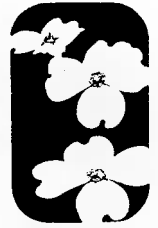


# Power That Pollutes



THE SOUTHERN  
ENVIRONMENTAL  
LAW CENTER



THE IZAAK  
WALTON  
LEAGUE OF  
AMERICA

## CLOSING THE LOOPHOLE ON OUTDATED POWER PLANTS

A VIRGINIA CLEAN AIR REPORT

AUGUST 1998





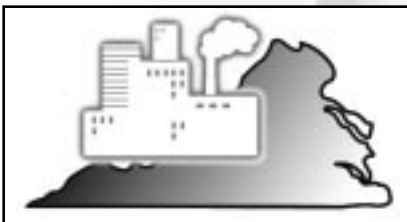
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A VIRGINIA CLEAN AIR REPORT

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# Executive Summary

Electric power plants constitute the largest single source of air pollution, nationally and regionally. In the four states contributing the most air pollution to Virginia — Virginia, West Virginia, Ohio and Kentucky — power plants are responsible for 78 percent of the sulfur dioxide (SO<sub>2</sub>) and 47 percent of the nitrogen oxide (NO<sub>x</sub>) released in the air.<sup>1</sup> This pollution causes acid rain, reduced visibility, ozone smog and polluted waters, all of which have major impacts on Virginia's mountains and farms, and the Chesapeake Bay. It also poses a major health risk. Already in 1998, with the summer ozone season only half over, monitoring stations across the state have recorded 89 violations of the federal health standards for ozone smog during a period of 23 days. Five of these violations have occurred at the Big Meadows monitoring station in the Shenandoah National Park.

## THE CLEAN AIR ACT LOOPHOLE

Under the Clean Air Act, plants in operation before the mid-1980s are not required to meet the pollution standards modern plants must meet. Plants grandfathered under the "existing plant" loophole were expected to retire at the end of their 30-year projected lives. Yet they continue to operate today, releasing four to 10 times more pollution than plants built today. Eight of 10 coal plants operating in Virginia today are grandfathered, and account for 212,000 of the 213,000 tons of SO<sub>2</sub> pollution, and 97,000 of 104,000 tons of NO<sub>x</sub> released by power plants in the state.

Grandfathered power plants throughout Virginia's airshed are currently underused and are capable of significantly increasing production as demand increases. Virginia utilities predict that electricity demand will increase by 19 percent in the state by 2004. This demand, plus new laws in Virginia and elsewhere that will allow consumers to choose their electricity supplier, will mean even more pollution from outdated power plants unless steps are taken now to clean up these plants.

## CLEANING THE AIR

There are a number of actions Virginians can take to clean up our air. First and foremost, we must support federal action that will close the existing plant loophole by requiring all plants currently operating to meet the modern pollution standards required of plants built today. If all power plants within Virginia's airshed met this requirement, 82 percent of the SO<sub>2</sub> and 79 percent of the power plant NO<sub>x</sub> contributing to Virginia's air pollution would be eliminated. In addition, policies to stimulate investment in renewable energy resources, and to improve energy efficiency, are needed so that clean energy resources are available to replace our aging power fleet as plants retire.

The time for clean air is now. Bringing grandfathered power plants up to modern standards, and developing clean energy resources, will help to ensure a healthy environment for generations to come.



# Introduction

## FROM THE LIGHT SWITCH TO THE SMOKESTACK: POWER PLANTS AND AIR POLLUTION

When people think about air pollution and its sources, they typically think about the things they see and smell everyday — diesel fumes, car exhaust, smoke from factories. They do not always see turning on the light switch, the television or the air conditioner on a hot, humid, "bad air" day as contributing to the poor air quality outside. But depending on the source of the electricity, daily household activities may be a major contributor to air pollution.

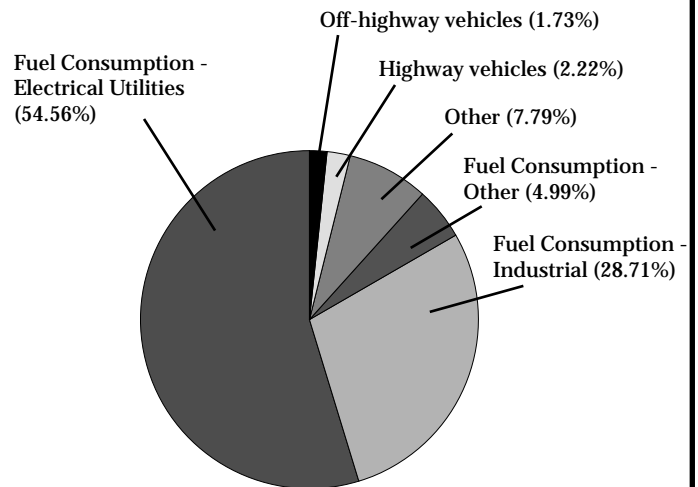
Electric power generation is the single largest source of air pollution nationwide. Power plants burning fossil fuels are responsible for 67 percent of the sulfur dioxide, 28 percent of the nitrogen oxide, 35 percent of the carbon dioxide, and 33 percent of the mercury emitted nationally.<sup>2</sup>

Sulfur dioxide emitted by power plants is the major cause of both acid rain and poor visibility conditions in Virginia and elsewhere in the East. Nitrogen oxide emissions also contribute to poor visibility and acid rain, but the major byproduct of this pollutant is ozone smog. Carbon dioxide emissions are accumulating in the atmosphere, trapping outgoing heat, and altering the Earth's climate. Mercury is a toxic pollutant that threatens human health.

