>
<td>37</td>
</tr>
<tr>
<td>Lower Roanoke, North Carolina.</td>
<td>9,808</td>
<td>38</td>
</tr>
<tr>
<td>Lower Chattahoochee, Alabama, Florida, Georgia.</td>
<td>9,467</td>
<td>39</td>
</tr>
<tr>
<td>Upper Ohio, Ohio, Pennsylvania, West Virginia.</td>
<td>9,378</td>
<td>40</td>
</tr>
<tr>
<td>Lower Tennessee-Beech, Mississippi, Tennessee.</td>
<td>9,366</td>
<td>41</td>
</tr>
<tr>
<td>Lower Cape Fear, North Carolina.</td>
<td>9,217</td>
<td>42</td>
</tr>
<tr>
<td>Lower Neches, Texas.</td>
<td>9,039</td>
<td>43</td>
</tr>
<tr>
<td>Altamaha, Georgia.</td>
<td>8,801</td>
<td>44</td>
</tr>
<tr>
<td>Lower Conecuh, Alabama, Florida.</td>
<td>8,594</td>
<td>45</td>
</tr>
<tr>
<td>Econfina-Steinhatchee, Florida.</td>
<td>8,426</td>
<td>46</td>
</tr>
<tr>
<td>Middle Tombigbee-Chickasaw, Alabama, Mississippi.</td>
<td>7,662</td>
<td>47</td>
</tr>
<tr>
<td>Muskingum, Ohio.</td>
<td>7,403</td>
<td>48</td>
</tr>
<tr>
<td>Lower St. Johns, Florida.</td>
<td>7,275</td>
<td>49</td>
</tr>
<tr>
<td>St. Croix, Maine.</td>
<td>7,000</td>
<td>50</td>
</tr>
</tbody>
</table>
## Table A-8: Top 50 Watersheds for Releases of Developmental Toxics, 2010

<table>
<thead>
<tr>
<th>Watershed</th>
<th>Releases of Developmental Toxics (lbs.)</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Humboldt. Nevada.</td>
<td>204,876</td>
<td>1</td>
</tr>
<tr>
<td>Lower Kanawha. West Virginia.</td>
<td>87,264</td>
<td>2</td>
</tr>
<tr>
<td>Lower Mississippi-Baton Rouge. Louisiana.</td>
<td>63,535</td>
<td>3</td>
</tr>
<tr>
<td>Upper Ohio-Shade. Ohio, West Virginia.</td>
<td>10,747</td>
<td>4</td>
</tr>
<tr>
<td>Lower James. Virginia.</td>
<td>10,744</td>
<td>5</td>
</tr>
<tr>
<td>Middle Kansas. Kansas.</td>
<td>10,498</td>
<td>6</td>
</tr>
<tr>
<td>Upper Black. Arkansas, Missouri.</td>
<td>10,096</td>
<td>7</td>
</tr>
<tr>
<td>Lower Brazos. Texas.</td>
<td>9,976</td>
<td>8</td>
</tr>
<tr>
<td>Middle Ohio-Laughery. Indiana, Kentucky, Ohio.</td>
<td>9,847</td>
<td>9</td>
</tr>
<tr>
<td>Lower Ohio-Little Pigeon. Indiana.</td>
<td>8,947</td>
<td>10</td>
</tr>
<tr>
<td>Upper Ohio. Ohio, Pennsylvania, West Virginia.</td>
<td>7,669</td>
<td>11</td>
</tr>
<tr>
<td>Silver-Little Kentucky. Indiana, Kentucky.</td>
<td>6,320</td>
<td>12</td>
</tr>
<tr>
<td>Northeast Cape Fear. North Carolina.</td>
<td>5,668</td>
<td>13</td>
</tr>
<tr>
<td>Little Calumet-Galien. Illinois, Indiana, Michigan.</td>
<td>5,446</td>
<td>14</td>
</tr>
<tr>
<td>Upper Ohio-Wheeling. Ohio, Pennsylvania, West Virginia.</td>
<td>4,769</td>
<td>15</td>
</tr>
<tr>
<td>West Galveston Bay. Texas.</td>
<td>4,434</td>
<td>16</td>
</tr>
<tr>
<td>Lower Kentucky. Kentucky.</td>
<td>4,303</td>
<td>17</td>
</tr>
<tr>
<td>Ottawa-Stony. Michigan, Ohio.</td>
<td>3,493</td>
<td>18</td>
</tr>
<tr>
<td>Puget Sound. Washington.</td>
<td>3,375</td>
<td>20</td>
</tr>
<tr>
<td>Muskingum. Ohio.</td>
<td>3,224</td>
<td>21</td>
</tr>
<tr>
<td>Lower Coosa. Alabama.</td>
<td>3,133</td>
<td>22</td>
</tr>
<tr>
<td>South Fork Holston. Tennessee, Virginia.</td>
<td>3,130</td>
<td>23</td>
</tr>
<tr>
<td>Polecat-Snake. Oklahoma.</td>
<td>2,665</td>
<td>24</td>
</tr>
<tr>
<td>Upper Alabama. Alabama.</td>
<td>2,545</td>
<td>25</td>
</tr>
<tr>
<td>Ohio Brush-Whiteoak. Kentucky, Ohio.</td>
<td>2,516</td>
<td>26</td>
</tr>
<tr>
<td>South Corpus Christi Bay. Texas.</td>
<td>2,459</td>
<td>27</td>
</tr>
<tr>
<td>Lower Tombigbee. Alabama.</td>
<td>2,448</td>
<td>28</td>
</tr>
<tr>
<td>Mattaponi. Virginia.</td>
<td>2,438</td>
<td>29</td>
</tr>
<tr>
<td>Guntersville Lake. Alabama, Georgia, Tennessee.</td>
<td>2,426</td>
