

2014

A Strategy to Protect Virginians From Toxic Chemicals

Noah M. Sachs

University of Richmond, nsachs@richmond.edu

Follow this and additional works at: <https://scholarship.richmond.edu/law-faculty-publications>



Part of the [Environmental Law Commons](#)

Recommended Citation

Noah M. Sachs & Ryan P. Murphy, A Strategy to Protect Virginians From Toxic Chemicals (2014)

This Book is brought to you for free and open access by the School of Law at UR Scholarship Repository. It has been accepted for inclusion in Law Faculty Publications by an authorized administrator of UR Scholarship Repository. For more information, please contact scholarshiprepository@richmond.edu.

1-2014

A Strategy to Protect Virginians From Toxic Chemicals

Noah M. Sachs

University of Richmond, nsachs@richmond.edu

Follow this and additional works at: <http://scholarship.richmond.edu/law-faculty-publications>



Part of the [Environmental Law Commons](#)

Recommended Citation

Noah M. Sachs & Ryan P. Murphy, A Strategy to Protect Virginians From Toxic Chemicals (2014)

This Book is brought to you for free and open access by the School of Law at UR Scholarship Repository. It has been accepted for inclusion in Law Faculty Publications by an authorized administrator of UR Scholarship Repository. For more information, please contact scholarshiprepository@richmond.edu.

A STRATEGY TO PROTECT VIRGINIANS FROM TOXIC CHEMICALS



ROBERT R. MERHIGE, JR.
CENTER FOR ENVIRONMENTAL STUDIES
UNIVERSITY OF RICHMOND SCHOOL OF LAW

Professor Noah M. Sachs
Ryan P. Murphy

JANUARY 2014

A STRATEGY TO PROTECT VIRGINIANS FROM TOXIC CHEMICALS

TABLE OF CONTENTS

EXECUTIVE SUMMARY	3
PART I: TOXIC CHEMICAL RELEASES, STORAGE, AND EXPOSURES IN VIRGINIA	9
A. Industrial Releases of Toxic Chemicals.....	9
B. Toxic Chemical Storage in Virginia.....	16
C. Historic Toxic Sites in Virginia	18
1. Superfund Sites in Virginia on the National Priorities List	19
2. Other Contaminated Sites in Virginia	21
D. Coal Ash in Virginia	25
E. Toxic Chemicals in the Home	28
1. Endocrine Disruptors in Children’s Products	28
2. Flame Retardants in Consumer Products.....	29
3. Triclosan in Anti-Bacterial Soaps & Other Household Products	31
4. Formaldehyde in Household Products.....	31
PART II: USING STATE AUTHORITY TO ADDRESS TOXIC RISKS	32
A. Create a Program to Remediate Contaminated Sites in Virginia.....	32
B. Increase VA DEQ’s Administrative Authority.....	37
C. Enact Legislation and Permit Conditions that Are More Stringent Than Federal Standards	38
D. Enact Legislation to Address Consumer Toxic Exposure.....	40
CONCLUSION	43
ENDNOTES	44

ABOUT THE AUTHORS

Noah M. Sachs

Noah M. Sachs is Professor of Law at the University of Richmond and Director of the School of Law’s Robert R. Merhige, Jr. Center for Environmental Studies. He is the author of numerous publications on domestic and international environmental law and is co-author of the textbook: *Regulation of Toxic Substances and Hazardous Waste* (Foundation Press 2011). He can be reached at 804-289-8555 or nsachs@richmond.edu.

Ryan Murphy

Ryan Murphy is a third-year student at the University of Richmond School of Law. He directed the 2013 Allen Chair Symposium and is the editor of the forthcoming 2014 Allen Chair issue of the *University of Richmond Law Review*: “The “Energy-Water Nexus.” He can be reached at ryan.p.murphy@richmond.edu.

Acknowledgements:

We wish to thank Dean Wendy Perdue of the University of Richmond School of Law and the Virginia Environmental Endowment for their support of the Center for Environmental Studies and this project.

Design: Jeff Blair, DesignVisions.net

EXECUTIVE SUMMARY

In Virginia, toxic chemicals in the environment receive relatively little attention, especially when compared to high-profile environmental issues such as the Chesapeake Bay, land use, and transportation. Legislators and the media rarely discuss where toxic chemicals are stored or released within the Commonwealth, and there is a dangerous silence about the daily exposure of Virginians to toxic chemicals.

A new strategy is urgently needed to protect Virginians from toxic chemicals. These chemicals are in the air we breathe, the water we fish in, and the land we live on. Exposure to toxic chemicals is significant. For example, over two million Virginians live in communities



that fail at least one federal health-based standard for air pollution.¹ Toxic contamination of fish remains so high that the Department of Health maintains fish consumption advisories for most of the major waterways in Virginia.² The health impacts of exposure fall particularly hard on children. There are over sixty schools in the Commonwealth that are in the top five percent of schools nationwide in terms of exposure to toxic air pollution.³

The Virginia Constitution states that it is the “Commonwealth’s policy to protect its atmosphere, lands, and waters from pollution, impairment, or destruction, for the benefit, enjoyment, and general welfare of the people of the Commonwealth.”⁴ Clearly, we have a long way to go before that policy becomes reality.





This report shows the true picture of contamination and toxic releases in Virginia. Consider these facts, based on data gathered from 2009-2012:

- In 2011, industries in Virginia discharged 19.9 million pounds of toxic chemicals into the air, 16.7 million pounds into water, and 2.5 million pounds into land.⁵
- In 2011, industries in Virginia emitted more toxic chemicals to water, air, and land than industries in thirty-six other states.⁶
- Electric generating facilities in Virginia emit more toxic chemicals than in thirty-nine other states.⁷
- A 2010 study by the Clean Air Task Force estimated that emissions of fine sooty particles from coal-fired power plants cause 647 premature deaths, 477 hospital admissions, and 896 non-fatal heart attacks annually in Virginia.⁸
- Virginia's waterways are the second worst in the nation, measured by the amount of toxic chemicals discharged into them.⁹
- The New River and the Roanoke River are among the worst twenty waterways in the nation, measured by the amount of toxic chemicals discharged into them.¹⁰

- The James River is the ninth worst waterway in the nation, measured by the amount of developmental toxins discharged into it.¹¹
- Virginia’s electric utilities generate about 2.4 million tons of toxic coal ash annually. Most of this ash is disposed next to waterways, and the U.S. Environmental Protection Agency (EPA) has listed eight coal ash disposal sites in the Commonwealth as “significant hazards.”¹² Failure of these decades-old sites to contain the ash would result in extensive environmental and economic damage.
- According to the Virginia Department of Environmental Quality (DEQ), there are 277 different facilities in the Commonwealth (with 570 total outfall pipes) that are legally permitted to discharge one or more toxic chemicals into Virginia’s waters.¹³
- Thirty-one contaminated sites in Virginia are so hazardous that they are on EPA’s National Priorities List under the federal Superfund program.¹⁴ There are hundreds of smaller contaminated sites throughout the Commonwealth that remain unaddressed because, unlike neighboring states, Virginia has no comprehensive program to prioritize and clean up contaminated sites that fall outside federal jurisdiction.

This is not an environmental record that we should be proud of. Reforms are urgently needed to reduce toxic chemical releases and toxic chemical exposures in the Commonwealth.

These facts, moreover, are just the tip of the iceberg. There are numerous other sources of toxic chemical exposure in Virginia that are poorly tracked by regulatory agencies. These include:

- Hazardous air toxics emitted from automobiles, trucks, trains, and boats.
- Toxic chemicals discharged into the air, water, and land from small facilities not required to report annual releases.¹⁵
- Air pollution and water pollution coming from out-of-state. Because Virginia is downwind from industrialized states such as Ohio, we receive significant air pollution from our neighbors.

- Agricultural pesticides and weed killers.
- Household, school, and workplace sources of toxic chemicals, including asbestos, lead paint, formaldehyde, endocrine disrupting chemicals, and other substances.

This report is the first comprehensive examination of the sources of toxic releases in Virginia and the potential exposure of Virginians to harmful chemicals. We have reviewed publicly available data on toxic releases and analyzed the laws and regulations that allow these releases to occur. **The central conclusion of this report is that the Commonwealth needs to use its own authority to fill gaps in federal law, step up enforcement, and protect Virginia’s citizens from toxic exposures.**

Because Virginians are exposed to toxic chemicals from a wide variety of sources, focusing on one source of exposure misses the big picture. As the National Cancer Institute concluded in a 2010 report, “the American people—even before they are born—are bombarded continually with myriad combinations” of toxic chemicals.¹⁶ It added that “the true burden of environmentally induced cancer has been grossly underestimated.”¹⁷



This report does not attempt to address every potential source of chemical exposure in the Commonwealth. For instance, we do not discuss asbestos, lead paint, occupational exposure, or the emerging issue of hydraulic fracturing chemicals. More research is needed to identify exposures and assess health risks from the wide variety of toxic chemicals released into Virginia’s environment.

Our review of the law concludes that existing law is inadequate to protect Virginians. There are major gaps in the law, and Virginia lags behind other states in using state authority to address chemical risks. For example, Virginia lacks a comprehensive program to identify and clean up hundreds of contaminated sites in the Commonwealth that are not covered by the federal Superfund law. Moreover, current budgets for program and enforcement personnel are inadequate to enforce existing law, let alone the expanded protective program we recommend in this report. The toxics program at DEQ is understaffed, with about thirty full-time employees devoted to implementing and enforcing toxic chemical laws and regulations for the entire Commonwealth. In comparison, we have found that North Carolina, a state with a population slightly larger than Virginia’s, has around one hundred full-time employees implementing and enforcing toxic chemical laws and regulations.



Our review concludes that most of the toxic releases to our environment are not illegal. They are usually permitted by DEQ, which implements federal and state environmental laws. The Commonwealth retains the authority to crack down on toxic discharges by enacting laws and issuing permits that are stricter than what federal law requires. However, it has rarely acted on this authority. There is little prospect for new federal environmental regulation or federal grant programs to assist the states on enforcement. For the foreseeable future, the Commonwealth must take the lead to protect its own citizens.

OUR PRINCIPAL RECOMMENDATIONS ARE AS FOLLOWS:

- **The General Assembly should increase funding and personnel at DEQ to oversee an expanded, protective, toxic chemical program, and it should consider consolidating personnel in a new Division of Toxic Substances at DEQ.**
- **The General Assembly should enact new legislation providing clear authority to DEQ to require responsible parties to clean up contaminated sites not addressed under the federal Superfund program. The General Assembly should also empower DEQ to undertake clean-up itself, using state funds, and then seek reimbursement from responsible parties.**
- **DEQ should use existing authority under the Waste Management Act to enter into consent orders with parties willing to remediate contaminated sites.**
- **DEQ and the three citizen boards governing air, water, and waste should enact strict limits on toxic chemical releases in environmental permits, especially in environmentally sensitive areas. The General Assembly should also provide authority to regulate toxic substances not controlled under federal law.**

- **DEQ and the three citizen boards should focus stricter permitting and enforcement efforts on chemical manufacturing and electric utilities, which are responsible for more than two-thirds of all reported toxic chemical releases to Virginia’s environment.**
- **The Virginia Waste Management Board and DEQ should close numerous loopholes in regulation that allow health risks to continue from toxic coal ash from power plants. Using existing authority, the Board and DEQ should increase inspections, monitoring, permitting, and oversight of coal ash landfills and ponds.**
- **The General Assembly should enact legislation that treats coal ash disposal sites as hazardous waste facilities.**
- **The General Assembly should increase the amount of penalties that DEQ can seek through informal orders to \$15,000 per day of violation.**
- **DEQ and the Attorney General should enforce existing laws requiring reporting by facilities that store toxic chemicals, and they should audit reports submitted by industry to ensure compliance with the law.**
- **The General Assembly should enact a comprehensive program to reduce exposures to toxic chemicals from products such as children’s toys, electronics, furniture, and construction materials. The program should adapt models from other states and should include product labeling, identification of priority chemicals, and, where necessary, product bans.**



This report is divided into two main parts. Part I of this report details the major sources of toxic chemical releases in Virginia. Part II then discusses our recommendations in more detail, outlining a series of reforms that would help the Commonwealth police and reduce the risks from toxic chemicals.

U.S. District Court Judge Robert R. Merhige, Jr., after whom the Center at the University of Richmond School of Law is named, gained national attention in the mid-1970s when he presided over a Clean Water Act case involving the discharge of Kepone into the James River. The work of the Robert R. Merhige, Jr. Center for Environmental Studies — and this report — continue his legacy.

PART I: TOXIC CHEMICAL RELEASES, STORAGE, AND EXPOSURES IN VIRGINIA



A. INDUSTRIAL RELEASES OF TOXIC CHEMICALS

Each day in the United States, 42 billion pounds of chemicals are produced or imported.¹⁸ In Virginia, industries use billions of pounds of toxic chemicals — including known carcinogens such as arsenic, trichloroethylene, chromium and silica — to produce products every year. Millions of pounds of toxic chemicals are then released to Virginia’s environment through smokestacks and discharge pipes.

In 2011 (the most recent year for which information is available), Virginia’s industries released 39.23 million pounds of toxic chemicals into air, water, and land.¹⁹ In addition, they generated another 68.71 million pounds of toxic chemical waste that they sent off-site for disposal (some of this disposal was out of state).²⁰

WHAT ARE “TOXIC” CHEMICALS?

All of the chemicals subject to reporting under EPCRA are toxic. “Toxic” does not mean that humans will have immediate health effects if exposed to them. But they are dangerous chemicals nonetheless. The law defines “toxic” chemicals as those known or reasonably anticipated to cause “adverse acute health effects . . . as a result of continuous or frequently occurring releases; cancer in humans; or a significant adverse effect on the environment because of the chemical’s toxicity and persistence in the environment.” The federal government has singled out 600 toxic chemicals for the toxic release reporting requirement, out of over 83,000 chemicals that have been used in commerce in the United States. The TRI reporting requirement, in other words, applies to only a small fraction of all chemicals in use. These 600 chemicals are dangerous, though the harm to humans from a given amount of exposure can vary widely.

Because of federal environmental laws, citizens have a right to know about the release and the management of toxic chemicals in the Commonwealth. The major right-to-know law is the Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986, passed by Congress in the wake of the 1984 disaster in Bhopal, India. In Bhopal, accidental release of toxic methyl isocyanate gas from a Union Carbide plant killed at least 3,800 people.

EPCRA has two major components. First, it requires that facilities that manufacture, process, or otherwise use any of nearly 600 toxic chemicals and 30 chemical categories report annually on the amount of each toxic chemical released from their facilities. This is the



so-called Toxic Release Inventory (TRI). Second, EPCRA requires facilities that store toxic chemicals above a certain threshold amount to file reports with state and local governments on the types and amounts of chemicals that they have on site. This so-called “inventory reporting” is designed to help communities understand the risks that are in the community and to give adequate notice to firefighters and other first responders.