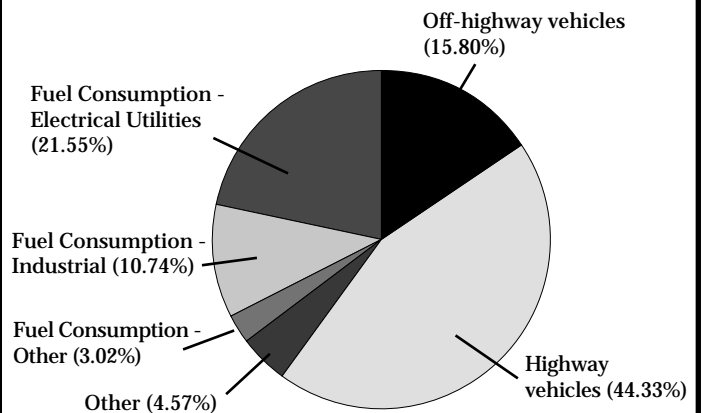
Coal-burning power plants built before 1980 are the principle source of air pollution within the electric utility industry. Nationally, outdated plants emit 97 percent of the SO<sub>2</sub>, 85 percent of the NO<sub>x</sub> and 92 percent of the CO<sub>2</sub> that comes from power plants, while generating only 52 percent of the nation's electricity.<sup>3</sup> Regionally, these plants generate 64 percent of the electricity produced in Virginia and states affecting Virginia's air quality. They also generate the bulk of Virginia's air pollution.

It does not have to be this way. Today, newly constructed

SO<sub>2</sub> EMISSION INVENTORY FOR VIRGINIA



NO<sub>x</sub> EMISSION INVENTORY FOR VIRGINIA



power plants burning coal are required to install pollution control equipment that results in four to 10 times less air pollution than that emitted by their ancestors. Although a few pre-1980 plants have installed this equipment and dramatically reduced their emissions, most have not. If, however, all plants were required to install modern pollution control equipment, emissions from power plants polluting Virginia's air would be greatly reduced, and the light switch would not be the air pollution source that it is today.

# The Clean Air Act Loophole

The disparity in pollution among power plants operating today is allowed by a loophole in the Clean Air Act that exempts, or "grandfathers," older plants from meeting the same emission standards that must be met by modern plants.

In 1970, Congress purposely exempted existing power plants from new, more stringent emissions standards when it passed the modern Clean Air Act. The history of the industry suggested that the useful life of the typical power plant was 30 years, and lawmakers expected existing plants to be retired at the end of their useful lives and replaced with cleaner burning plants that utilize more efficient and cost-effective technology.<sup>4</sup> When Congress amended the Clean Air Act in 1977, it recognized that even tighter controls on power plant pollution were needed to improve the nation's air quality, but it decided to expand the loophole to all plants that were either planned or under construction at that time.

Unfortunately, technology, economics and politics have conspired to alter the scenario envisioned when the "existing plant" loophole in the Clean Air Act was created. As a consequence, many of the power plants affecting Virginia's air quality continue to operate well beyond their 30-year projected lives, free of pollution control standards required of modern plants.

## SUBSIDIZING DIRTY POWER

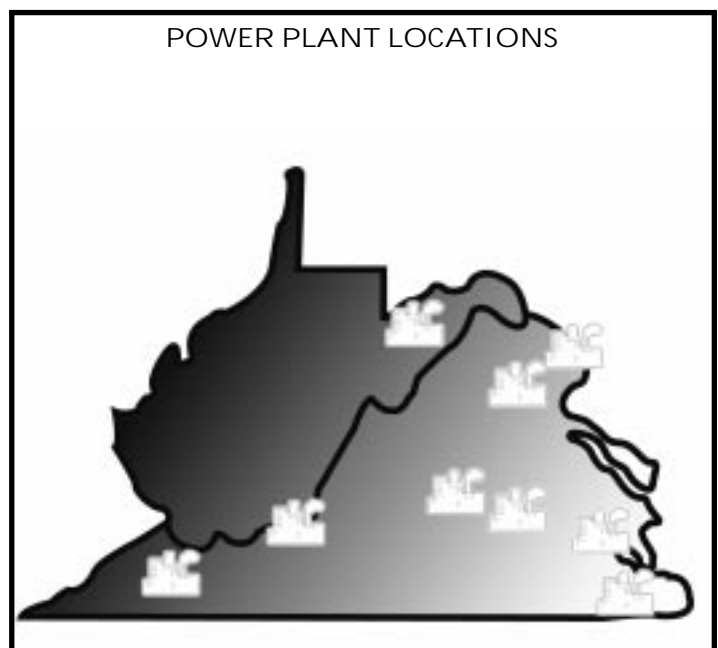
The Clean Air Act loophole provides an economic benefit, a federal subsidy, to grandfathered plants that modern plants do not enjoy. Because these outdated plants do not have to pay for modern equipment to curb their pollution, they are able to produce power at lower costs. The loophole accounts for between 75 percent and 100 percent of the cost margin between older and newer units and results in a production cost advantage of between .5 and 2 cents per kilowatt-hour (kwh) for many older plants. In an increasingly competitive electric power