<td>30</td>
</tr>
<tr>
<td>Detroit. Michigan.</td>
<td>2,239</td>
<td>31</td>
</tr>
<tr>
<td>Kentucky Lake. Kentucky, Tennessee.</td>
<td>2,150</td>
<td>32</td>
</tr>
<tr>
<td>Cuyahoga. Ohio.</td>
<td>2,067</td>
<td>33</td>
</tr>
<tr>
<td>Lower Grand. Louisiana.</td>
<td>2,062</td>
<td>34</td>
</tr>
<tr>
<td>Lower Genesee. New York.</td>
<td>2,046</td>
<td>35</td>
</tr>
<tr>
<td>Cahokia-Joachim. Illinois, Missouri.</td>
<td>1,948</td>
<td>36</td>
</tr>
<tr>
<td>Siletz-Yaquina. Oregon.</td>
<td>1,928</td>
<td>37</td>
</tr>
<tr>
<td>East Central Louisiana Coastal. Louisiana.</td>
<td>1,907</td>
<td>38</td>
</tr>
<tr>
<td>Perqure-Piasa. Illinois, Missouri.</td>
<td>1,824</td>
<td>39</td>
</tr>
<tr>
<td>Buffalo-San Jacinto. Texas.</td>
<td>1,821</td>
<td>40</td>
</tr>
<tr>
<td>Powell. Tennessee.</td>
<td>1,768</td>
<td>41</td>
</tr>
<tr>
<td>Lower Mississippi-New Orleans. Louisiana.</td>
<td>1,745</td>
<td>42</td>
</tr>
<tr>
<td>Upper Tallapoosa. Alabama, Georgia.</td>
<td>1,725</td>
<td>43</td>
</tr>
<tr>
<td>Middle Wabash-Busseron. Illinois, Indiana.</td>
<td>1,638</td>
<td>44</td>
</tr>
<tr>
<td>Lower Kaskasia. Illinois.</td>
<td>1,530</td>
<td>45</td>
</tr>
<tr>
<td>Lower Tennessee-Beech. Mississippi, Tennessee.</td>
<td>1,521</td>
<td>46</td>
</tr>
<tr>
<td>Lower Monongahela. Pennsylvania, West Virginia.</td>
<td>1,509</td>
<td>47</td>
</tr>
<tr>
<td>Lower Cape Fear. North Carolina.</td>
<td>1,469</td>
<td>48</td>
</tr>
<tr>
<td>Mobile-Tensaw. Alabama.</td>
<td>1,456</td>
<td>49</td>
</tr>
<tr>
<td>Jordan. Utah.</td>
<td>1,397</td>
<td>50</td>
</tr>
</tbody>
</table>
Table A-9: Top 50 Watersheds for Releases of Reproductive Toxics, 2010

<table>
<thead>
<tr>
<th>Watershed</th>
<th>Releases of Reproductive Toxics (lbs.)</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Kanawha. West Virginia.</td>
<td>85,721</td>
<td>1</td>
</tr>
<tr>
<td>Lower Mississippi-Baton Rouge. Louisiana.</td>
<td>61,727</td>
<td>2</td>
</tr>
<tr>
<td>Lower Brazos. Texas.</td>
<td>12,767</td>
<td>3</td>
</tr>
<tr>
<td>Middle Kansas. Kansas.</td>
<td>10,498</td>
<td>4</td>
</tr>
<tr>
<td>Upper Ohio-Shade. Ohio, West Virginia.</td>
<td>10,415</td>
<td>5</td>
</tr>
<tr>
<td>Upper Black. Arkansas, Missouri.</td>
<td>9,950</td>
<td>6</td>
</tr>
<tr>
<td>Lower Ohio-Little Pigeon. Indiana.</td>
<td>7,481</td>
<td>7</td>
</tr>
<tr>
<td>Upper Ohio. Ohio, Pennsylvania, West Virginia.</td>
<td>7,417</td>
<td>8</td>
</tr>
<tr>
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<td>Silver-Little Kentucky. Indiana, Kentucky.</td>
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<tr>
<td>Middle Ohio-Laughery. Indiana, Kentucky, Ohio.</td>
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<td>West Galveston Bay. Texas.</td>
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<td>Polecat-Snake. Oklahoma.</td>
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<tr>
<td>Upper Alabama. Alabama.</td>
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<td>Mattaponi. Virginia.</td>
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<tr>
<td>South Fork Holston. Tennessee, Virginia.</td>
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<td>Cuyahoga. Ohio.</td>
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<td>Cahokia-Joachim. Illinois, Missouri.</td>
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<td>Siletz-Yaquina. Oregon.</td>
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<tr>
<td>Kentucky Lake. Kentucky, Tennessee.</td>
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<td>21</td>