The TRI data, which are estimates provided by the facilities themselves, provide a look at the sources of toxic releases in the Commonwealth. The following tables (relying primarily on 2011 data) show where the releases are coming from and where they are going. Toxic emissions in Virginia have been declining in recent years, but they still remain significant.²¹ As Table 1 demonstrates, toxic air emissions represent the greatest percentage of reported releases, followed by toxic water discharges and toxic releases to land.



TABLE 1. Toxic Emissions in Virginia by Environmental Medium (2011) ^{22, 23, 24}

CHEMICALS RELEASED TO AIR			CHEMICALS RELEASED TO WATER			CHEMICALS RELEASED TO LAND		
Chemical	Pounds (% of Total)		Chemical	Pounds (% of Total)		Chemical	Pounds (% of Total)	
Hydrochloric Acid	7,451,621	37%	Nitrate Compounds	16,249,549	97%	Barium & Barium Compounds	874,542	34%
Ammonia	3,343,343	17%	Ammonia	145,748	1%	Vanadium & Vanadium Compounds	349,460	14%
Methanol	1,891,366	9%	Barium & Barium Compounds	72,874	<1%	Manganese & Manganese Compounds	309,755	12%
Sulfuric Acid	1,455,972	7%	Cyclohexanol	59,001	<1%	Lead & Lead Compounds	235,179	9%
Toluene	1,210,314	6%	Manganese & Manganese Compounds	45,964	<1%	Copper & Copper Compounds	217,872	9%
Hydrogen Fluoride	547,238	3%	Dimethyl-amine	39,947	<1%	Zinc & Zinc Compounds	168,240	7%
Glycol Ethers	497,307	2%	Zinc & Zinc Compounds	39,613	<1%	Chromium & Chromium Compounds	119,880	5%
Freon	339,527	2%	Nitroglycerin	19,723	<1%	Nickel & Nickel Compounds	119,626	5%
n-Hexane	309,569	2%	Methanol	12,201	<1%	Arsenic & Arsenic Compounds	79,920	3%
Styrene	303,577	2%	N-Methy-2-pyrrolidone	8,023	<1%	Cobalt & Cobalt Compounds	40,978	2%
Other	2,622,348	13%	Other	21,561	<1%	Other	29,779	1%
Total Air Emissions	19,972,182	100%	Total Water Discharges	16,714,204	100%	Total Land Discharges	2,545,231	100%

The toxic discharges to water are particularly high relative to the rest of the nation. National TRI data show that Virginia’s rivers and streams are the second worst in the nation in terms of toxic discharges. Only Indiana has more toxic discharges to waterways than Virginia.²⁵

Table 1 shows that industries discharged 16.7 million pounds of toxic chemicals into Virginia’s waterways in 2011. According to DEQ, there are 277 different facilities in the Commonwealth, with 570 total outfall pipes, that are legally permitted to discharge one or more toxic chemicals into Virginia’s waters.²⁶ In 2011, ninety-seven percent of all toxic discharges to water were nitrate compounds. In Virginia, the largest source of nitrate discharges is the Radford Army Ammunitions Plant, where nitrates and nitrogen compounds are used to make explosives.²⁷

Table 2 below compares Virginia to the rest of the nation and reveals that the Commonwealth’s waterways consistently rank high on toxic discharges. The New River, which receives the third most toxic discharges in the nation, absorbs nearly all of its toxic discharges from the Radford Army Ammunitions Plant. Around the Commonwealth, there are other companies that can be identified as the single largest polluter on a waterway. The Accomac Processing Plant, owned by Perdue Farms, Inc., contributes substantially all of the toxic discharges to Parker Creek,²⁸ while Tyson Foods, Inc. contributes substantially all of the toxic discharges to Sandy Bottom Branch.²⁹ Both waterways flow through Accomack County on Virginia’s eastern shore.

TABLE 2. Virginia Waterways Receiving Significant Amounts of Toxic Pollutants in 2010 ^{30, 31, 32, 33}

WATERWAY	CATEGORY	NATIONAL RANKING (Pounds Received)	
New River	Total Toxic Discharges	3d	(12.0 million)
Roanoke River	Total Toxic Discharges	15th	(2.8 million)
Parker Creek	Total Toxic Discharges	23d	(2.0 million)
Sandy Bottom Branch	Total Toxic Discharges	43d	(1.2 million)
James River	Total Toxic Discharges	45th	(1.1 million)
Roanoke River	Cancer Causing Chemicals	29th	(9,811)
York River	Cancer Causing Chemicals	41st	(6,524)
James River	Developmental Toxins	9th	(9,432)
Clinch River	Developmental Toxins	35th	(1,835)
Gravelly Run	Developmental Toxins	45th	(1,340)
York River	Developmental Toxins	46th	(1,320)
Gravelly Run	Reproductive Toxins	26th	(1,340)
Clinch River	Reproductive Toxins	27th	(1,300)
York River	Reproductive Toxins	33d	(1,104)

One class of chemicals, called Persistent Bioaccumulative Toxins (PBTs), are just a small component of overall toxic releases in the Commonwealth, but they accumulate in the tissue of humans and animals and cause long-term health and environmental effects even when released in small amounts.³⁴

The most notable PBT compounds released in Virginia are lead and mercury. In 2011, Virginia industries released 247,664 pounds of lead and lead compounds and 1,725 pounds of mercury and mercury compounds.³⁵ The major sources of lead and mercury in Virginia are primary metal manufacturers; stone, clay, and glass product manufacturers; coal-fired power plants; transportation equipment manufacturers; solvent recovery facilities; and the paper industry. Lead exposure has adverse health effects in both children and adults at very low blood levels.³⁶

In children, lead’s effects include decreased cognitive function and an increased incidence of attention-deficit disorder and behavior problems.

Mercury is a neurotoxin and is of particular concern because the mercury emitted into the air in Virginia, primarily from coal-fired power plants, gets deposited and taken up by fish in Virginia’s streams and in the Chesapeake Bay. Mercury is widespread throughout the Chesapeake Bay watershed,³⁷ and mercury is responsible for more fish consumption advisories in Virginia than any other pollutant.³⁸

Over sixty-five percent of total toxic chemical emissions in Virginia come from just ten facilities. Table 3 lists the top ten largest toxic chemical polluters in the Commonwealth.

TABLE 3. The Top Ten Virginia Facilities Discharging Toxic Chemicals into the Environment in 2011³⁹

FACILITY	LOCATION	POUNDS RELEASED (% of total VA toxic emissions)		INDUSTRY
Alliant Techsystems, Inc. (Radford Army Ammunitions Plant)	Radford, Montgomery County	13,078,061	33%	Metal Products Manufacturing
Honeywell Resins & Chemicals, LLC	City of Hopewell	2,084,449	5%	Chemical Manufacturing
Accomac Processing Plant (Perdue Farms, Inc.)	Accomack County	2,076,006	5%	Poultry Processing
Chesterfield Power Station (Dominion)	Chesterfield County	2,037,109	5%	Generating Facility
Chesapeake Energy Center (Dominion)	Chesapeake City	1,863,143	5%	Generating Facility
Clover Power Station (Dominion)	Halifax County	1,342,302	3%	Generating Facility
Jewell Coke Co., L.P. (SunCoke Energy)	Buchanan County	1,314,522	3%	Coal & Petroleum Products
Clinch River Plant (American Electric Power)	Russell County	1,268,491	3%	Generating Facility
Rocktenn Co, LLC	King William County	986,367	3%	Paper Manufacturing
Babcock & Wilcox Nuclear Ops. Group	Lynchburg	942,493	3%	Uranium Processing
Other	-	12,240,000	32%	-

Many other chemical manufacturers and electric generating facilities – not on this Top 10 list – discharge toxic substances to the air and water in Virginia. The TRI data show that chemical manufacturing and electricity generation should be the focus of attention on stricter permitting and enforcement because they account for more than two-thirds of all reported releases in the Commonwealth.⁴⁰

Chemical Manufacturing

Chemical manufacturing produces significant chemical releases to the environment. In 2011, chemical manufacturing was responsible for forty-five percent of all toxic releases to the environment in Virginia. Some Virginia chemical manufacturers have been sued by federal authorities for violations of environmental law. For example, the Honeywell Resins and Chemicals plant in Hopewell, Virginia produces caprolactam – a chemical used during nylon production – and ammonium sulfate – a chemical used for fertilizer.⁴¹ In May 2013, Honeywell agreed to pay \$3 million to settle a complaint brought by the U.S. Department of Justice alleging Clean Air Act violations from unpermitted chemical releases in Hopewell and from failure to upgrade pollution control equipment. The releases allegedly included the carcinogen benzene, other volatile organic compounds, nitrogen oxide, and particulate matter.⁴² The settlement included millions of dollars of upgrades in pollution control equipment. The year before, nearby Hercules, Inc. settled a similar complaint from the federal government related to alleged releases of methanol and other chemicals in violation of the Clean Air Act.⁴³

Electric Utilities

As illustrated in Table 3, electric utilities operate some of the largest sources of toxic air pollution in the Commonwealth, and utilities are responsible for twenty-three percent of the toxic releases in the Commonwealth. All of the generating facilities listed in Table 3 are coal-fired power plants.⁴⁴ Coal combustion produces approximately forty percent of the Commonwealth's in-state electricity generation, and it also produces a substantial amount of toxic byproducts. Coal combustion leaves behind a toxic stew of heavy metals in the ash – including lead, barium, mercury, and arsenic – and Virginia's utilities typically dispose of this ash in landfills and ponds located near the power plants (see Part I.D.). Coal combustion also releases acid gases to the air, including hydrochloric acid, hydrogen fluoride, and sulfuric acid. These acid gases have been linked to decreased respiratory function and an increased number of children with asthma.⁴⁵

One of the most hazardous substances released by electric utilities is tracked separately from Toxic Release Inventory reporting and is not included in Table 3. This substance is fine sooty particles, called PM2.5 (particulate matter less than 2.5 microns in diameter), which can lodge in the lung, causing asthma, heart disease, and death.

In 2010, the non-profit Clean Air Task Force released a study that estimated the health impacts of PM2.5 emissions from coal-fired power plants, based on extensive modeling by the technical consulting firm Abt Associates.⁴⁶ The study modeled how emissions from particular coal-fired power plants affected air concentrations of PM2.5. Then, drawing on medical literature on PM2.5 health impacts, the study estimated the health impacts of particular coal-fired power plants across the country. With respect to Virginia, the study found:

- Virginia ranks sixth worst in the nation in terms of health impacts from PM2.5 emissions from coal-fired power plants.⁴⁷
- PM2.5 emissions from coal-fired power plants in Virginia and from upwind states such as Ohio and Indiana cause 647 premature deaths, 477 hospital admissions, and 896 non-fatal heart attacks annually in Virginia.⁴⁸
- Richmond had the fifteenth highest number of premature deaths related to PM2.5 of all major cities in the United States.⁴⁹
- 115 premature deaths annually in Richmond are attributable to PM2.5 emissions from coal-fired power plants.⁵⁰
- 94 premature deaths annually from PM2.5 emissions were attributable to a single power plant: Dominion's Chesterfield Generating Station.⁵¹

B. TOXIC CHEMICAL STORAGE IN VIRGINIA

Besides giving communities the right to know about toxic releases in their environment, EPCRA also provides communities the right to know about toxic chemicals stored in their communities.

The importance of understanding what hazardous substances are stored in communities was highlighted by the April 17, 2013 explosion of a fertilizer plant in West, Texas. The explosion at the plant occurred when a fire detonated approximately thirty tons of ammonium nitrate stored at the facility.⁵² The fire killed fourteen people, including ten first responders and two civilians who volunteered to fight the fire, and injured another two hundred.⁵³

In the wake of the explosion, the Reuters news agency reviewed the chemical inventory forms that industries across the country are supposed to submit under EPCRA, and it discovered a spate of errors in the reporting, as well as facilities that failed to comply altogether.⁵⁴

EPCRA'S REPORTING REQUIREMENTS FOR CHEMICAL STORAGE

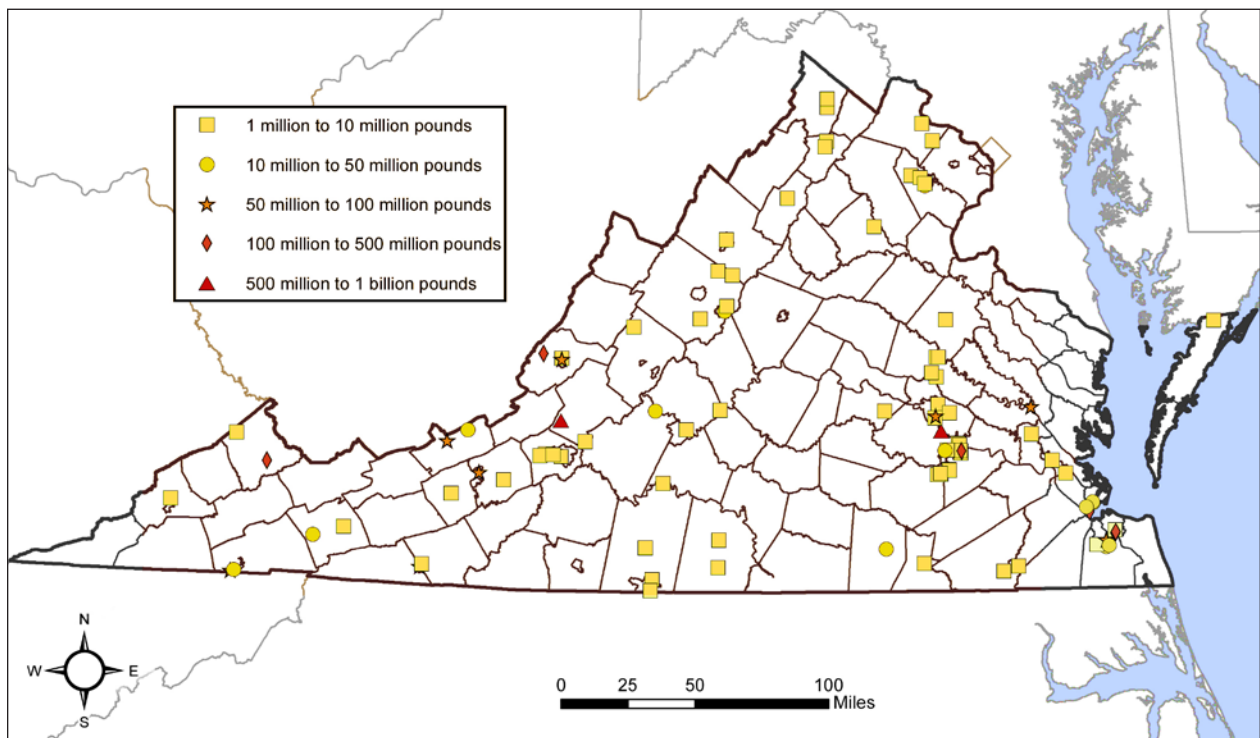
Under EPCRA, any facility that manufactures, processes, or stores a hazardous chemical must submit an inventory form to state and local governments and local fire departments. These reporting requirements apply to a greater number of chemicals than the reporting requirements for releases, and the inventories must include information regarding the amount, how the chemical is stored, and where the chemical is stored at the facility. These reports allow local and state governments to develop and coordinate effective chemical emergency response plans. They also allow first responders to understand the hazards if an accident occurs at the facility.