industry, this gives grandfathered plants a distinct advantage over modern plants. Meanwhile, they bear no economic burden for increased health care and other business costs caused by the added pollution that results from their grandfathered status.

## GRANDFATHERED POWER PLANTS AND THEIR IMPACT ON VIRGINIA

Virginia's air is dirty. Northern Virginia is one of only three regions in the Southeast that does not meet existing federal standards for ozone smog, standards that have been found inadequate to protect human health.<sup>5</sup> The number of areas exceeding smog limits will increase in Virginia, and throughout the region, when recently adopted tighter health standards take effect. Bad air in the Shenandoah National Park and throughout Virginia's mountains has reduced visibility, poisoned streams, and damaged trees and plants. Air pollution also is contributing to the degradation of the Chesapeake Bay.

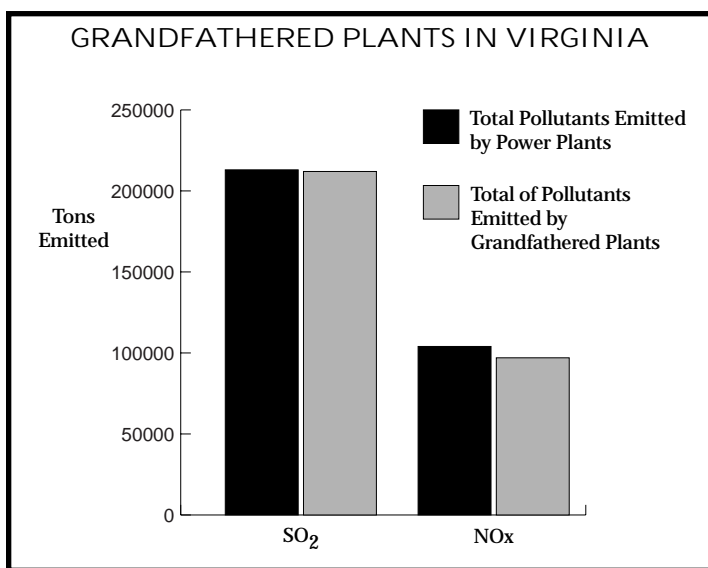
Although there are many sources contributing to the air pollution impacting Virginians and their environment, grandfathered power plants stand out because of the enormous quantity of pollution they emit.



## VIRGINIA'S GRANDFATHERED PLANTS

Eight out of 10 coal plants currently operating in Virginia are exempt under the Clean Air Act from meeting modern emission standards. The first unit of the Glen Lyn power plant, in Giles County, began operation in 1944 and is the oldest plant in the state still operating. But not by much. The youngest of the grandfathered eight was constructed in 1954, and the average age of the oldest units of these plants is 46.6 years.

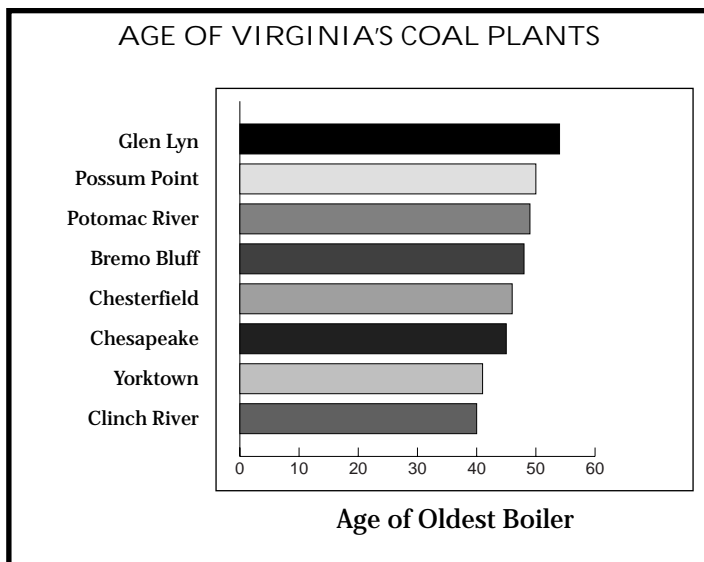
Virginia's coal plants generate 55 percent of the SO<sub>2</sub> and 22 percent of the NO<sub>x</sub> pollution emitted in the state annually.<sup>6</sup> In 1997, this amounted to more than 213,000 tons of SO<sub>2</sub> and 104,000 tons of NO<sub>x</sub> from all coal plants, with 212,000 tons of the SO<sub>2</sub> and 97,000 tons of the NO<sub>x</sub> coming from the grandfathered units.<sup>7</sup>