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<tr>
<td>Muskingum. Ohio.</td>
<td>1,907</td>
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<tr>
<td>Lower Mississippi-New Orleans. Louisiana.</td>
<td>1,744</td>
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<td>Lower James. Virginia.</td>
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<tr>
<td>East Central Louisiana Coastal. Louisiana.</td>
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<tr>
<td>Lower Columbia-Clatskanie. Oregon, Washington.</td>
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<td>Perquim-Plasa. Illinois, Missouri.</td>
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<td>Buffalo-San Jacinto. Texas.</td>
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<td>Lower Tennessee-Beech. Mississippi, Tennessee.</td>
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<td>Lower Monongahela. Pennsylvania, West Virginia.</td>
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<td>York. Virginia.</td>
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<tr>
<td>Lower Calcasieu. Louisiana.</td>
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<td>Jordan. Utah.</td>
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<td>Bayou Sara-Thompson. Louisiana, Mississippi.</td>
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<td>Sandy Hook-Staten Island. New Jersey, New York.</td>
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<td>Middle Cedar. Iowa.</td>
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<td>Wheeler Lake. Alabama, Tennessee.</td>
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<td>Lower Tombigbee. Alabama.</td>
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<td>Cohansepy-Maurice. New Jersey.</td>
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<td>Upper Oconee. Georgia.</td>
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<td>Upper Walnut River. Kansas.</td>
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<td>Lower Grand. Louisiana.</td>
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<tr>
<td>Lower Genesee. New York.</td>
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Table A-10: Top Facilities by Releases of All Toxic Chemicals in 2010

<table>
<thead>
<tr>
<th>Facility Name</th>
<th>State</th>
<th>Owner</th>
<th>Toxic Releases (lb.)</th>
<th>Waterways Affected</th>
<th>Rank</th>
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<tbody>
<tr>
<td>AK STEEL CORP (ROCKPORT WORKS)</td>
<td>IN</td>
<td>AK STEEL CORP</td>
<td>24,305,396</td>
<td>Ohio River</td>
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<td>US ARMY RADFORD ARMY AMMUNITION PLANT</td>
<td>VA</td>
<td>US DEPARTMENT OF DEFENSE</td>
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<td>OH</td>
<td>AK STEEL CORP</td>
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<td>DUPS ONT CHAMBERS WORKS</td>
<td>NJ</td>
<td>E I DU PONT DE NEMOURS &amp; CO INC</td>
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<td>Delaware River</td>
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<td>NE</td>
<td>TYSON FOODS INC</td>
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<tr>
<td>CARGILL MEAT SOLUTIONS CORP</td>
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<td>CARGILL INC</td>
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<td>Shonka Ditch</td>
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<tr>
<td>DSM CHEMICALS NORTH AMERICA INC</td>
<td>GA</td>
<td>DSM HOLDING CO INC</td>
<td>4,527,472</td>
<td>Savannah River</td>
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<tr>