In the vast majority of states, including Virginia, regulators do not audit the reports to make sure that companies are accurately reporting the chemicals that they store on-site. The Virginia DEQ lacks the manpower to audit the inventory reports that companies submit on chemical storage, and the Commonwealth cannot be sure that companies are reporting accurately. Local governments would be the first responders in the case of an emergency involving chemicals at a facility, but they are also under-staffed and rarely audit the reports submitted by companies. There are 114 local emergency planning committees in Virginia. None of them receive any state funding to oversee chemical emergency response plans.⁵⁵

Thousands of companies throughout Virginia store and use substantial quantities of toxic chemicals. These companies are located in every part of the Commonwealth and are often in densely populated urban and suburban areas. We have reviewed summaries prepared by DEQ of chemical inventory reporting forms for 2011. Under-reporting in the Commonwealth appears to be rampant. For instance, nearly every large auto service station and vehicle maintenance facility in the Commonwealth is subject to reporting given the amounts of waste oil, motor oil, diesel fuel, and other substances typically at these facilities. But in 2011, less than twenty such facilities reported their hazardous substance inventories to DEQ.

Our review of the DEQ summaries for 2011 also revealed that at least sixty-five separate facilities in the Commonwealth stored one or more hazardous chemicals in amounts exceeding one million pounds. Some of these chemicals are highly explosive. Others are dangerous because they are carcinogens or reproductive toxins. We have prepared the first map of the Commonwealth, below, showing the locations of industries and other facilities in Virginia that stored at least one million pounds of a toxic chemical at some point during 2011.

Facilities in Virginia Storing Over 1 Million Pounds of Toxic Substances in 2011



C. HISTORIC TOXIC SITES IN VIRGINIA

For over one hundred years, industries in Virginia typically discharged their toxic waste directly into rivers and streams, or dumped it in municipal landfills or on-site pits. Sediments in the James, Elizabeth, and York Rivers and the Chesapeake Bay are still contaminated from this dumping long ago. These practices largely came to an end over thirty years ago when

Congress passed the Superfund law — the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). Because of the significant liability costs under that law, most companies have dramatically improved their handling and disposal of hazardous substances compared to the 1960s and 1970s. Nonetheless, many of the historic dump sites from earlier in the 20th Century remain hazardous to human health, and the most hazardous sites in Virginia are now part of the Superfund program.



Nansemond Ordnance Depot Superfund Site, Suffolk

Unlike many other states, Virginia has no program in place to address smaller dump sites—those not considered large enough or hazardous enough for the federal Superfund program. Below, we discuss the federal Superfund sites in Virginia, and then discuss the lack of regulations for smaller, non-Superfund sites that are located throughout the Commonwealth.

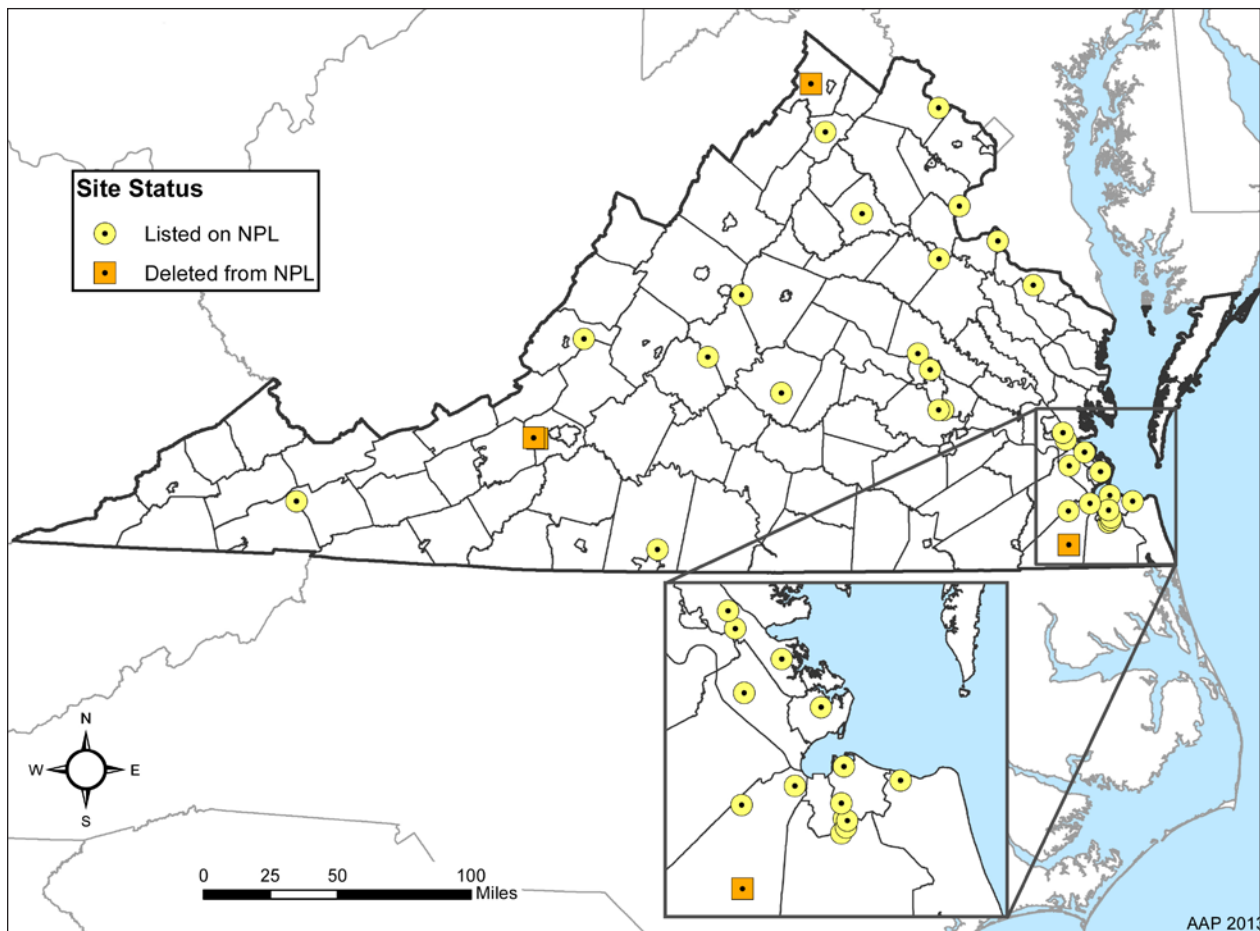


1. Superfund Sites in Virginia on the National Priorities List

The most hazardous sites in the Commonwealth are those listed on EPA's National Priorities List (NPL), a list of sites that pose the most hazard to the public and warrant ongoing investigation and remediation as a result.⁵⁶ Currently, thirty-one sites within the Commonwealth are National Priorities, and they are in various stages of clean-up.



Superfund Sites in Virginia



A few of the Commonwealth's NPL sites are highlighted here:

- **Hidden Lane Landfill, Sterling.** In 2008, the EPA placed the Hidden Lane Landfill on the NPL after state and county officials detected carcinogenic trichloroethylene (TCE) in the drinking water wells of homes in nearby Broad Run Farms.⁵⁷ Tests revealed that twenty-two homes in the subdivision had detectable levels of TCE in their drinking water and that TCE measurements for sixteen wells exceeded safe drinking levels. VA DEQ installed water filtration units for the homes with detectable levels of TCE,⁵⁸ and EPA is now overseeing those units. The source of the TCE contamination is still being studied by EPA, and EPA is likely to develop a clean-up approach in 2014.
- **Peck Iron and Metal Site, Portsmouth.** From 1945 to 1999, Peck Iron and Metal processed scrap metal from military bases, government agencies, and local businesses. Some scrap metals, like automotive parts, contained cadmium, while other scrap materials contained polychlorinated biphenyls (PCBs) and lead.⁵⁹ A study revealed that the groundwater and soil are contaminated with PCBs, arsenic, chromium, lead, and nickel.⁶⁰ Although the site was listed on the NPL in 2009, clean-up activities have just begun, meaning that the site still poses substantial risk to individuals that come into contact with groundwater or soil associated with the site.
- **Nansemond Ordnance Depot, Suffolk.** This site is considered the most hazardous Superfund site in Virginia by the U.S. EPA.⁶¹ The site is located on 975 acres between the Nansemond River to the west, the James River to the north, and Streeter Creek to the east. It was once used by the U.S. Army as an ammunition facility, and several thousand pounds of ordnance and TNT have been removed from the site.⁶² TNT, lead, and other heavy metals have been released to groundwater and surface water near the site.⁶³ Although the site was listed on the NPL in 1999, there is currently no long-term remediation plan in place because the contamination is extensive and it is still being studied.⁶⁴ Currently, the EPA is investigating whether human populations are exposed to contaminants and the degree to which contaminant migration has stabilized.⁶⁵

As these snapshots indicate, it can take ten to twenty years from the time a hazardous site is identified to the time when remedial action is completed and risks are lowered at a site on a long-term basis. The Greenwood Chemical Company site in Newtown has been listed on the NPL since July 22, 1987.⁶⁶ The EPA did not complete clean-up and disposal efforts until May 2005 with

the removal of 19,500 tons of arsenic-contaminated surface soil. A groundwater/surface water pump-and-treat system has been in place since 2000, and it must be periodically monitored to ensure that the *still* contaminated groundwater does not pose any direct threat to nearby residents. In Dillwyn, Virginia, the Buckingham County Landfill has been listed on the NPL since 1989, but the remedy selected in 1994 (a landfill cap) proved to be ineffective at protecting human health.⁶⁷ In 2008, ongoing monitoring revealed that nine site-related contaminants, including 1,4-dioxane—a potent PBT—had migrated to groundwater.



2. Other Contaminated Sites in Virginia

The largest toxic chemical problem in Virginia that remains unaddressed is that there is no comprehensive state program to enforce clean-up of smaller hazardous waste sites in the Commonwealth—those that do not qualify for listing on the NPL and are not being addressed by the U.S. EPA.

These smaller sites may include spills by metal plating plants, paper processing plants, auto body shops, gas stations, dry cleaners, and manufacturing facilities. A 2002 report by the Environmental Law Institute identified 2,015 “known or suspected” contaminated sites in Virginia (those tracked in some way by the state), and 411 sites “needing attention” (sites determined to need some level of clean-up or further evaluation).⁶⁸ This Environmental Law Institute report, the most recent available addressing state contaminated sites, needs to be updated, yet the Commonwealth poorly tracks these non-NPL sites. Indeed, the actual number of sites needing attention is likely to be higher than the 2002 data.

Virginia does have some programs in place regarding emergency response and waste remediation, but the overall system of laws and regulations is weak and highly fragmentary. There are multiple offices within DEQ that have responsibility for toxic chemicals, and there is little centralized coordination of the toxic chemical programs. The relevant offices are understaffed and cannot adequately address hazardous waste sites in the Commonwealth. **There are approximately thirty full-time staff at DEQ devoted to implementing toxic chemical laws, such as Superfund, RCRA, EPCRA, and the state voluntary remediation program. In contrast, we conducted a comparative analysis of personnel in North Carolina and found that North Carolina, which is slightly larger than Virginia in population, has about one hundred personnel to implement toxic chemical laws and regulations.**

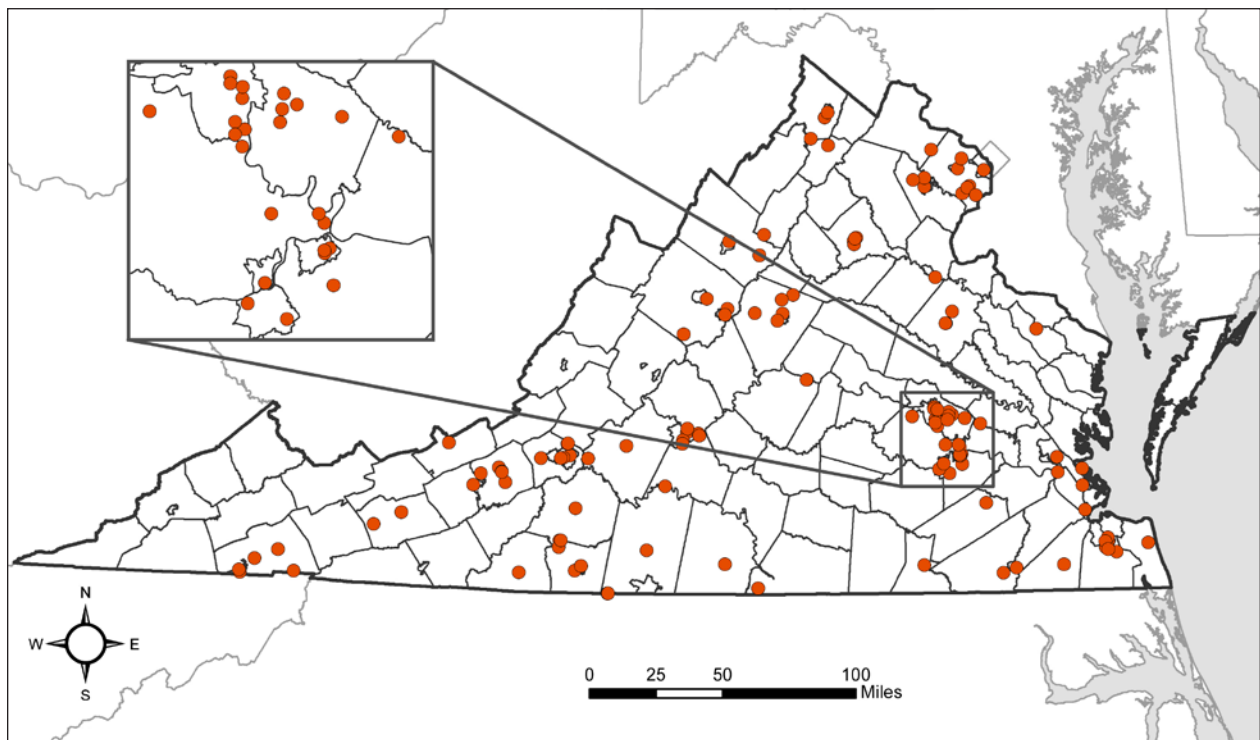
Because there is no obligation to report discovery of long-abandoned waste sites in Virginia, state records are far from comprehensive. There is no state “priority list” or hazard ranking for clean-ups. DEQ staff instead focuses attention on just a few areas where they have clear regulatory authority, such as these programs:

- **Spill Reporting & Response.** The Virginia Department of Emergency Management (DEM) and VA DEQ coordinate responses to oil and hazardous materials spills.⁶⁹ The agencies rely on the public to report chemical spills through emergency hotlines – such as 911 and the Virginia Emergency Operations Center. This program addresses recent spills only, however, and does not cover long-abandoned waste sites.
- **Voluntary Remediation Program.** In some cases, a real estate developer will want to clean up a contaminated site in order to develop the property. Under DEQ’s Voluntary Remediation Program (VRP), developers submit a proposal for how they intend to remediate a site. Once the standards of the program have been met, DEQ will issue a certificate containing conditions and future use restrictions. Many reclaimed sites, for example, are subject to groundwater use restrictions, excavation restrictions, or residential use restrictions. The program grants the developer limited immunity from enforcement actions under several environmental statutes, including the Virginia Waste Management Act. Since 1996, over 240 sites have been cleaned up through the VRP; currently, an additional 125 sites are enrolled in the program.⁷⁰ The VRP is considered a successful program in the Commonwealth. However, it depends on the developer’s voluntary cooperation to remediate a site, funding for the program has been variable, and the program does not apply to toxic waste sites that no one intends to develop.
- **Federal Facilities Restoration Program.** DEQ partners with the Department of Defense (DOD) and U.S. EPA to clean up contaminated sites at military installations within the Commonwealth, such as Fort Monroe in Hampton. DOD and U.S. EPA provide the funding for the program, which reaches sites beyond those listed on the NPL. The program has funded forty-two sites, including thirteen from the NPL, in Virginia. The U.S. Army Corps of Engineers usually takes the lead in remediating these sites, which may involve cleaning up and removing hazardous, toxic, and radioactive wastes, explosives, and munitions.