## IMPORTED POLLUTION

Virginia's coal plant emissions do not tell the whole story, however. For example, Mount Storm, Virginia Power's largest coal plant, is located just beyond the Virginia border in West Virginia. Constructed in 1961, this plant alone generated more than 96,000 tons of SO<sub>2</sub> and 43,000 tons of NO<sub>x</sub> pollution in 1997, making it one of the top polluters in the country.<sup>8</sup> Because of prevailing winds, most of the pollution from Mount Storm blows directly into Virginia.<sup>9</sup>

Mount Storm is not the only out-of-state power plant



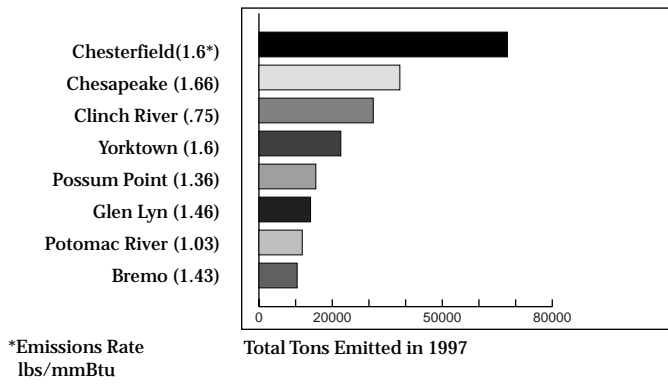
contributing to Virginia's air quality problems. In fact, analyses based on meteorological and pollution data have concluded that power plants located in West Virginia, Ohio, and northeastern Kentucky are all within Virginia's "airshed," meaning that emissions from these states are likely to pollute Virginia's air under weather conditions typical of the region.<sup>10</sup> The top eight polluters in each of these states emitted a total of 1.9 million tons of SO<sub>2</sub> and 760,000 tons of NO<sub>x</sub> in 1997.

## NEW VERSUS OLD

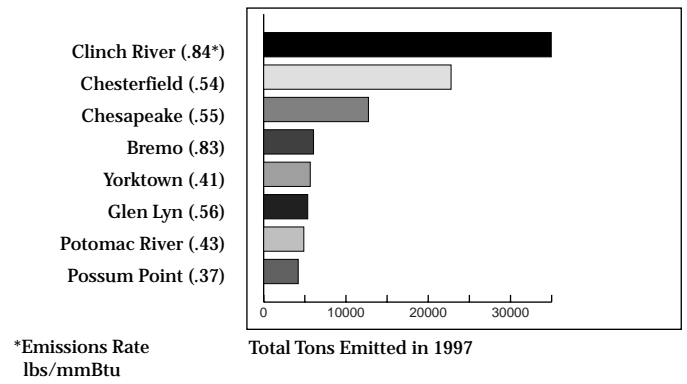
The contrast between the emission rates of power plants that have installed modern pollution control technology and those that have not is striking. For example, SEI Birchwood, the newest coal plant to be built in Virginia, is required to limit its pollution to .10 pounds of SO<sub>2</sub> and .15 pounds of NO<sub>x</sub> for every million British thermal units (Btu) of fuel burned.<sup>11</sup> If these same emission limits were applied to Virginia Power's Mount Storm, that plant's SO<sub>2</sub> emissions in 1997 would have dropped 94 percent from 96,000 to 5,800 tons, and its NO<sub>x</sub> emissions would have dropped 80 percent from 43,000 to 8,800 tons.

Even more striking is the fact that the technology exists to achieve these emission rates at grandfathered plants like Mount Storm. In fact, Virginia Power has installed pollution control equipment to reduce the SO<sub>2</sub> emission rate on one of the three generating units at Mount Storm to .18 pounds per million Btu of fuel burned, compared to an emission rate of 2.58 pounds per million Btu for the

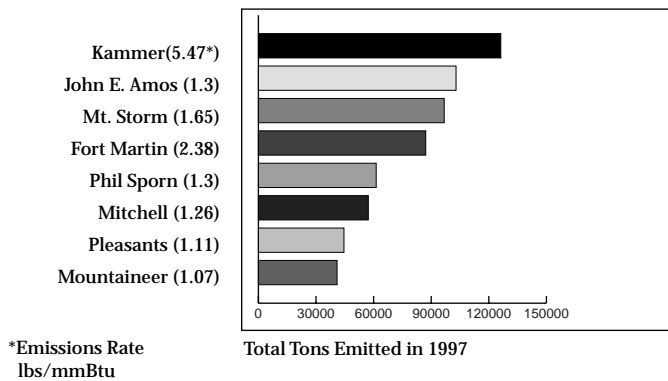
### SO<sub>2</sub> EMISSIONS FOR VIRGINIA'S GRANDFATHERED PLANTS