<td>TYSON FRESH MEATS INC</td>
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<td>TYSON FOODS INC</td>
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<td>TYSON FRESH MEATS INC - JOSLIN IL</td>
<td>IL</td>
<td>TYSON FOODS INC</td>
<td>3,290,330</td>
<td>Rock River</td>
<td>9</td>
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<tr>
<td>NORTH AMERICAN STAINLESS</td>
<td>KY</td>
<td>ACERINOX SA</td>
<td>3,206,744</td>
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<tr>
<td>JOHN MORRELL &amp; CO</td>
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<td>THE SMITHFIELD FOODS INC</td>
<td>2,949,940</td>
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<tr>
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<td>EXXON MOBIL CORP</td>
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<td>CARGILL INC</td>
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<td>SMITHFIELD PACKING CO INC TAR HEEL DIV</td>
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<td>THE SMITHFIELD FOODS INC</td>
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<td>PERDUE FARMS INC</td>
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<td>USS - CLAIRTON WORKS</td>
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<td>US STEEL CORP</td>
<td>2,415,233</td>
<td>Monongahela River, Peters Creek</td>
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<td>BASF CORP - SAVANNAH OPERATIONS</td>
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<td>BASF CORP</td>
<td>2,415,000</td>
<td>Savannah River</td>
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<td>CONOCOPHILLIPS</td>
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<td>MCCAIN FOODS USA</td>
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<td>MCCAIN FOODS USA INC</td>
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<td>MCCAIN FOODS USA INC</td>
<td>ME</td>
<td>MCCAIN FOODS USA INC</td>
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<tr>
<td>USS GARY WORKS</td>
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<td>PERDUE FARMS INC</td>
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<td>FARMLAND FOODS INC</td>
<td>NE</td>
<td>FARMLAND FOODS INC</td>
<td>1,739,613</td>
<td>Big Blue River</td>
<td>23</td>
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</table>
### Table A-10: Top Facilities by Releases of All Toxic Chemicals in 2010

<table>
<thead>
<tr>
<th>Facility Name</th>
<th>State</th>
<th>Owner</th>
<th>Toxic Releases (lb.)</th>
<th>Waterways Affected</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROQUETTE AMERICA INC</td>
<td>IA</td>
<td>ROQUETTE FRERES</td>
<td>1,704,810</td>
<td>Mississippi River</td>
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<td>TYSON FRESH MEATS INC</td>
<td>IA</td>
<td>TYSON FOODS INC</td>
<td>1,691,335</td>
<td>Cedar River, Iowa River</td>
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<tr>
<td>JBS PLAINWELL</td>
<td>MI</td>
<td>JBS USA</td>
<td>1,646,574</td>
<td>Chart Creek, Kalamazoo River</td>
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<tr>
<td>SANDERSON FARMS INC</td>
<td>TX</td>
<td>SANDERSON FARMS INC</td>
<td>1,533,000</td>
<td>Cottonwood Branch</td>
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<td>FINCH PAPER LLC</td>
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<td>FINCH PAPER HOLDINGS</td>
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<td>SANDERSON FARMS INC</td>
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<td>CF INDUSTRIES INC</td>