■ **RCRA Corrective Action.** In 2000, U.S. EPA authorized DEQ to take the lead on Corrective Action remediation under the Resource Conservation and Recovery Act of 1976 (RCRA) within the Commonwealth. Under the program, DEQ has the authority to investigate and order clean up at facilities that manage hazardous wastes. Approximately 75,000 tons of hazardous waste are generated in the Commonwealth each year, and while some is managed within the Commonwealth, the vast majority is shipped out of state for disposal.⁷¹ Currently, DEQ is taking action at 121 sites throughout Virginia and the agency refers to these 121 sites as the “2020 baseline,” because it aims to achieve the program goals by 2020. The program has been relatively successful thus far. Human exposure is under control at 111 sites; migration of contaminated groundwater is under control at 103 sites; and the final clean-up remedy is operating at more than half of the sites.⁷² DEQ’s goal is to have human exposures and groundwater migration controlled at ninety-five percent of the 2020 baseline, and have final remedies in place and operating at ninety-five percent of the baseline as well.

RCRA Corrective Action Sites in Virginia

For interactive map, see http://www.epa.gov/reg3wcmd/ca/ca_sites/r3ca_sites.html





Hidden Lane Landfill Superfund Site, Sterling

While these programs have been in place for over a decade, they are highly fragmentary and focus very limited resources on just a few sites where there is existing regulatory authority. Hundreds of sites, many near residential areas, remain unaddressed.

Unlike most states, Virginia has no laws or regulations in place establishing a comprehensive

program to remediate contaminated sites. As a result, some sites may remain health risks for decades, because no agency has ever investigated the true extent of contamination. Others may simply be un-developable (and off the tax rolls) due to the contamination and liability issues.

Currently, the only relevant legislation that could provide a basis for action at these sites is Virginia Code §10.1-1402(19), which authorizes the Virginia Waste Management Board to “take actions to contain or clean up sites or to issue orders to require cleanup of sites where solid or hazardous waste . . . have been improperly managed and to institute legal proceedings to recover the costs of the containment or clean-up activities from the responsible parties.” The Board — a citizen board that meets only twice a year — has rarely exercised this authority and has never issued regulations to implement this authority. DEQ and the Waste Management Board rarely exercise their enforcement authority to order clean-ups at non-RCRA sites, even though there appears to be a funding source available. The Virginia Environmental Emergency Response Fund, established in 1991 for “emergency response to environmental pollution incidents,” currently has about \$15 million available.



Peck Iron and Metal Superfund Site, Portsmouth

D. COAL ASH IN VIRGINIA

The ash produced from burning coal for electricity contains a concentrated mixture of toxic heavy metals, including arsenic, antimony, cadmium, chromium, lead, and mercury. These pollutants are known to cause cancer, neurological, and other adverse health effects. But despite the toxic mixture of heavy metals, coal ash disposal remains loosely regulated at both the state and federal level. The lack of regulatory oversight increases the risk that leaks will go unnoticed, potentially leading to serious breaches and widespread contamination of waterways.

THE KINGSTON COAL ASH SPILL

In 2008, a massive coal ash spill in Kingston, Tennessee revealed the dangers of poor design, inadequate inspections, and otherwise failing to treat coal ash as a hazardous waste. The spill released 5.4 million cubic yards of wet coal ash – more than double the amount that the Tennessee Valley Authority said was in the pond – and damaged two-dozen homes, covered 300 acres, and flowed into the adjacent Emory River. Five years later, clean-up efforts continue, and the TVA projects that the clean-up will carry a final price tag of approximately \$1.2 billion. In the end, approximately 510,000 cubic yards of coal ash will remain in the Clinch and Emory Rivers, and will require annual monitoring for up to thirty years.



Aerial View of 2008 Coal Ash Spill, Kingston TN

Since 2010, the federal government has been working on new disposal regulations, but these regulations are not final and they apply primarily to future disposal of coal ash, not to the billions of tons of ash that has already been disposed in the United States.⁷³

The nation's power plants generate about 140 million tons of coal ash every year, making coal ash one of the most significant waste streams in the United States.⁷⁴ **Virginia's coal-fired plants produce about 2.4 million tons of coal ash annually (far exceeding all other forms of hazardous waste generated in the Commonwealth).**⁷⁵ **Virginia is the 18th largest producer of coal ash in the nation.**⁷⁶ All this waste must go somewhere, and power plants dispose of most of this waste in on-site landfills or in ponds (where the ash is intentionally mixed with water), often within a half mile of nearby residents. About half of the nation's coal ash ponds are unlined, which increases the risk that toxic chemicals and metals from the ash will leach into these water bodies or groundwater — which may serve as a community's water supply.⁷⁷

Because coal-fired power plants need water to operate, they are situated along Virginia’s rivers and other water bodies, and in turn, so are the coal ash ponds.

Virginia electricity generators operate twenty-five coal ash ponds – thirteen of which are unlined (the coal ash rests directly on soil with no barrier). The ponds have an average age of forty-seven years, which exceeds the forecasted lifespan of ash ponds by seven years.⁷⁸ Virginia law does not require groundwater monitoring or daily cover of the ash and does not require post-closure monitoring at retired coal ash ponds. As a result, many coal ash ponds – even those past their forecasted lifespan – go unmonitored for years. Despite the risks, Virginia does not treat coal ash ponds and landfills as hazardous waste facilities, and it exempts many locations and uses of coal ash from the Commonwealth’s less stringent solid waste regulations.⁷⁹

Between 2010 and 2011, following the 2008 Kingston, Tennessee coal ash spill, EPA classified eight Virginia coal ash ponds as “significant hazard” ponds due to their potential to cause “economic loss, environment damage, disruption of lifeline facilities, or impact other concerns.”⁸⁰ Furthermore, the EPA found two of the significant hazard ponds to be in “poor” condition. A “poor” rating indicates that the inspection revealed a safety deficiency or that further investigations were needed.

TABLE 4. Virginia Coal Ash Ponds Classified by EPA as Significant Hazards⁸¹

COMPANY	FACILITY	LOCATION	IMPOUNDMENT	EPA’S RATING (2011) ⁸²	ACTION PLAN ⁸³
Dominion	Bremo Bluff Power Station	Fluvanna County	North Ash Pond	Fair	Yes
			West Ash Pond	Fair	
Dominion	Chesapeake Energy Center	Chesapeake	Bottom Ash & Sedimentation Pond	Poor	Yes
Dominion	Chesterfield Power Station	Chester	Lower (Old) Ash Pond	Fair	Yes
Dominion	Possum Point Power Station	Dumfries	Ash Pond E	Fair	Yes
			Ash Pond D	Satisfactory	
American Electric Power	Clinch River Power Station	Russell County	Ash Pond 1 (1A/1B)	Fair	Yes
			Ash Pond 2 (Inactive)	Poor	

EPA gave a “poor” rating to the Dominion Chesapeake Energy Center coal ash pond, located in Chesapeake, Virginia, after inspections revealed soil erosion and slope failures on its eastern and western embankments.⁸⁴ The engineering firm hired by EPA noted that

the embankments holding the ash could not be expected to perform acceptably under recommended ash loading conditions. If the Chesapeake Energy Center's coal ash pond were to fail (e.g., a breach or collapse in the earth surrounding it), it would release toxic ash to the Elizabeth River, which flows to the Chesapeake Bay.⁸⁵ The Chesapeake Energy Center also hosts a 22-acre coal ash landfill, which has caused arsenic contamination in nearby groundwater.⁸⁶

EPA also gave a "poor" rating to American Electric Power's coal ash disposal site in Carbo, Virginia, along the Clinch River.⁸⁷ AEP operates two ash ponds at the site, both built in the 1950s. If either pond were to fail, coal ash would spill into the already heavily polluted Clinch River and would impact Drumps Creek, Virginia Routes 616 and 665, and the Norfolk & Western railway as well.⁸⁸ One of the ponds did fail in 1967, causing a massive fish kill in the Clinch River and impairing ecosystems as far as ninety miles downstream.

Clearly, the Commonwealth should be more involved in ensuring safety at these and other coal ash sites, but as noted above, the sites are only loosely regulated, and coal ash is often exempted from otherwise applicable solid waste laws. Virginia law requires facility owners to perform annual inspections and submit reports on a biannual basis for High Hazard Potential impoundments. However, the Commonwealth does not typically conduct its own inspections of coal ash impoundments, and state law states that inspections should occur only as the Department of Conservation and Recreation "may" deem necessary.⁸⁹

Nearby states have been more active than Virginia in addressing dangers from coal ash ponds. For example, in 2013, in the highest-profile North Carolina environmental litigation in years, the Department of Environment and Natural Resources filed multiple lawsuits against Duke Energy, the largest utility and one of the largest employers in North Carolina. The lawsuits contend that all of Duke Energy's coal ash ponds in the state have permit violations and that some coal ash ponds are polluting water bodies and drinking water sources, including Mountain Island Lake, the source of drinking water for approximately 860,000 people in Charlotte. All fourteen of Duke Energy's coal-fired power plants in North Carolina are now the subject of litigation over coal ash.⁹⁰ According to DENR, Duke Energy's coal ash ponds "pose a serious danger to the health, safety and welfare of the people of the State of North Carolina and serious harm to the water resources of the State."⁹¹

In October 2013, citizens near Morgantown, West Virginia sued First Energy Corp., alleging that First Energy was negligent and reckless in its operation of the Little Blue Run coal ash pond, which holds more than 20 billion gallons of waste and has been designated as a "high hazard" by the EPA.⁹²

E. TOXIC CHEMICALS IN THE HOME

One of the biggest gaps in Virginia law governing toxics is toxic chemicals in the home, contained in items such as cleaning products, construction materials, furniture, baby products, and toys. The federal government has done little to address these risks. In the past decade, several states have recognized this regulatory gap and have taken it upon themselves to protect their citizens from toxic chemicals contained in common consumer goods. Part II of this report discusses the states that have taken action.

Virginia has done essentially nothing in this area, even as scientists have documented the hidden dangers of toxic chemicals in common consumer products. The scientific understanding of such chemicals is developing rapidly, and below, we list some of the most prominent hazards that need to be addressed.

1. Endocrine Disruptors in Children's Products

A variety of substances, both natural and man-made, are endocrine disruptors – chemicals that interfere with human hormones and cause “adverse developmental, reproductive, neurological, and immune effects.”⁹³ Many everyday products – including children’s products – contain these substances. Studies demonstrate that endocrine disruptors pose the greatest risk during the early stages of human development.⁹⁴

Two common “plasticizers” – bisphenol-A (BPA) and phthalates – have come under particular scrutiny in recent years. BPA, used to make hard plastics for items such as cups and bottles, has been used in food packaging for nearly fifty years. BPA is also commonly used as a sealant inside metal food cans. Research clearly demonstrates that BPA leaches from packaging and plastic containers into food and drink, and studies increasingly link BPA to adverse cognitive and developmental effects in infants and young children.⁹⁵ More than 130 studies have linked BPA to breast cancer, obesity, and other disorders.⁹⁶

In 2012, the U.S. Food and Drug Administration banned BPA in children’s cups and bottles, but manufacturers remain free to use it for other applications.⁹⁷ Hundreds of formulations for BPA-containing linings and plastics exist, but under current regulations, manufacturers do not have to reveal the formulas for these uses.⁹⁸ Without accurate information, it is difficult to know exactly how much BPA is being used and for what. Moreover, at least one common BPA-substitute, known as Bisphenol-S, may be found in children’s products and likely causes similar adverse health effects.⁹⁹



Phthalates, which are used to make plastics more pliable, can be found in any product that contains vinyl – including flooring, furniture, car seats, siding, and shower curtains. They have been linked to asthma, developmental defects, and diabetes.¹⁰⁰ A recent study linked high levels of phthalates in mothers’ urine to premature births.¹⁰¹

Toy manufacturers used phthalates to produce children’s toys and child care products until Congress banned their use in such applications in 2008.¹⁰² However, the 2008 law does not apply to other applications of phthalates, and phthalates are still common in the household environment. They may leach into foods from plastic containers and escape from common building materials into the air and dust.¹⁰³ In 2012, the Virginia-based Center for Health, Environment and Justice reported that it found phthalates in common school supplies, including binders, lunchboxes, and backpacks, in amounts exceeding the concentration limits that Congress has established for toys.¹⁰⁴ Therefore, without more comprehensive action, children remain exposed to these toxic chemicals through a variety of everyday products.

2. Flame Retardants in Consumer Products

American children are born with higher concentrations of flame retardant chemicals in their blood than children of any other nation.¹⁰⁵ Then, after birth, American children, and particularly children in minority and low-income communities, are further exposed to flame retardants while nursing, playing, and even sleeping. That is because these toxic chemicals off-gas from furniture and other household items and settle in household dust.