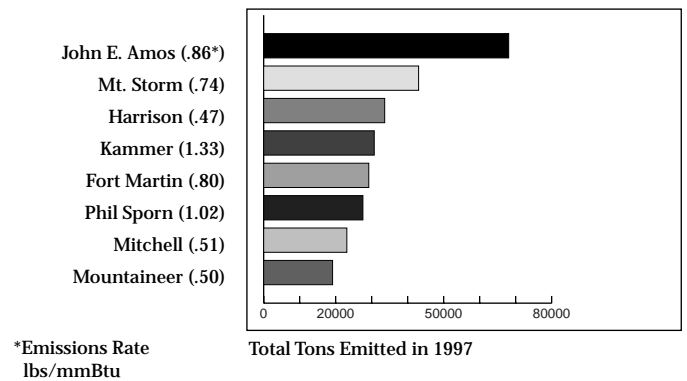
### NOX EMISSIONS FOR VIRGINIA'S GRANDFATHERED PLANTS



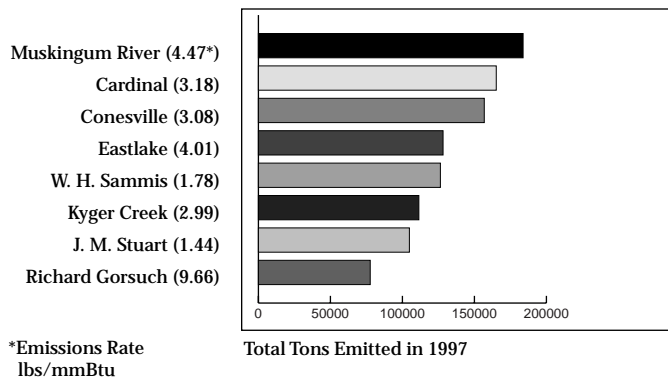
### EIGHT LARGEST SO<sub>2</sub> EMITTERS FOR WEST VIRGINIA



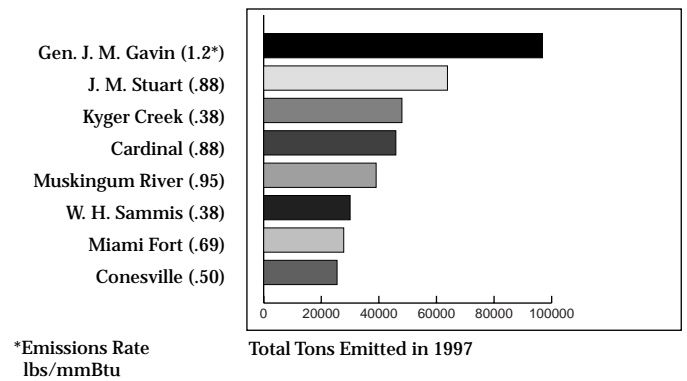
### EIGHT LARGEST NOX EMITTERS FOR WEST VIRGINIA



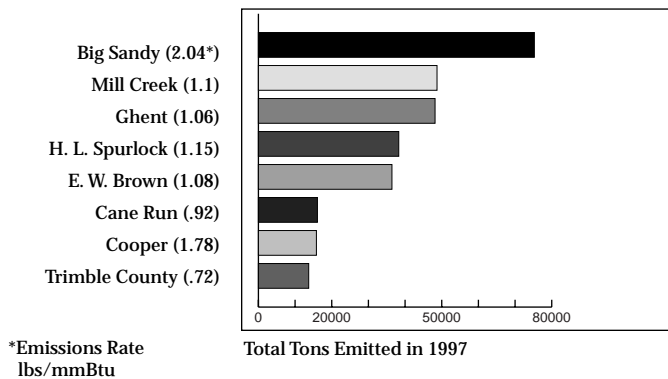
### EIGHT LARGEST SO<sub>2</sub> EMITTERS FOR OHIO



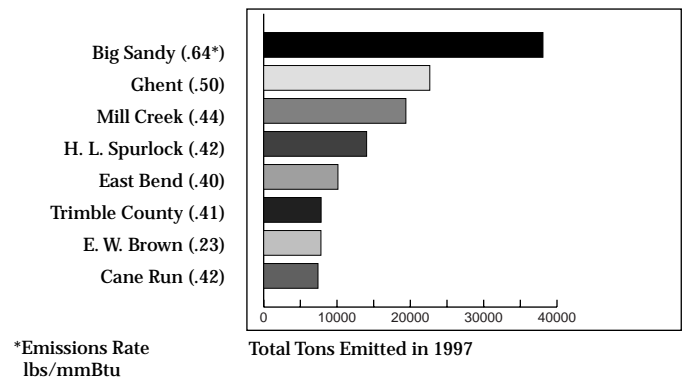
### EIGHT LARGEST NOX EMITTERS FOR OHIO



### EIGHT LARGEST SO<sub>2</sub> EMITTERS FOR KENTUCKY



### EIGHT LARGEST NOX EMITTERS FOR KENTUCKY





other two units. If similar equipment had been installed on the remaining two units, 1997 SO<sub>2</sub> emissions from the entire plant would have dropped to 10,500 tons, representing a 89 percent decline in SO<sub>2</sub> emissions.