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<td>CF INDUSTRIES HOLDINGS INC</td>
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<td>EASTMAN KODAK CO</td>
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<td>ANHEUSER-BUSCH INBEV</td>
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<td>PECO FOODS INC</td>
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<td>PECO FOODS INC</td>
<td>1,339,293</td>
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<td>PRYOR SOLAE</td>
<td>OK</td>
<td>E I DU PONT DE NEMOURS &amp; CO INC</td>
<td>1,310,452</td>
<td>Grand Neosho River</td>
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<td>JERRITT CANYON MINE</td>
<td>NV</td>
<td>YUKON NEVADA GOLD</td>
<td>1,293,522</td>
<td>Burns Creek, Mill Creek, Winters Creek</td>
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<td>TYSON FOODS INC BLOUNTSVILLE PROCESSING PLANT</td>
<td>AL</td>
<td>TYSON FOODS INC</td>
<td>1,276,298</td>
<td>Graves Creek</td>
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<td>MATERION BRUSH INC</td>
<td>OH</td>
<td>MATERION INC</td>
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<td>Hyde Run Ditch, Portage River</td>
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<td>BASF CORP ATTAPULGUS OPS</td>
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<td>BASF CORP</td>
<td>1,234,500</td>
<td>Little Attapulagus Creek</td>
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</tbody>
</table>
Table A-10: Top Facilities by Releases of All Toxic Chemicals in 2010

<table>
<thead>
<tr>
<th>Facility Name</th>
<th>State</th>
<th>Owner</th>
<th>Toxic Releases (lb.)</th>
<th>Waterways Affected</th>
<th>Rank</th>
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<tbody>
<tr>
<td>ASCEND PERFORMANCE MATERIALS LLC - DECATUR PLANT</td>
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<td>1,154,357</td>
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<td>CARGILL MEAT SOLUTIONS CORP</td>
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<td>BABCOCK &amp; WILCOX NUCLEAR OPERATIONS GROUP VA</td>
<td>VA</td>
<td>BABCOCK &amp; WILCOX CO INC</td>
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<td>State</td>
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<td>Waterways Affected</td>
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<tr>
<td>Alabama</td>
<td>TYSON FOODS INC BLOUNTSVILLE PROCESSING PLANT</td>
<td>TYSON FOODS INC</td>
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<td>POGO MINE</td>
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<td>TYSON FOODS INC</td>
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<td>Rock River</td>
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<td>Indiana</td>
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<tr>
<td>Kentucky</td>
<td>NORTH AMERICAN STAINLESS</td>
<td>ACERINOX SA</td>
<td>3,206,744</td>
<td>Ohio River</td>
<td></td>
</tr>
<tr>
<td>Louisiana</td>
<td>EXXONMOBIL REFINING &amp; SUPPLY BATON ROUGE REFINERY</td>
<td>EXXON MOBIL CORP</td>
<td>2,833,713</td>
<td>Mississippi River</td>
<td></td>
</tr>
<tr>
<td>Maine</td>
<td>MCCAIN FOODS USA INC</td>
<td>MCCAIN FOODS USA INC</td>
<td>2,271,733</td>
<td>Aroostook River</td>
<td></td>
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<tr>
<td>Maryland</td>
<td>ERACHEM COMILOG INC - BALTIMORE PLANT</td>
<td>COMILOG US INC</td>
<td>922,688</td>
<td>Curtis Creek</td>
<td></td>
</tr>
</tbody>
</table>

Table A-11: Top Discharging Facility by State, All Toxic Chemicals, 2010
Table A-11: Top Discharging Facility by State, All Toxic Chemicals, 2010 (cont’d.)