Young children – who play on the floor and frequently put objects in their mouths – typically have higher levels of flame retardant chemicals in their bodies than adults. Studies also show that blood levels of these chemicals have increased in adults between 1970 and 2004 and have yet to decline despite the fact that some have been taken off the market, raising concerns that certain flame retardants are persistent bioaccumulative toxins.¹⁰⁶

Today, flame retardant chemicals are found in many household products, from electronics to furniture to insulation. They are harmful to human health, yet they do little to save lives in household fires.

One class of flame retardant, polybrominated diphenyl ethers (PBDEs) can mimic thyroid hormones and disrupt metabolism in adults and impair cognitive and neurological function in children.¹⁰⁷ Industry began phasing out PBDEs in 2005, but simply substituted new chemical mixtures – such as “Firemaster 550” – in a number of household items.¹⁰⁸ The manufacturers of Firemaster 550 have declined to reveal the components of the mixture, but scientists have determined that the components are similar to known endocrine disruptors.¹⁰⁹

Another class, chlorinated organophosphate flame retardants (chlorinated tris) is known to cause mutations in human DNA, and it is a likely human carcinogen.¹¹⁰ Manufacturers phased chlorinated tris out of children’s clothing in the 1970s, but it is still used in changing pads, nursing pillows, car seats, and sofas.¹¹¹ In addition, a common component of flame retardant mixtures, BDE-49, has been linked to autism and other neurological disorders.¹¹²

CHICAGO TRIBUNE SERIES – “PLAYING WITH FIRE”

In May 2012, the Chicago Tribune published a series of articles, “Playing with Fire,” that revealed the deceptive marketing campaign that drove an influx of toxic flame retardant chemicals into American households. The groundbreaking series reported that alleged fire-protection organizations were actually front groups for chemical manufacturers that produced flame retardant chemicals. The series also cited studies by the U.S. Consumer Product Safety Commission that demonstrated that flame retardants in couches, chairs, and other furniture cannot withstand flames from the fabric upholstery. In other words, the chemicals are both ineffective and harmful.

3. Triclosan in Anti-Bacterial Soaps & Other Household Products

Triclosan, an antibacterial and antifungal chemical found in a variety of household products – most commonly soaps, deodorants, lotions, toothpastes, and some plastics and textiles – is a suspected endocrine disruptor linked to adverse neurological and reproductive effects. Recent studies also associate triclosan with allergic responses and suggest that triclosan may encourage antibiotic resistance in bacteria – a particularly pernicious environmental health effect.¹¹³

In 2010, the Natural Resources Defense Council sued the U.S. FDA to force the agency to finalize a rule it first proposed in 1978 that would have banned triclosan in soaps.¹¹⁴ As that lawsuit makes its way through the courts, the U.S. EPA will be undertaking the registration review for triclosan and its pesticidal applications ten years earlier than planned.¹¹⁵

Recently, the FDA acknowledged that it does not have any evidence that antibacterial soaps with triclosan are any more effective than ordinary soap and water.¹¹⁶ Despite its marginal utility, and its potentially toxic health effects, the use of triclosan in consumer products remains almost entirely unregulated, providing another example of our failure to comprehensively test chemicals for adverse effects before placing them on the market.

4. Formaldehyde in Household Products

Formaldehyde is a known human carcinogen and a toxic air pollutant subject to state and federal regulation under the Clean Air Act when it is emitted as a byproduct of manufacturing. However, federal law barely addresses its use in consumer products.¹¹⁷ Numerous studies have found that formaldehyde is associated with cancer, attention deficit disorder, memory impairments, asthma and other respiratory ailments, and insomnia.

Manufacturers use formaldehyde in plywood, particleboard, and other pressed wood products, glues and adhesives, paints, textiles, and in household cleaning supplies.¹¹⁸ It off-gasses from these products and pollutes our indoor environments. Despite its health effects, agencies have taken a patchwork approach to regulating formaldehyde in household products. For example, in 2010, President Obama signed the Formaldehyde Standards for Composite Wood Products Act, which allowed the EPA to issue regulations on emissions from wood products. Those regulations still are not final, and formaldehyde emissions from other household products remain unregulated.

PART II:

USING STATE AUTHORITY TO ADDRESS TOXIC RISKS

Given widespread toxic releases in the Commonwealth and multiple sources of exposure, the Commonwealth should be far more active in protecting its citizens from toxic risks. Many other states have already enacted comprehensive programs to address risks from toxic chemicals. Models exist for Virginia. Some of the reforms proposed here will require new legislation and funding, while others can be undertaken now by DEQ and other agencies using existing authority.

Federal environmental law in no way pre-empts or precludes the state from acting. In fact, most federal environmental laws are structured to provide minimum standards, or a “floor,” and states have the authority to impose more stringent requirements than those required by federal law. The Commonwealth can act now to address the concerns highlighted in Part I of this report, and a few reforms would go a long way towards controlling toxic chemicals in the state.

A. CREATE A PROGRAM TO REMEDIATE CONTAMINATED SITES IN VIRGINIA



As noted in Part I-C, when a site does not qualify for the National Priorities List (NPL), the site does not qualify for clean-up funding through Superfund, and the U.S. EPA may not undertake remedial action at the site. If EPA is not addressing the site, such sites fall through the cracks unless the state possesses an alternative clean-up program.

The majority of U.S. states have programs in place to address these kinds of sites, but Virginia does not. Virginia’s clean-up authority is fragmentary and underfunded and does not effectively address the many dangerous sites that are not overseen by the federal government. Only sites that pose

very low risks to public health qualify for the Voluntary Remediation Program (VRP), and the Virginia Environmental Emergency Response Fund does not provide a means for cleaning up historically contaminated sites that are too hazardous for the VRP, but do not qualify for the NPL.

As a result of this lack of attention to the toxic legacy of the past, contaminated sites dot the Virginia landscape. These sites continue to pose human and environmental health risks, and they also represent lost economic opportunities, because the land has no viable use until it is restored.

We therefore recommend that the Commonwealth create a program to identify and remediate these sites and pursue the parties who are responsible for the contamination.

Effective models for comprehensive state clean-up programs exist in a number of states. A 2002 report by the Environmental Law Institute compared all fifty states' regulatory authority, and Virginia has weaker laws in place compared to most other states.¹¹⁹ Virginia has no priority list or hazard ranking to set a program agenda, and funding has been inadequate to address these non-NPL, non-RCRA sites in the Commonwealth.

Below, we discuss three states that have comprehensive programs: North Carolina, New Jersey, and Connecticut:

North Carolina. North Carolina's Department of Environment and Natural Resources has its own Superfund Section that identifies and prioritizes contaminated sites throughout the state.

The Superfund Section implements the North Carolina Inactive Hazardous Sites Response Act of 1987, which complements the federal Superfund program. As of April 5, 2013, North Carolina is monitoring approximately 2,000 sites that fall outside federal jurisdiction. The Act places an affirmative obligation on owners, operators, or responsible parties who know or should know of the existence of a contaminated site to notify the department, which facilitates efficient investigations.¹²⁰ The Secretary of the Environment and Natural Resources may issue an order to any responsible party for clean-ups, or take action directly if no responsible party can be found.¹²¹ In the latter event, the Secretary may draw upon a special state fund to finance the remediation, with the possibility of suing later for reimbursement if a responsible party is found.¹²²

North Carolina divides its contaminated sites into two categories. At the most hazardous sites, the Superfund Section supervises clean-up pursuant to a consent agreement with the responsible party until the remedial action is complete. At less sensitive sites, the system is more privatized: the remediating party contracts with a Registered Environmental Consultant that the department has screened and approved to oversee clean-up activities. The department then conducts periodic audits of the work until clean-up is complete.¹²³ The dual path allows the program to address more sites with the same amount of staff.

Notably, North Carolina has established a special office within the department to address just one source of contamination: dry-cleaning solvents. The department estimates that 1,500 sites within North Carolina are contaminated with dry-cleaning solvents, and it uses a dedicated fund to remediate such sites. In addition, the compliance unit inspects active dry-cleaning operations and enforces regulatory measures designed to prevent future contamination.¹²⁴

New Jersey. New Jersey's hazardous waste program has three main components. First, New Jersey enacted the Spill Compensation and Control Act in 1976, which created a fund of first resort for clean-up activities and makes "any person . . . in any way responsible for any hazardous substance" discharged on a site strictly liable to the fund for all clean-up costs.¹²⁵ New Jersey finances the fund with taxes and penalties arising out of the Act. Today, the program maintains a database of approximately 38,000 contaminated sites.¹²⁶

Second, New Jersey enacted the Industrial Site Recovery Act (ISRA) in 1993, which requires owners of industrial facilities to conduct site investigations and remediation when ceasing operations or before selling the property.¹²⁷ By making environmental issues central in property transfers, the ISRA aims to avoid situations where environmental contamination is discovered years or decades later.

Finally, in 2009, New Jersey enacted the Site Remediation Reform Act, which places an affirmative obligation on responsible parties to remediate contaminated sites, rather than waiting for the state to act first. Responsible parties must meet a number of mandatory remediation timeframes and hire a "site remediation professional" licensed by the state.¹²⁸ This privatized model, in which private site remediation professionals make most of the clean-up decisions at a site, has also been adopted in Massachusetts and other states.¹²⁹

Connecticut. Connecticut has established a state fund to cover the costs of clean-up in the event that the responsible party cannot be identified or the responsible party fails to adequately restore the site.¹³⁰ Payments from the state fund are authorized only when the site does not qualify for the NPL and is ineligible for federal funding as a consequence.¹³¹

The Connecticut Department of Energy and Environmental Protection has developed its own “priority score” to prioritize sites in the state for remedial action. The department may refer a site to the U.S. EPA, issue administrative orders to responsible parties, or if the Commissioner determines that the site will not qualify for the NPL, pursue remedial action using the fund.¹³² This system coordinates federal and state responsibilities for contaminated sites. By combining efforts, state and federal authorities can restore more contaminated sites, reduce the risks to human and environmental health, and create additional economic opportunities in the state.

We recommend that Virginia pursue a three-pronged approach for addressing releases and spills of toxic substances around the Commonwealth.

First, in the near-term, regulatory agencies should rely on existing authority under Virginia Code §10.1-1402(19), which authorizes the Waste Management Board to “take actions to contain or clean up sites or to issue orders to require cleanup of sites where solid or hazardous waste . . . have been improperly managed and to institute legal proceedings to recover the costs of the containment or clean-up activities from the responsible parties.” This language provides sufficient authority for the Board and DEQ to order clean-ups at particular sites. If the Board and DEQ can identify cooperative parties, such orders can be “on consent,” meaning that the order can outline a detailed program for site remediation that the party will agree to undertake. Theoretically, the language also authorizes DEQ itself to undertake clean-ups and then recover costs from responsible parties. However, no funding has ever been provided to DEQ to undertake such substantial work on its own. The General Assembly should establish a fund of at least \$10 million to allow DEQ to undertake clean-ups and then recover costs from responsible parties.

Second, more comprehensive legislation is needed to locate contaminated sites, prioritize them, and assign responsibility, particularly in the cases where there is no cooperative responsible party willing to undertake a clean-up. In designing a new program, the Commonwealth should aim wherever possible to have the costs borne by responsible

parties (polluters, waste transporters, and owners and operators of contaminated sites), rather than by the taxpayers. In drafting such legislation, the General Assembly should explicitly establish strict, joint and several liability for parties that are responsible for site contamination. Virginia



should also follow New Jersey by placing an obligation on responsible parties to remediate historic contamination and to document whether any contamination has occurred before transferring title to industrial property. This would place the clean-up obligation on the party with the best information regarding the nature and scope of the contamination and would be more efficient than a “buyer beware” scheme, which narrows the market to only those buyers with the means and motivation to conduct clean-up themselves. Furthermore, it would prevent the creation of additional contaminated sites. Additional personnel within DEQ will be needed to oversee these programs, and investigative personnel will be needed to identify responsible parties.

Third, DEQ should build on its Site Assessment Program, which coordinates with the U.S. EPA to identify sites where hazardous substances pose a risk to the public health or environment. The Site Assessment Program also ranks sites for proposed listing on the NPL. The program, which currently has only one full-time employee, should be expanded to identify the full range of contaminated sites within Virginia. Today, there is no comprehensive database of contaminated sites in the Commonwealth. For comparison, North Carolina’s database of 2,000 sites is indicative of the potential scale of the problem here in Virginia. There are over forty contaminated sites under state regulatory supervision in the City of Durham, NC alone.¹³³ In Virginia, DEQ’s efforts are focused on the Voluntary Remediation Program and corrective action under RCRA, but this is missing the larger picture of toxic risks in the Commonwealth.

B. INCREASE VA DEQ'S ADMINISTRATIVE AUTHORITY

Administrative orders provide agencies with key enforcement tools – tools that are particularly valuable in the context of toxics regulation and clean-up. Administrative orders allow agencies to identify violations, provide streamlined hearings, and issue prompt decisions based on the evidence presented to it.

In Virginia, by statute, the maximum penalty that VA DEQ can impose via administrative order (the “informal special order”) is \$10,000.¹³⁴ The General Assembly set the \$10,000 cap in 1996 and has not raised it since. That penalty pales in comparison to administrative penalties authorized in other states. For example, in North Carolina, the Secretary of Environment and Natural Resources may impose an administrative penalty of \$15,000 *per day* in the case of a violation involving nonhazardous waste and up to \$32,500 *per day* in the case of a violation involving hazardous waste,¹³⁵ and in New Jersey, the Department of Environmental Protection may impose civil administrative penalties of up to \$15,000 *per day* for violations of the state Pollution Prevention Act.¹³⁶



If DEQ believes a violation warrants a more significant penalty, it may seek to go above the cap, but it must go through an elaborate process requiring a hearing officer appointed by the Supreme Court of Virginia,¹³⁷ or it must seek the assistance of the Office of the Attorney General in bringing a penalty action in court. To assess penalties through formal procedures, the responsible party must have been issued at least two written notices of violation for the same or substantially similar violations; the violation must be unresolved; at least 130 days must have passed since VA DEQ issued the first notice of violation; and there must be a finding that a violation occurred after a hearing in accordance with the formal procedures.¹³⁸ If the agency makes it through all these hoops, then certain statutes authorize it to assess penalties of \$32,500 for each violation, up to \$100,000 per order.¹³⁹

The elaborate – and lengthy – formal procedures leave regulated entities with enormous leverage to bargain VA DEQ down to the \$10,000 cap. That leverage can become even more significant if the agency hopes to resolve an issue quickly. Moreover, a \$10,000 penalty lacks the necessary weight to deter or reform the most egregious violators. Bolstering VA DEQ’s authority to assess penalties by raising the \$10,000 cap would greatly augment the agency’s enforcement authority.