#### GEARING UP PRODUCTION

In addition to having inadequate pollution controls, most of the coal plants releasing pollution into Virginia's air are also underused. A plant's capacity factor measures how much electricity the plant generates compared to how much the plant is capable of generating when operating full-time. Coal plants are capable of a capacity factor approaching 80 percent. Consequently, if a plant's capacity factor is 50 percent — the average capacity factor for Virginia's grandfathered plants — and consumer demand increases, utility companies are likely to increase plant production by 30 percent.

Analyses by the U.S. EPA and others suggest that the current movement to open the electric utility industry to competition will lead to increased electricity production from older coal plants because economic conditions, including weak environmental requirements, will favor these plants. Electricity production trends over the past three years appear to support these analyses.

One measure of electricity production is the amount of Btu burned to produce electricity. This is known as the "heat input" of a power plant. Based on the national heat input statistics, electricity production of grandfathered power plants has increased by 1.6 percent annually between 1980 and 1995.<sup>12</sup> Between 1995 and 1996, however, electricity production at these plants increased by 4.4 percent.<sup>13</sup> Electricity production in Virginia followed this trend in 1997, as is evidenced by a 3.2 percent production increase above 1996 levels at Virginia Power's grandfathered plants.<sup>14</sup>

Unless significant action is taken now to bring old plants up to modern standards, pollution from grandfathered power plants will continue to exact an increasing toll on our health, environment and quality of life.



VISIBILITY IN SHENANDOAH NATIONAL PARK ON GOOD AND BAD DAYS



### *Protecting Our Natural Resources*

From the Blue Ridge Mountains to the Chesapeake Bay, air pollution is having a considerable impact on Virginia's priceless natural resources and economy.

#### THE MOUNTAINS

The Shenandoah National Park attracts 2 million visitors annually. According to a 1993 study, total park visitor spending in the counties surrounding the park exceeds \$45 million annually. The National Park Service and the company operating the Skyline Drive are estimated to spend an additional \$10 million annually in the local area.

For the millions of annual visitors, Virginia's mountains represent a place to escape the noise, congestion and hectic pace of the cities. They are a place to hike, fish for native trout or simply relax in the solitude of natural surroundings. Many people escape to the mountains simply to see beautiful vistas and breathe clean air. Or so it seems. What most people do not realize is that there are days in the summer when the air quality in the mountains is worse than in the cities from which they fled. And this air pollution is taking its toll.

## VISIBILITY

Summertime visibility in Virginia's mountains is now less than one-quarter the natural range.<sup>16</sup> Under normal conditions, atmospheric water vapor scatters light and reduces visibility. Virginia's mountains always have been known for their haze, due to the humid conditions that characterize our summers. In fact, it is the region's natural haze that gives the Blue Ridge Mountains their name. The haze we see today, however, is due primarily to air pollution.

Once sulfur dioxide and nitrogen oxide pollution is released into the atmosphere, it is transformed into particles known as sulfate and nitrate. These particles attach to water molecules in the atmosphere, forming larger particles that are more effective in scattering light, thereby creating more haze than would result simply from the presence of water vapor. Sulfate particles are responsible for most of the visibility loss in Virginia and the Southeast. On average summer days, when visibility in Virginia's mountains is between 26 and 35 miles, sulfate particles account for 60 percent of the visibility loss.<sup>17</sup> On the worst summer days, when visibility falls below 12 miles, sulfate particles account for between 70 percent and 80 percent of the visibility loss. Seventy-eight percent of the sulfur dioxide and 39 percent of the nitrogen oxide reducing visibility in Virginia comes from power plants.<sup>18</sup>

## ACID RAIN

When sulfate and nitrate particles combine with water molecules, a second problem endemic to the mountains is created: acid rain, snow, sleet and fog. The rate



of acid deposition in Virginia's mountains is among the highest in the country.<sup>19</sup>

Virginia's mountain streams are particularly sensitive to acid deposition, due to the soil chemistry and geology peculiar to the region. Currently, 50 percent of Virginia's native brook trout streams have a reduced capacity to host trout populations due to acid rain, and 6 percent are incapable of supporting trout or other fish populations because of their chronic acid state.<sup>20</sup> A recent study sponsored by Trout Unlimited found that if current acid deposition levels continue, the number of streams incapable of supporting fish populations is projected to climb to 35 percent by 2041. The study concluded that a 70-percent reduction in acid deposition will be required to preserve the 50 percent of Virginia's native brook trout streams that are currently "non-acidic" and fully capable of supporting fish populations.<sup>21</sup>

## OZONE SMOG

Although ozone smog is most often associated with urban areas, it is also present in the mountains. Like acid deposition, ozone smog concentrations in the mountains are among the highest in the country,<sup>22</sup> where they are known to cause leaf damage and growth loss to trees and other plants. A decline of 26 percent to 51 percent in the growth rate of eastern white pines in the Blue Ridge Mountains from the late 1950s to the mid-1970s has been attributed to ozone pollution.<sup>23</sup> In Shenandoah National Park, tulip poplar, green ash, sweet gum, black locust, Eastern hemlock, Table Mountain pine, pitch pine and Virginia pine seedlings all have demonstrated growth loss at ozone levels below federal standards.<sup>24</sup>