<table>
<thead>
<tr>
<th>State</th>
<th>Facility</th>
<th>Owner</th>
<th>Toxic Releases (lbs.)</th>
<th>Waterways Affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Massachusetts</td>
<td>ONYX SPECIALTY PAPERS INC - WILLOW MILL</td>
<td>(none listed)</td>
<td>3,696</td>
<td>Housatonic River</td>
</tr>
<tr>
<td>Michigan</td>
<td>JBS PLAINWELL</td>
<td>JBS USA</td>
<td>1,646,574</td>
<td>Chart Creek, Kalamazoo River</td>
</tr>
<tr>
<td>Minnesota</td>
<td>SOUTHERN MINNESOTA BEET SUGAR COOPERATIVE</td>
<td>SOUTHERN MINNESOTA BEET SUGAR COOPERATIVE</td>
<td>562,026</td>
<td>County Ditch 45</td>
</tr>
<tr>
<td>Mississippi</td>
<td>PECO FOODS INC</td>
<td>PECO FOODS INC</td>
<td>1,339,293</td>
<td>Sipsey Creek</td>
</tr>
<tr>
<td>Missouri</td>
<td>TYSON FOODS INC - PROCESSING PLANT</td>
<td>TYSON FOODS INC</td>
<td>410,724</td>
<td>Little Muddy Creek</td>
</tr>
<tr>
<td>Montana</td>
<td>CHS INC LAUREL REFINERY</td>
<td>CHS INC</td>
<td>111,566</td>
<td>Yellowstone River</td>
</tr>
<tr>
<td>Nebraska</td>
<td>TYSON FRESH MEATS INC WWTP</td>
<td>TYSON FOODS INC</td>
<td>4,623,500</td>
<td>Missouri River</td>
</tr>
<tr>
<td>Nevada</td>
<td>JERRITT CANYON MINE</td>
<td>YUKON NEVADA GOLD</td>
<td>1,293,522</td>
<td>Burns Creek, Mill Creek, Winters Creek</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>MERRIMACK STATION</td>
<td>PUBLIC SERVICE CO OF NEW HAMPSHIRE</td>
<td>1,542</td>
<td>Merrimack River</td>
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<tr>
<td>New Jersey</td>
<td>DUPONT CHAMBERS WORKS</td>
<td>E I DU PONT DE NEMOURS &amp; CO INC</td>
<td>5,354,113</td>
<td>Delaware River</td>
</tr>
<tr>
<td>New Mexico</td>
<td>US DOD USAF HOLLOMAN AFB</td>
<td>US DEPARTMENT OF DEFENSE</td>
<td>46,267</td>
<td>Lagoon G</td>
</tr>
<tr>
<td>New York</td>
<td>FINCH PAPER LLC</td>
<td>FINCH PAPER HOLDINGS</td>
<td>1,480,125</td>
<td>Hudson River</td>
</tr>
<tr>
<td>North Carolina</td>
<td>SMITHFIELD PACKING CO INC TAR HEEL DIV</td>
<td>THE SMITHFIELD FOODS INC</td>
<td>2,743,689</td>
<td>Cape Fear River</td>
</tr>
<tr>
<td>North Dakota</td>
<td>GREAT RIVER ENERGY STANTON STATION</td>
<td>GREAT RIVER ENERGY</td>
<td>52,955</td>
<td>Missouri River</td>
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<tr>
<td>Ohio</td>
<td>AK STEEL CORP COSHOCTON WORKS</td>
<td>AK STEEL CORP</td>
<td>5,500,750</td>
<td>Muskingum River</td>
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<tr>
<td>Oklahoma</td>
<td>PRYOR SOLAE</td>
<td>E I DU PONT DE NEMOURS &amp; CO INC</td>
<td>1,310,452</td>
<td>Grand Neosho River</td>
</tr>
<tr>
<td>Oregon</td>