C. ENACT LEGISLATION AND PERMIT CONDITIONS THAT ARE MORE STRINGENT THAN FEDERAL STANDARDS

The Commonwealth should be much more aggressive than it has been in the past in enacting legislation and imposing permit limits and conditions that are tougher than federal law requires. We recommend that the Commonwealth:

- Enact legislation requiring reductions in toxic air emissions at existing manufacturing plants and electric generating facilities.
- Enact legislation protecting the most polluted rivers (such as the New River and the Roanoke River) from excessive toxic discharges.
- Expand regulation of toxic air pollutants beyond the 188 hazardous air pollutants regulated under the federal Clean Air Act (there are hundreds of other toxic pollutants not regulated).
- Impose stricter limits in water discharge permits to protect sensitive ecosystems.

Coal ash provides the leading example of where the Commonwealth could act on its own authority. After the massive coal ash spill in Kingston, TN, discussed in Part I-D, the U.S. EPA began developing a rule under the Resource Conservation and Recovery Act (RCRA) to address coal ash disposal. In 2010, the agency proposed two potential avenues for regulating coal ash disposal under RCRA, proposing to regulate it stringently as a hazardous waste or, alternatively, as a solid waste with less extensive regulatory controls.¹⁴⁰ This federal rulemaking is not yet finalized.

We recommend that Virginia regulate coal ash as a hazardous waste regardless of what federal law requires. Coal ash contains highly toxic constituents such as chromium, arsenic, and mercury, and under EPA tests for toxicity, coal ash would easily qualify as hazardous waste under federal law.¹⁴¹ Any decision by the federal government to treat coal ash as a solid waste would be a political decision, not a scientific one. Furthermore, coal ash already qualifies as hazardous waste under existing Virginia law. In Virginia, hazardous waste is defined as a solid waste “which, because of its quantity, concentration or physical, chemical or infectious characteristics, may ... pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.”¹⁴² This definition easily encompasses coal ash.

Currently, the Waste Management Board exempts coal ash ponds and landfills from both solid waste permitting and the hazardous waste program.¹⁴³ The Board has statutory authority to issue regulations to ensure that the Virginia public and environment are protected from coal ash contamination well into the future. Better regulation should include daily cover of the ash, groundwater monitoring, and closure and capping of existing ash disposal sites that are decades-old. The General Assembly should also clarify that coal ash is a hazardous waste, regardless of what federal law requires.

One recent example stands out where the Commonwealth did exercise strong state authority to protect the environment. In 2008, the State Air Pollution Control Board was in charge of issuing a final permit for a generating facility in Wise County proposed by Dominion Virginia Power. Under DEQ's draft permit, the plant would have released approximately 71 pounds of mercury into the environment every year. However, a federal court then interpreted the Clean Air Act's plain language to require mercury emissions limits that reflected MACT, or "maximum achievable control technology."¹⁴⁴ In implementing this MACT requirement, the Air Pollution Control Board concluded that there were already other coal-fired power plants in the United States that achieved far lower emissions of mercury than Dominion was proposing. Therefore, the Board issued Dominion a permit that allowed no more than 0.00000088 pounds of mercury emissions per megawatt-hour, or about four pounds per year.¹⁴⁵ The Wise County plant has become a benchmark for mercury emissions from coal-fired power plants built in the United States.¹⁴⁶

Generally, states are reluctant to implement more stringent permitting programs than required by federal law because of a fear that doing so will drive up the cost of doing business in the state. However, considerable research has shown that well-designed regulation can actually enhance competitiveness as the benefits of innovation offset the cost of compliance.¹⁴⁷ Moreover, preserving the health of Virginia's citizens and environment improves the economic potential of both – and saves lives.



D. ENACT LEGISLATION TO ADDRESS CONSUMER TOXIC EXPOSURE

The Commonwealth should follow the lead of other states in addressing exposure to toxic substances within the home. Because these exposures do not come from major facilities, they tend to get overlooked, but the total exposure of Virginians to toxins in the home is significant and deserves just as much attention as exposure from industrial facilities or contaminated sites.

The General Assembly has acted before — in one isolated instance — to address children’s exposure to toxic products. In 1987, the General Assembly required each Virginia school to evaluate its art supplies and identify those supplies containing toxic chemicals. It also required any art supplies containing toxic chemicals to be labeled and prohibited the use of such chemicals in kindergarten through the fifth grade.¹⁴⁸

Since then, Virginia has been notably hands-off when it comes to policing consumer products containing toxic chemicals, even as many other states are acting preemptively to address these risks. The non-profit group Safer States has identified over one hundred bills, introduced in twenty-nine state legislatures in 2013 alone, which address toxic risks in the home.¹⁴⁹ The states that are active in this area span the country, from New York and Massachusetts to Idaho, Missouri, and South Dakota.

States have taken several approaches towards controlling risks from toxic substances in consumer goods, including bans on specified chemicals, bans on certain chemicals in specified applications, and enacting “right-to-know” legislation that requires disclosure of toxic ingredients in household products. Much of the action has focused on restricting the use of toxic chemicals in toys and children’s products. Maine and Washington have been leaders in this regard.

Maine.¹⁵⁰ In 2008, the Maine Legislature authorized the state Department of Health and Human Services and the state Center for Disease Control and Prevention to produce a list of “chemicals of high concern.” The list includes chemicals that have been identified as carcinogens, reproductive or developmental toxicants, endocrine disruptors, or PBTs. The agencies may designate a chemical of high concern as a “priority chemical” if it has been detected in humans or the household environment; if it is an ingredient in a consumer product; or if it has been banned in another state within the United States. Any manufacturer or distributor of a children’s product containing a priority chemical must provide the agencies with notice including the product, the number of units sold or distributed

for sale in Maine or nationally, the priority chemicals in the product, and the purpose for which those chemicals are used in the product. If the agencies determine that the children's product exposes children and vulnerable populations to the priority chemical and that there is a safer alternative to the priority chemical, then the agencies may prohibit the manufacture, sale, or distribution of that product within Maine.

Washington.¹⁵¹ Similarly, the Washington Legislature adopted the Children's Safe Products Act in 2008. The legislation applies to "children's products," which are defined to include toys, children's cosmetics, children's jewelry, child car seats, clothing and certain products designed for feeding, teething, or to facilitate sleeping. The legislation bans the manufacturing and sale of children's products containing lead, cadmium, or phthalates. Second, it directs the state Department of Ecology and the state Department of Health to identify "high priority chemicals that are of high concern for children" in light of the potential for fetal exposure. Then the departments must identify children's products or product categories that may contain the chemicals of high concern for children. Manufacturers of a children's product containing a chemical of high concern for children must submit an annual filing with the Department of Ecology identifying the chemical, its purpose in the product, and the amount of the chemical used. The information is collected and made public on the Department of Ecology's website.

In 2012, recognizing that children spend a significant amount of time in school, Vermont took the step of requiring manufacturers and distributors to sell only "environmentally preferred" cleaning products to schools within Vermont.¹⁵² To qualify, an independent third party must have certified that the product has a reduced effect on human health when compared to other cleaning products. Furthermore, each distributor and manufacturer that sells cleaning products to a school district must provide "green cleaning" training.

More recently, California enacted legislation authorizing the California Department of Toxic Substances Control to adopt regulations to encourage safe substitutes for toxic ingredients in products sold in California.¹⁵³ Under the recently-issued regulations, the department will develop a list of toxic chemicals (the "Candidate Chemicals List") identified as PBTs, carcinogenic, endocrine disruptors, or those that adversely affect human development. For any product that presents a risk of "widespread adverse impacts" from these chemicals, manufacturers must perform an alternatives analysis to determine how to make the product safer.¹⁵⁴ Based on the alternatives analysis, the department may choose to restrict the use of a chemical of concern, prohibit sales of certain products, or require redesigning of the product.



The program attempts to shift the focus to the product development stage and promote the use of safe alternatives.

Our recommendations for reducing risks from toxic chemicals in the home include:

- The General Assembly should broaden the 1987 legislation on art supplies by requiring manufacturers of all children’s products to clearly label any items containing chemicals of concern. The labels should clearly indicate the chemical, its purpose in the product, and health risks.
- The General Assembly should also direct DEQ and the Virginia Department of Health to develop a list of chemicals of concern and designate “priority chemicals” according to the risk of exposure based on environmental factors or its use in a children’s product. If a children’s product presents a health risk, DEQ and the Virginia Department of Health should be authorized to make the information public on their websites and to ban or limit the product if necessary to protect public health.

CONCLUSION

For too long, Virginia has ignored the health risks from toxic chemicals in our communities. The risks range from near-term dangers such as fire and explosion to longer-term health risks to adults, children, and developing fetuses. Our review of existing laws and regulations shows that toxic chemicals have been a low-priority issue in the Commonwealth, with little funding and few personnel. Record-keeping and reporting has been poor, and DEQ lacks a comprehensive picture of the true extent of toxic exposures in the Commonwealth. There is no prioritized database of contaminated sites in the Commonwealth, and coal ash, chemical storage, household toxics, and other issues have been neglected. The scale of the response simply does not match the scale of the problem.

Toxic chemical contamination is widespread in the Commonwealth. Indeed, as documented in this report, Virginia ranks high nationally on many kinds of toxic chemical releases. Millions of pounds of toxic chemicals are released directly into our environment annually, and exposure is widespread.

To create a healthier Virginia and protect our citizens, the Commonwealth itself must take the lead. The General Assembly, working with DEQ and other agencies, should enact a comprehensive, protective program to address toxic chemicals – and provide the funding and personnel to implement it.



ENDNOTES

¹ Currently, the U.S. EPA lists the following Virginia localities as exceeding health-based standards for both ozone and PM2.5: the City of Alexandria; Arlington County; the City of Fairfax; Fairfax County; the City of Falls Church; Loudoun County; the City of Manassas; the City of Manassas Park; and Prince William County. *The Green Book Nonattainment Areas for Criteria Pollutants: All Criteria Pollutants: Currently Designated Nonattainment Areas for All Criteria Pollutants*, U.S. EPA (July 31, 2013),

<http://www.epa.gov/airquality/greenbk/ancl.html#VIRGINIA>. The Census Bureau estimates that 2.3 million people live in these localities. *State and County Quick Facts: Virginia*, U.S. CENSUS BUREAU (last revised June 27, 2013), quickfacts.census.gov/qfd/states/51000.html.

² See *Consumption Advisories and Restrictions in effect for Virginia's Waterways*, Virginia Dept. of Health, <http://www.vdh.virginia.gov/epidemiology/DEE/PublicHealthToxicology/Advisories/index.htm>.

³ See *Toxic Air and America's Schools*, USA TODAY (2008), <http://usatoday30.usatoday.com/news/nation/environment/smokestack/index> (last visited Dec. 17, 2013).

⁴ VA CONST., art.XI, § 1.

⁵ VIRGINIA DEPT. OF ENVTL. QUALITY [Va. DEQ], 2011 VIRGINIA TOXICS RELEASE INVENTORY REPORT 7 (Mar. 2013) [hereinafter VA. TRI REPORT].

⁶ TRI: TRI Explorer: Release Reports – Geography, U.S. EPA (Dec. 3, 2013), http://iaspub.epa.gov/triexplorer/tri_release.geography.

⁷ TRI: TRI Explorer: Release Reports – Industry, U.S. EPA (Dec. 3, 2013), http://iaspub.epa.gov/triexplorer/tri_release.geography (select electric utilities under industry).

⁸ CLEAN AIR TASK FORCE, THE TOLL FROM COAL 12 tbl.2 (Marika Tatsutani ed. 2010).

⁹ ROB KERTH & SHELLEY VINYARD, WASTING OUR WATERWAYS 2012: TOXIC INDUSTRIAL POLLUTION AND THE UNFULFILLED PROMISE OF THE CLEAN WATER ACT 11 tbl.1 (May 2012) (prepared for Environment Virginia Research & Policy Center).

¹⁰ *Id.* at 12 tbl.2.

¹¹ *Id.* at 18 tbl.5.

¹² EARTHJUSTICE, VIRGINIA COAL ASH DISPOSAL IN PONDS AND LANDFILLS 1 (Aug. 2012), available at <http://earthjustice.org/features/campaigns/state-fact-sheets-on-coal-ash>.

¹³ VA. DEQ, 2012 REPORT ON TOXICS REDUCTION IN STATE WATERS 12 (Jan. 2013).

¹⁴ *Final National Priorities List (NPL) Sites—by State*, U.S. EPA (Oct. 31, 2013), <http://www.epa.gov/superfund/sites/query/queryhtm/nplfin.htm#VA>.

¹⁵ Only industrial sources that (1) manufacture more than 25,000 pounds of a toxic chemical; (2) process more than 25,000 pounds of a toxic chemical; or (3) “otherwise use” more than 10,000 pounds of a toxic chemical in a year must report toxic releases to the U.S. EPA or Virginia DEQ. 40 C.F.R. § 372.25 (2012).

¹⁶ PRESIDENT'S CANCER PANEL, *Introduction to REDUCING ENVIRONMENTAL CANCER RISK: WHAT WE CAN DO NOW* (2010).

¹⁷ *Id.*

¹⁸ *Id.* at 16.

¹⁹ VA. TRI REPORT, *supra* note 5, at 7.

²⁰ *Id.*

²¹ In 2011, Virginia facilities reported a 15 percent reduction in releases to air, a 7 percent reduction in releases to water, and a 21 percent reduction in releases to land relative to 2010. VA. TRI REPORT, *supra* note 5, at i–ii. For a discussion of the historical trend since 1998 and baseline adjustments, see VA. TRI REPORT, *supra* note 5, at App.E.

²² VA. TRI REPORT, *supra* note 5, at 8, 10, fig.3.