## THE FARMLANDS

Ozone smog, at levels found throughout the growing season in Virginia's countryside, also interferes with photosynthesis, the process by which plants produce and store food. This results in reduced crop yields and weakens the ability of plants to withstand pests and disease. And it is costing Virginia's farmers. In 1996, ozone pollution is estimated to have cost Virginia farmers between \$18 million and \$29 million, due to reduced yields of corn, soybeans, wheat, barley, peanuts and cotton.<sup>25</sup>

## THE BAY

The Chesapeake Bay is a natural treasure beyond compare. The nation's largest estuary, it is home to 295 species of fish, 45 species of shellfish and 27,000 plant species. Recreational fishing in the bay is estimated to generate more than \$1 billion annually in Virginia and Maryland. In 1992, the dockside value of fish and shellfish harvested from the bay approached \$80 million.<sup>26</sup> Tragically, like Virginia's mountains and farms, this valuable resource also is experiencing decline due to air pollution.

Nitrogen is the pollutant that poses the greatest threat to the bay. Because nitrogen is a nutrient, excess quantities entering the bay spur the growth of algae blooms, which consume oxygen as they decay. The result is the loss of dissolved oxygen necessary to sustain the bay's diverse aquatic life.

Among the problems associated with water over-enriched with nutrients such as nitrogen is a one-cell organism



## OZONE IMPACTS ON ANNUAL CROP YIELDS IN VIRGINIA

Crop	Annual yield in thousand bushels <sup>1</sup>	Production value in thousand dollars <sup>1</sup>	Percent estimated yield loss due to ozone <sup>2</sup>	Estimated value in production w/out ozone loss (in thousand dollars)
Corn	39,060	\$126,945	0-1.9	\$126,945- \$129,357
Soybean	16,320	\$111,792	1/4 state > 10 3/4 state-- 6-9.9	\$119,500 - >\$122,888
Wheat	14,575	\$60,486	1/2 state-- 6-9.9 1/2 state-- 10 <sup>3</sup>	\$65,675 - >\$66,902
Barley	5,100	\$14,790	0-1.9	\$14,790 - \$15,071
Peanut	225,000 <sup>4</sup>	\$58,981	1/10 state-- 4-5.9 9/10 state-- 2-3.9	\$60,281 - \$61,398 <sup>5</sup>
Cotton	160 <sup>6</sup>	\$60,707	6-9.9 <sup>3</sup>	\$64,349 - \$66,717
Total		\$433,701		\$451,540 - >\$462,333

<sup>1</sup> 1996 production figures from United States Department of Agriculture, National Agricultural Statistics Service

<sup>2</sup> From EPA 1996. Office of Air Quality Planning and Standards Staff Paper. Review of National Ambient Air Quality Standards for Ozone. EPA-452/R-96-007

<sup>3</sup> Loss estimates extrapolated from EPA Staff Paper, cited above

<sup>4</sup> Annual yield in thousand pounds

<sup>5</sup> 1997 production figures from United States Department of Agriculture, National Agricultural Statistics Service

<sup>6</sup> Annual yield in thousand bales

known as *Pfiesteria piscicida*. *Pfiesteria* first surfaced in its toxic form in tributaries to the bay in 1997. It caused massive fish kills and health problems, including rashes and memory loss, for people exposed to waters where the outbreaks occurred.<sup>27</sup>