<td>TDY INDUSTRIES INC (DBA WAH CHANG)</td>
<td>ALLEGHENY TECHNOLOGIES INC</td>
<td>548,479</td>
<td>Willamette River</td>
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<tr>
<td>Pennsylvania</td>
<td>USS - CLAIRTON WORKS</td>
<td>US STEEL CORP</td>
<td>2,415,233</td>
<td>Monongahela River, Peters Creek</td>
</tr>
<tr>
<td>Rhode Island</td>
<td>BB &amp; S TREATED LUMBER OF NE</td>
<td>(none listed)</td>
<td>404</td>
<td>Black Swamp</td>
</tr>
<tr>
<td>South Carolina</td>
<td>INVISTA SARL CAMDEN MAY PLANT</td>
<td>KOCH INDUSTRIES INC</td>
<td>1,032,712</td>
<td>Wateree River</td>
</tr>
</tbody>
</table>
### Table A-11: Top Discharging Facility by State, All Toxic Chemicals, 2010 (cont’d.)

<table>
<thead>
<tr>
<th>State</th>
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<th>Owner</th>
<th>Toxic Releases (lbs.)</th>
<th>Waterways Affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Dakota</td>
<td>JOHN MORRELL &amp; CO</td>
<td>THE SMITHFIELD FOODS INC</td>
<td>2,949,940</td>
<td>Big Sioux River</td>
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<tr>
<td>Tennessee</td>
<td>EASTMAN CHEMICAL CO</td>
<td>EASTMAN CHEMICAL CO</td>
<td>788,135</td>
<td>Holston River</td>
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<tr>
<td>Texas</td>
<td>SANDERSON FARMS INC</td>
<td>SANDERSON FARMS INC</td>
<td>1,533,000</td>
<td>Cottonwood Branch</td>
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<tr>
<td>Utah</td>
<td>CHEVRON PRODUCTS CO - SALT LAKE REFINERY</td>
<td>CHEVRON CORP</td>
<td>90,594</td>
<td>Northwest Oil Drain Canal</td>
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<tr>
<td>Vermont</td>
<td>IBM CORP</td>
<td>IBM CORP</td>
<td>121,518</td>
<td>Winooski River</td>
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<tr>
<td>Virginia</td>
<td>US ARMY RADFORD ARMY AMMUNITION PLANT</td>
<td>US DEPARTMENT OF DEFENSE</td>
<td>12,006,602</td>
<td>New River</td>
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<tr>
<td>Washington</td>
<td>SIMPSON TACOMA KRAFT CO LLC</td>
<td>SIMPSON INVESTMENT CO</td>
<td>261,473</td>
<td>Puget Sound</td>
</tr>
<tr>
<td>West Virginia</td>
<td>DUPONT WASHINGTON WORKS</td>
<td>E I DU PONT DE NEMOURS &amp; CO INC</td>
<td>551,164</td>
<td>Ohio River</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>MCCAIN FOODS USA INC</td>
<td>MCCAIN FOODS USA INC</td>
<td>807,600</td>
<td>Wisconsin River</td>
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<tr>
<td>Wyoming</td>
<td>PACIFICORP DAVE JOHNSTON PLANT</td>
<td>BERKSHIRE HATHAWAY</td>
<td>7,398</td>
<td>North Platte River</td>
</tr>
</tbody>
</table>