- ²³ *Id.* at 8, 11, fig.4.
- ²⁴ *Id.* at 8, 12, fig.5.
- ²⁵ KERTH & VINYARD, *supra* note 9, at 11 tbl.1.
- ²⁶ 2012 REPORT ON TOXICS REDUCTION IN STATE WATERS, *supra* note 13, at 12.
- ²⁷ KERTH & VINYARD, *supra* note 9, at 43, tbl.A-10. Alliant Techsystems ran the plant under contract with the U.S. Army until 2011 when BAE Systems won the contract. In 2012, BAE Systems assumed control of operations.
- ²⁸ *Id.*
- ²⁹ *Id.*
- ³⁰ *Id.* at 34, tbl.A-2.
- ³¹ *Id.* at 36, tbl.A-3. The authors define cancer-causing chemicals “as those listed on California’s Proposition 65 list of substances known to cause cancer” in addition to other “compounds associated with cancer-causing chemicals.” *Id.* at 16 n.29.
- ³² *Id.* at 37, tbl.A-4. The authors linked toxic chemicals to developmental disorders using California’s list of “Chemicals Known to the State to Cause Cancer or Reproductive Toxicity.” *Id.* at 28.
- ³³ *Id.* at 38, tbl.A-5. The authors linked toxic chemicals to reproductive disorders using California’s list of “Chemicals Known to the State to Cause Cancer or Reproductive Toxicity.” *Id.* at 28.
- ³⁴ U.S. EPA, *Fact Sheet on EPCRA Section 313 Rulemaking: Persistent Bioaccumulative Toxic Chemicals* (1999), available at <http://www2.epa.gov/toxics-release-inventory-tri-program/pbt-chemicals-final-rule-fact-sheet>.
- ³⁵ VA. TRI REPORT, *supra* note 5, at 19.
- ³⁶ *Health & Education: Environmental Health Topics: Environmental Agents: Lead*, NAT’L INST. ENVTL. HEALTH SCI. (last updated Sept. 9, 2013), <http://www.niehs.nih.gov/health/topics/agents/lead/>.
- ³⁷ VICKI BLAZER ET AL., TECHNICAL REPORT: TOXIC CONTAMINANTS IN THE CHESAPEAKE BAY AND ITS WATERSHED: EXTENT AND SEVERITY OF OCCURRENCE AND POTENTIAL BIOLOGICAL EFFECTS vii (Dec. 2012).
- ³⁸ *How We Save the Bay: Air Pollution – Mercury*, CBF.ORG (last visited Oct. 21, 2013), <http://www.cbf.org/how-we-save-the-bay/issues/air-pollution/mercury>.
- ³⁹ VA. TRI REPORT, *supra* note 5, at 23–24, fig.11, App. I-1.
- ⁴⁰ VA. TRI REPORT, *supra* note 5, at 21–22.
- ⁴¹ Press Release, United States Department of Justice, Honeywell Resins and Chemicals to Pay \$3 Million Penalty, Upgrade Air Pollution Controls at Hopewell, Virginia, Plant (Mar. 27, 2013), <http://www.justice.gov/opa/pr/2013/March/13-enrd-353.html>.
- ⁴² *Id.*
- ⁴³ Rex Springston, *Hercules Inc. Agrees to Better Control Pollution Releases in Hopewell*, RICH. TIMES-DISPATCH (Aug. 1, 2012).
- ⁴⁴ Currently, American Electric Power awaits approval from state regulators to switch its Clinch River Plant from coal to natural gas beginning in 2015.
- ⁴⁵ AMERICAN LUNG ASSOCIATION, TOXIC AIR: THE CASE FOR CLEANING UP COAL-FIRED POWER PLANTS 2, 6 (Mar. 2011); *Environmental Impacts of Coal Power: Air Pollution*, UNION OF CONCERNED SCIENTISTS, http://www.ucsusa.org/clean_energy/coalvswind/c02c.html (last visited Dec. 5, 2013).
- ⁴⁶ CLEAN AIR TASK FORCE, *supra* note 8.
- ⁴⁷ *Id.* at 12 tbl.3.
- ⁴⁸ *Id.* at 12 tbl.2.
- ⁴⁹ *Id.* at 13 tbl.4.
- ⁵⁰ *Id.*

- ⁵¹ *Fossil Transition, Problems of Coal, Death and Disease from Power Plants*, CLEAN AIR TASK FORCE, http://www.catf.us/fossil/problems/power_plants/existing/ (last visited Nov. 12, 2013). In 2010, the year of the study, the plant emitted 268 tons of PM_{2.5}. Emissions from the Chesterfield Generating Station have fallen to 122.16 tons; however, it remains a significant source of PM_{2.5} in the Richmond area. See VA. DEQ, 2010 POINT SOURCE CRITERIA POLLUTANT EMISSIONS REPORT (2010), available at <http://www.deq.virginia.gov/Programs/Air/AirQualityPlanningEmissions/EmissionInventory.aspx> (reports between the years of 2002 and 2012 are available).
- ⁵² United States Chemical Safety Board, *Preliminary Findings of the U.S. Chemical Safety Board from its Investigation of the West Fertilizer Explosion and Fire* (June 27, 2013), available at <http://www.csb.gov/documents/>.
- ⁵³ *Obama Consoles Texas Community Rocked by Blast: 'You Are Not Alone,'* THE GUARDIAN (Apr. 25, 2013 7:43 PM), <http://www.theguardian.com/world/2013/apr/25/obama-texas-fertiliser-memorial>.
- ⁵⁴ U.S. EPA, *Emergency Planning and Community Right-to-Know Overview*, U.S. EPA; M.B. Pell, Ryan McNeill & Selam Gebrekidan, *Exclusive: U.S. System for Flagging Hazardous Chemicals is Widely Flawed*, REUTERS (Aug. 10, 2013 12:55 PM), <http://www.reuters.com/article/2013/08/10/us-chemical-tierii-idUSBRE97906O20130810>.
- ⁵⁵ *Virginia Emergency Response & Planning Organizations*, VA. DEQ, <http://www.deq.virginia.gov/Programs/Air/AirQualityPlanningEmissions/SARATitleIII/VAEmergencyResponsePlanningOrganizations.aspx> (last visited Aug. 19, 2013).
- ⁵⁶ CERCLA § 105(a)–(c), 42 U.S.C. § 9605(a)–(c) (2006); *Superfund: Laws, Policy and Guidance: CERCLA Overview*, U.S. EPA (last updated Dec. 12, 2011), <http://www.epa.gov/superfund/policy/cercla.htm>.
- ⁵⁷ National Priorities List, 73 Fed. Reg. 14,719, 14,722 (Mar. 19, 2008); *Mid-Atlantic Superfund: Virginia Sites: Hidden Lane Landfill*, U.S. EPA (last updated Jan. 24, 2013), <http://www.epa.gov/reg3hwmd/npl/VAD980829030.htm>.
- ⁵⁸ *Mid-Atlantic Superfund: Virginia Sites: Hidden Lane Landfill*, U.S. EPA (last updated Jan. 24, 2013), <http://www.epa.gov/reg3hwmd/npl/VAD980829030.htm>.
- ⁵⁹ *Mid-Atlantic Superfund: Virginia Sites: Peck Iron and Metal*, U.S. EPA (last updated Nov. 25, 2013), <http://www.epa.gov/reg3hwmd/npl/VAN000306115.htm>.
- ⁶⁰ *Id.*
- ⁶¹ *Superfund: Sites: National Priorities List: Final National Priorities List (NPL) Sites—by State*, U.S. EPA (Oct. 31, 2013), <http://www.epa.gov/superfund/sites/query/queryhtm/nplfin.htm#VA>. The U.S. EPA listed the Former Nansmond Ordnance Depot after it scored 70.71 on the Hazard Ranking System. *Id.*
- ⁶² *Mid-Atlantic Superfund: Virginia Sites: Former Nansmond Ordnance Depot: Current Site Information*, U.S. EPA (last updated Nov. 8, 2013), <http://www.epa.gov/reg3hwmd/npl/VAD123933426.htm>.
- ⁶³ *Id.*
- ⁶⁴ *See id.*
- ⁶⁵ *Superfund Site Progress Profile: Former Nansmond Ordnance Depot*, U.S. EPA, <http://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0302639> (last visited Dec. 1, 2013).
- ⁶⁶ National Priorities List of Uncontrolled Hazardous Waste Sites, 52 Fed. Reg. 27,620 (July 22, 1987); *Mid-Atlantic Superfund: Virginia Sites: Greenwood Chemical Company*, U.S. EPA (Jan. 24, 2013), <http://www.epa.gov/reg3hwmd/npl/VAD003125374.htm>.
- ⁶⁷ *Mid-Atlantic Superfund: Virginia Sites: Buckingham County Landfill*, U.S. EPA (May 14, 2013), <http://www.epa.gov/reg3hwmd/npl/VAD089027973.htm>; *Superfund: Sites: NPL: NPL Site Narrative for Buckingham County Landfill*, U.S. EPA (last updated on Nov. 27, 2012), <http://www.epa.gov/superfund/sites/npl/nar1688.htm>.
- ⁶⁸ ENVIRONMENTAL LAW INSTITUTE, *ANALYSIS OF STATE SUPERFUND PROGRAMS* (2002), available at <http://elistorge.org/Data/products/d12-10a.pdf>.
- ⁶⁹ *Programs: Pollution Response & Preparedness*, VA. DEQ, <http://www.deq.virginia.gov/Programs/PollutionResponsePreparedness.aspx> (last visited Dec. 1, 2013).

⁷⁰ See *Programs: Land Protection & Revitalization: Voluntary Remediation Program: Public Information*, VA. DEQ, <http://www.deq.virginia.gov/Programs/LandProtectionRevitalization/RemediationProgram/VoluntaryRemediationProgram/PublicInformation.aspx> (last visited Dec. 1, 2013) (citing from the “Completed Sites Report” and the “Planned Sites Report”).

⁷¹ According to the *2011 National Biennial RCRA Hazardous Waste Report*, 390 different firms generated 74,803 tons of hazardous waste in Virginia. The Report lists the 50 largest hazardous waste generators in the state, which includes the Radford Army Ammunition Plant, Honeywell International (Hopewell), Boehringer Ingelheim Chemicals (Petersburg), Chaparral, Inc. (Petersburg), Arkema Inc. (Courtland), Western Refining Yorktown, Steel Dynamics Roanoke, Dupont Front Royal, and Former Corning Danville. Most hazardous waste was generated by iron and steel mills, followed by basic chemical manufacturing, resin manufacturing, petroleum and coal products manufacturing, and pharmaceutical manufacturing. U.S. EPA, NATIONAL BIENNIAL RCRA HAZARDOUS WASTE REPORT: STATE DETAIL ANALYSIS 409 (2012).

⁷² *Corrective Action: RCRA Facilities: Virginia*, U.S. EPA (last updated Nov. 6, 2013), <http://www.epa.gov/reg3wcmd/ca/va.htm>.

⁷³ See *Hazardous and Solid Waste Management System; Identification and Listing of Special Wastes; Disposal of Coal Combustion Residual From Electric Utilities*, 75 Fed. Reg. 35,128, 35,148–49 (June 21, 2010).

⁷⁴ *In Harm’s Way: Coal Ash Contaminated Sites*, EARTHJUSTICE.ORG, www.earthjustice.org/features/campaigns/in-harm-s-way-coal-ash-contaminated-sites (last accessed July 4, 2013); see Shaila Dewan, *Hundreds of Coal Ash Dumps Lack Regulation*, N.Y. TIMES, at A1 (Jan. 7, 2009).

⁷⁵ EARTHJUSTICE, *supra* note 12, at 1.

⁷⁶ *Id.*

⁷⁷ Press Release, New EPA Data Show Coal Ash Problem Much Worse (June 27, 2012), <http://earthjustice.org/news/press/2012/new-epa-data-show-coal-ash-problem-much-worse>; see *In Harm’s Way: Coal Ash Contaminated Sites*, <http://earthjustice.org/features/campaigns/in-harm-s-way-coal-ash-contaminated-sites> (last visited Sept. 5, 2013).

⁷⁸ EARTHJUSTICE, *supra* note 12, at 1.

⁷⁹ See various exemptions for fossil fuel combustion wastes at 9 VA. ADMIN. CODE §§20-81-95(C)(7), 20-81-95(D)(18), and 20-81-97. See also 9 VA. ADMIN. CODE §20-85-150 (exempting sites that manage fossil fuel combustion products from solid waste facility permitting).

⁸⁰ EARTHJUSTICE, *supra* note 12, at 1; see *Wastes: Industrial Wastes: Special Waste: Coal Combustion Residuals: Frequent Questions*, U.S. EPA (last updated July 29, 2013), <http://www.epa.gov/osw/nonhaz/industrial/special/fossil/coalash-faqs.htm>.

⁸¹ U.S. EPA rated the “hazard potential” of the impoundments according to the following criteria: (1) “High Hazard Potential,” meaning that failure “will probably cause loss of human life;” (2) “Significant Hazard Potential,” meaning that failure would probably not cause the loss of human life, but can cause significant economic losses, environmental damage, or impact key infrastructure; (3) “Low Hazard Potential,” meaning that failure would probably not cause the loss of human life or economic loss or environmental damage; and (4) “Less than Low Hazard Potential,” which captures all other impoundments.

⁸² U.S. EPA rated the structural integrity of the impoundments according to the following categories: (1) “Satisfactory,” meaning that the inspection did not reveal any existing or potential safety deficiencies; (2) “Fair,” meaning that the inspection indicated that acceptable performance should be expected under all required loading conditions; (3) “Poor,” meaning that the inspection revealed a safety deficiency for a required loading condition (static, hydrologic, or seismic); and (4) “Unsatisfactory,” meaning that the structure is unsafe. *Coal Combustion Residuals Impoundment Assessment Reports: Frequently Asked Questions*, U.S. EPA (last updated July 29, 2013), <http://www.epa.gov/osw/nonhaz/industrial/special/fossil/coalash-faqs.htm>. No impoundments received an “unsatisfactory” rating. *Coal Combustion Residuals Impoundment Assessment Reports*, U.S. EPA (last updated Sept. 23, 2013), <http://www.epa.gov/osw/nonhaz/industrial/special/fossil/surveys2/states.htm#va>.

⁸³ After an inspection, U.S. EPA provided each facility with a copy of the final report and requested that the facility develop an action plan for implementing the recommendations in the report. *Coal Combustion Residuals Impoundment Assessment Reports*, U.S. EPA (last updated Sept. 23, 2013), <http://www.epa.gov/osw/nonhaz/industrial/special/fossil/surveys2/states.htm#va>.

⁸⁴ O’BRIEN & GERE ENGINEERS, INC., DAM SAFETY ASSESSMENT OF CCW IMPOUNDMENTS: CHESAPEAKE ENERGY CENTER 11 (Sept. 30, 2010) (prepared for U.S. EPA). The report notes that Dominion Virginia Power “is well aware of the deficiencies” and has proposed a schedule for repairs to “address the deficiencies in an appropriate time frame.” *Id.*

- ⁸⁵ EARTHJUSTICE, *supra* note 12, at 1.
- ⁸⁶ *Id.* at 2.
- ⁸⁷ DEWBERRY & DAVIS, LLC, COAL COMBUSTION RESIDUE IMPOUNDMENT: CLINT RIVER POWER PLANT (Dec. 2011) (prepared for U.S. EPA).
- ⁸⁸ EARTHJUSTICE, *supra* note 12, at 1.
- ⁸⁹ 4 VA. ADMIN. CODE 50-20-105, -180 (2012); see also VA. CODE ANN. § 10.1-604, -607 (2012).
- ⁹⁰ Proposed Consent Order, at 7, North Carolina v. Duke Energy Progress, Inc., No. 13 CVS 4061 (N.C. Super. Ct. Oct. 2013); Complaint at 2, North Carolina v. Duke Energy Carolinas, LLC, No. 13 CVS 14661 (N.C. Super. Ct. Aug. 16, 2013); Complaint at 2, North Carolina v. Duke Energy Progress, Inc., No. 13 CVS ___ (N.C. Super. Ct. Aug. 16, 2013); see *Mountain Island Lake Water Testing*, CATAWBA RIVERKEEPER, <http://www.catawbariverkeeper.org/our-work/covekeepers/mountain-island-lake/mountain-island-lake-heavy-metal-contamination> (last visited Dec. 17, 2013).
- ⁹¹ See Press Release, N.C. Dep't of Env't & Nat. Res., State takes action on permit violations at coal-fired power plants not included in earlier lawsuits (Aug. 16, 2013), *available at* http://portal.ncdenr.org/c/document_library/get_file?uuid=94f346fa-782a-414d-bc7a-0dc9d1638ae9&groupId=38364.
- ⁹² *Pa., W.Va. Landowners Sue FirstEnergy Over Waste*, CHARLESTON GAZETTE (Oct. 14, 2013), <http://www.wvgazette.com/News/201310140104>.
- ⁹³ *Health & Education: Environmental Health Topics: Environmental Agents: Endocrine Disruptors*, NAT'L INST. ENVTL. HEALTH SCI. (June 5, 2013), <http://www.niehs.nih.gov/health/topics/agents/endocrine/>.
- ⁹⁴ *Id.*
- ⁹⁵ *Health & Education: Environmental Health Topics: Environmental Agents: Bisphenol A*, NAT'L INST. ENVTL. HEALTH SCI. (July 18, 2013), <http://www.niehs.nih.gov/health/topics/agents/sya-bpa/>
- ⁹⁶ PRESIDENTS CANCER PANEL, *supra* note 16, at 18.
- ⁹⁷ Sabrina Tavernise, *F.D.A. Makes It Official: BPA Can't Be Used in Baby Bottles and Cups*, N.Y. TIMES, July 18, 2012, at A15.
- ⁹⁸ *News & Events: Public Health Focus: Bisphenol A (BPA): Use in Food Contact Application*, U.S. FDA (last updated June 4, 2013), <http://www.fda.gov/newsevents/publichealthfocus/ucm064437.htm>.
- ⁹⁹ Brian Bienkowski, *BPA Replacement Also Alters Hormones*, SCIENTIFIC AMERICAN (Jan. 17, 2013), <http://www.scientificamerican.com/article.cfm?id=bpa-replacement-also-alters-hormones>.
- ¹⁰⁰ CTR. FOR HEALTH, ENV'T & JUSTICE, HIDDEN HAZARDS: TOXIC CHEMICALS INSIDE CHILDREN'S VINYL BACK-TO-SCHOOL SUPPLIES 13-15 (2012).
- ¹⁰¹ Andrew M. Seaman, *Chemicals in Plastics and Cosmetics Tied to Early Births*, REUTERS (Nov. 18, 2013), <http://www.reuters.com/article/2013/11/18/us-chemicals-cosmetics-idUSBRE9AH15620131118>.
- ¹⁰² Bienkowski, *supra* note 99.
- ¹⁰³ U.S. EPA, *Phthalates*, in TOXICITY AND EXPOSURE ASSESSMENT FOR CHILDREN'S HEALTH (Oct. 10, 2007), *available at* <http://epa.gov/teach>.
- ¹⁰⁴ Katie Moisse, *Chemicals Banned From Toys Lurk in School Supplies*, ABCNEWS (Aug. 27, 2012), <http://abcnews.go.com/Health/Wellness/phthalates-chemicals-banned-toys-school-supplies-center-health/story?id=17086775>.
- ¹⁰⁵ Patricia Callahan & Sam Roe, *Playing with Fire: A Deceptive Campaign by Industry Brought Toxic Flame Retardants Into Our Homes and Into Our Bodies. And the Chemicals Don't Even Work as Promised*, CHI. TRIBUNE (May 6, 2012), at C1.
- ¹⁰⁶ *Id.*; see *Chemical Safety and Pollution Prevention: Pollution Prevention & Toxics: Existing Chemicals: PDBEs Action Plan Summary*, U.S. EPA, <http://www.epa.gov/oppt/existingchemicals/pubs/actionplans/pbde.html> (last updated Apr. 9, 2013).
- ¹⁰⁷ Mary Russell Roberson, *Flame Retardants' Effects on Health*, DUKE UNIV. RES. (June 18, 2013), <http://research.duke.edu/stories/flame-retardants-effects-health>.

- ¹⁰⁸ Heather M. Stapleton et al., *Novel and High Volume Use Flame Retardants in U.S. Couches Reflective of the 2005 PentaBDE Phase Out*, 46 ENVTL. SCI. & TECH. 13,432, 13,438 (2012).
- ¹⁰⁹ See Mary Russell Roberson, *Flame Retardants Make Dust Bunnies Dangerous*, DUKE UNIV. RES. (June 18, 2013), <http://research.duke.edu/stories/flame-retardants-make-dust-bunnies-dangerous>; Michael Hawthorne, *Toxic Roulette: Flame Retardants Get a Pass from Regulators with Little Assessment of Potential Health Risks*, CHI. TRIBUNE (May 10, 2012), at C1.
- ¹¹⁰ Mary Russell Roberson, *supra* note 109.
- ¹¹¹ *Id.*
- ¹¹² Eleonora Napoli et al., *Toxicity of the Flame-Retardant BDE-49 on Brain Mitochondria and Neuronal Progenitor Striatum Cells Enhanced by a PTEN-Deficient Background*, 134 TOXICOLOGICAL SCI. 111 (2013).
- ¹¹³ Erin M. Rees Clayton et al., *The Impact of Bisphenol A and Triclosan on Immune Parameters in the U.S. Populations, NHANES 2003-2006*, 119 ENVTL. HEALTH PERSPECTIVES 390 (2010); *For Consumers: Consumer Updates: Triclosan: What Consumers Should Know*, U.S. FDA (Apr. 12, 2013), <http://www.fda.gov/forconsumers/consumerupdates/ucm205999.htm>; CDC, *National Biomonitoring Program: Biomonitoring Summary: Triclosan*, CTR. DISEASE CONTROL & PREVENTION (July 23, 2013), http://www.cdc.gov/biomonitoring/Triclosan_BiomonitoringSummary.html.
- ¹¹⁴ Press Release, *Lawsuit Seeks Final Rule on 'Antibacterial' Chemicals After 32-Year Delay* (July 27, 2010), <http://www.nrdc.org/media/2010/100727.asp>.
- ¹¹⁵ Registration Review; Pesticide Dockets Opened for Review and Comment and Other Docket Acts, 78 Fed. Reg. 18586, 18587 (Mar. 27, 2013).
- ¹¹⁶ *Triclosan: What Consumers Should Know*, *supra* note 113.
- ¹¹⁷ *Smarter Living: Health: Chemical Index: Formaldehyde*, NAT. RES. DEF. COUNCIL (Dec. 27, 2011), <http://www.nrdc.org/living/chemicalindex/formaldehyde.asp>.
- ¹¹⁸ U.S. CPSC, AN UPDATE ON FORMALDEHYDE (2013 rev. ed.), *available at* www.cpsc.gov/cpsc/pub/pubs/725.pdf.
- ¹¹⁹ ENVTL. LAW INST., *supra* note 68, at tbl. IV-2.
- ¹²⁰ N.C. GEN. STAT. § 130A-310.1(b).
- ¹²¹ *Id.* § 130A-310.1(c) & (e). In North Carolina, a "responsible party" means anyone who discharges or deposits; arranges for discharge or deposit; accepts for discharge or deposit; or transports for the purpose of discharge or deposit any hazardous substance that contaminates a site. *Id.* § 130A-310.7(a).
- ¹²² *Id.* § 130A-310.7(a).
- ¹²³ *Division of Waste Management: Superfund Section: Remedial Actions*, N.C. DEP'T OF ENV'T. & NAT. RES., <http://portal.ncdenr.org/web/wm/sf/ihs/remedialactionrecprogram> (last visited Dec. 10, 2013). The audits resulted in seven notices of violation issued to RECs during fiscal year 2012-2013. *Division of Waste Management: Superfund Section: REC Program: REC Violations*, N.C. DEP'T OF ENV'T. & NAT. RES., <http://portal.ncdenr.org/web/wm/sf/ihs/recviolations> (last visited Dec. 10, 2013).
- ¹²⁴ *Division of Waste Management: Superfund Section: Special Remediation Branch*, N.C. DEP'T OF ENV'T. & NAT. RES., <http://portal.ncdenr.org/web/wm/dsca> (last visited Dec. 10, 2013).
- ¹²⁵ N.J. STAT. ANN. § 58:10-23.11g.
- ¹²⁶ *Site Remediation Program: Origins of the Site Remediation Program*, N.J. DEP'T OF ENV'T'L PROTECTION (Aug. 22, 2013), <http://www.nj.gov/dep/srp/about/origins.htm>.
- ¹²⁷ N.J. STAT. ANN. § 13:1K-9.
- ¹²⁸ *Id.* § 58:10B-1.3.
- ¹²⁹ *Id.* § 58:10C-27a; see *id.* § 58:10C-27b; see also *Cleanup of Sites & Spills: The Privatized Waste Site Cleanup Program*, MASS. DEP., <http://www.mass.gov/eea/agencies/massdep/cleanup/the-privatized-waste-site-cleanup-program.html> (last visited Dec. 17, 2013).
- ¹³⁰ CONN. GEN. STAT. ANN. § 22a-451.

¹³¹ *Id.* § 22a-133.

¹³² *Id.* § 22a-133e.

¹³³ *Superfund Section, Inactive Hazardous Waste Sites and Pollutant-Only Sites, Inventory by County, available at* http://portal.ncdenr.org/c/document_library/get_file?uuid=bc36cebd-0da1-4199-be4c-1044a7f1343c&groupId=38361.

¹³⁴ VA. CODE ANN. §§ 10.1-1182, -1186(9) (Repl. Vol. 2007).

¹³⁵ N.C. GEN. STAT. § 130A-22(a) (setting maximum administrative penalties for violations of Article 9, which contains North Carolina's waste management laws).

¹³⁶ N.J. STAT. ANN. § 13:1d-49.

¹³⁷ VA DEQ, CIVIL ENFORCEMENT MANUAL 2-23-24 (May 11, 2012), available at <http://www.deq.virginia.gov/Programs/Enforcement/LawsRegulationsGuidance.aspx>.

¹³⁸ See *id.* at 2-23-24; see, e.g., VA. CODE ANN. §§ 10.1-1309(A)(vi), -1455(G), 62.1-44.15(8a).

¹³⁹ See, e.g., VA. CODE ANN. §§ 10.1-1309(A)(vi), -1455(G), 62.1-44.15(8a).

¹⁴⁰ Hazardous and Solid Waste Management System; Identification and Listing of Special Wastes; Disposal of Coal Combustion Residuals From Electric Utilities, 75 Fed. Reg. 35,128, 35,128 (June 21, 2010).

¹⁴¹ See Notice of Regulatory Determination on Wastes From the Combustion of Fossil Fuels, 65 Fed. Reg. 32,214, 32,214 (May 22, 2000); Kristen Lombardi, *The Hidden History: Federal Regulation Was Considered, but Fell Victim to a Bureaucratic Debate*, CTR. FOR PUBLIC INTEGRITY (Jan. 7, 2009 9:36 PM), <http://www.publicintegrity.org/2009/01/07/2980/hidden-history>; Press Release, Earthjustice, New EPA Testing Method Identifies Higher Coal Ash Threat; Must Drive Agency's Rulemaking (May 5, 2010), available at <http://earthjustice.org/news/press/2010/new-epa-testing-method-identifies-higher-coal-ash-threat-must-drive-agency-s-rulemaking>.

¹⁴² VA. CODE ANN. §10.1-1400 (emphasis added).

¹⁴³ 9 VA. ADMIN. CODE §20-85-150.

¹⁴⁴ See *New Jersey v. EPA*, 517 F.3d 574 (D.C. Cir. 2008).

¹⁴⁵ Memorandum from Dallas Sizemore, Regional Director, Va. DEQ, to James Martin, Vice President, Virginia Electric Power Co. (June 30, 2008), available at <http://www.deq.virginia.gov/Programs/Air/PermittingCompliance/Permitting/PowerPlants/DominionVirginiaCityHybridEnergyCenter.aspx>. The Virginia City Hybrid Energy Center MACT permit is attached to the memo.

¹⁴⁶ In addition to the federal MACT requirements for mercury emissions, the applicable permits established state imposed conditions, such as enforceable mechanisms for increasing the percentage of biomass burned in lieu of coal and converting an existing power plant to natural gas. These conditions helped to mitigate the plant's carbon dioxide emissions, which federal law did not regulate at the time of permitting. The requirement to burn some biomass, rather than solely coal, mitigated emissions of other key pollutants, like sulfur dioxide and nitrogen oxides, and additional technology based conditions allowed the state to set standards below the federal requirements that existed at the time.

¹⁴⁷ See Michael Porter & Claas van der Linde, *Toward a New Conception of the Environment-Competitiveness Relationship*, 9 J. ECON. PERSPECTIVES 97 (1995).

¹⁴⁸ 1987 Va. Acts of Assembly ch.225. Congress has also passed federal legislation on this issue. Labeling of Hazardous Art Materials Act, Pub. L. No. 100-695, 102 Stat. 4568 (1988).

¹⁴⁹ See *2013 Toxic Chemicals Legislation*, SAFER STATES (Mar. 18, 2013), available at http://www.saferstates.com/states_in_the_lead/current_legislation.html.

¹⁵⁰ MAINE REV. STAT., title 38, ch. 16-D (2013).

¹⁵¹ WASH. REV. CODE ANN. tit. 70, ch. 240.

¹⁵² 18 VT. STAT. ANN. § 1781-1782.

¹⁵³ CAL. CODE div. 4.5, tit. 22, ch.55.

¹⁵⁴ CAL. CODE REGS. tit. 22, § 69503.2.



NOTES:



ROBERT R. MERHIGE, JR.
CENTER FOR ENVIRONMENTAL STUDIES
UNIVERSITY OF RICHMOND SCHOOL OF LAW

28 Westhampton Way
University of Richmond, VA 23173

ABOUT THE CENTER FOR ENVIRONMENTAL STUDIES

The Robert R. Merhige, Jr. Center for Environmental Studies at the University of Richmond School of Law engages in research, instruction, and public outreach on energy and environmental issues in the Mid-Atlantic region and beyond. The Center hosts conferences, symposia, and speakers on pressing environmental issues, generating dialogue for policy solutions. Drawing on the resources of the law school and the University, the Center prepares students to tackle the complex challenges of careers in environmental law. The Center honors the work of the late U.S. District Court Judge Robert R. Merhige, Jr., whose creativity in settling the Kepone litigation of the 1970's made the Center's activities possible.

law.richmond.edu/centers/environmental