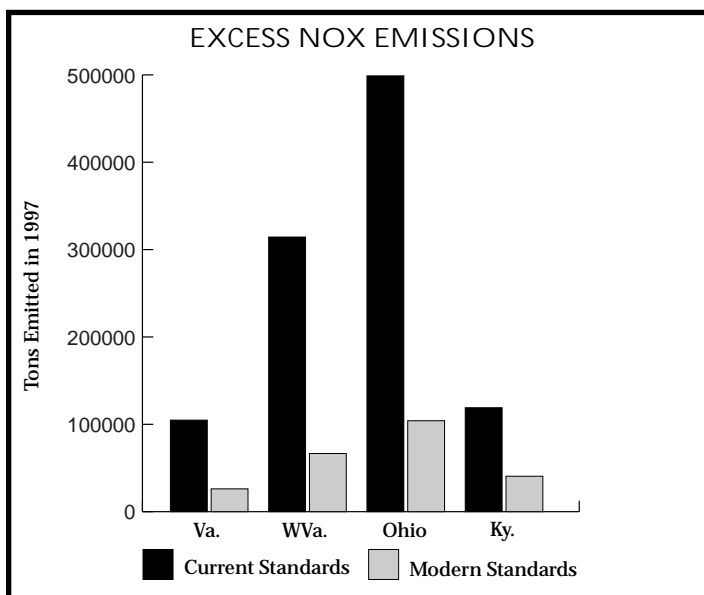
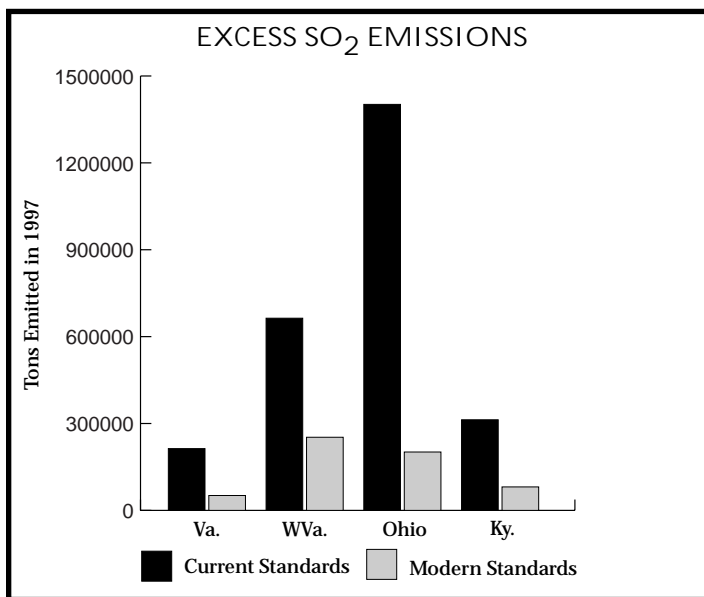
Although the bulk of nitrogen entering the bay comes from agricultural, urban and suburban runoff, more than 25 percent comes from the air. Power plants produce 37 percent of the airborne nitrogen pollution in the states with the greatest impact on the bay.<sup>28</sup> A 1996 study conducted for the U.S. EPA concluded that control measures to reduce power plant NOx emissions to .15 pounds per million Btu burned represents the most cost-effective measure for controlling nitrogen emissions in the Chesapeake Bay airshed.<sup>29</sup>

# Protecting Our Health

Hundreds of thousands of Virginians are exposed to unnecessary health risks due to high levels of air pollution across the state. Those at greatest risk in areas with unhealthy air are children, the elderly, people suffering from chronic lung disorders such as asthma and bronchitis, and people who work or exercise outdoors. The pollutants causing the greatest harm are ground-level ozone, commonly referred to as ozone smog, and microscopic fine particles, known as PM 2.5. Outdated coal plants are a major source of these pollutants.

## OZONE SMOG

Exposure to unhealthy levels of ground-level ozone, the



main ingredient of urban smog, reduces lung function, aggravates asthma, increases the severity and incidence of respiratory infections, and decreases exercise capacity.<sup>30</sup> Currently, Northern Virginia is the only area in the state, and one of only three areas in the Southeast, that does not meet federal health standards for ozone pollution.<sup>31</sup> The American Lung Association estimates that 170,000 people living in Northern Virginia, including 28,000 children, are particularly susceptible to exposure to high levels of ozone smog because they suffer from chronic asthma and bronchitis.<sup>32</sup>

Although only Northern Virginia fails to meet current ozone health standards, problems with ozone smog are not limited to that portion of the state. In 1997, after reviewing thousands of health studies and receiving more than 50,000 comments from individuals and businesses, the U.S. EPA determined that current ozone standards are not adequate to protect human health. As a result of this review, tighter health standards have now been adopted. Through July 1998, 19 monitoring stations across the state, ranging from Rural Retreat in Wythe County to Hampton and Alexandria, have recorded a total of 89 violations of the new ozone standard during a period of 23 days. Northern Virginia leads the state with monitoring stations recording violations on 14 days, followed by violations on 10 days in the Richmond area, eight days in the Tidewater area, four days in Roanoke County and three days in Wythe County. Ironically, the Big Meadows monitoring station in the Shenandoah National Park, a place many people escape to when air quality gets bad, has recorded violations of the new ozone standard on five days so far in 1998.

## FINE PARTICLES

Fine particles, or particulate matter (PM) 2.5, is the term used to describe microscopic particles of pollution roughly one-thirtieth the width of human hair and smaller. These particles, when inhaled, are able to escape the body's filtering mechanisms and penetrate deep into the lungs, where they cause lung damage, make breathing more difficult, and can lead to early death. Electric power plants burning fossil fuel produce most of the fine particles in Virginia's air.

Two major studies conducted in the past five years have linked exposure to fine particle pollution to increased mortality rates. They concluded that residents in heavily polluted cities have, on average, a one to two-year shorter life span than people living in the cleanest cities.<sup>33</sup> An analysis matching the findings of these two studies with reported levels of fine particle exposure concluded that more than 64,000 people die prematurely every year due to fine particle pollution.<sup>34</sup> The analysis estimated that fine particles kill more than 800 Virginians annually in cities outside of Northern Virginia, and an additional 588 in the Washington, D.C., metropolitan area, which includes Northern Virginia and the Maryland suburbs.

## *A Plan for Cleaner Air*

Although there are many sources of Virginia's air pollution, electric power plants produce a disproportionate share of this pollution. We can make the greatest progress toward clean air by reducing pollution from these plants.

### CLOSING THE LOOPHOLE

Cleaning Virginia's air must begin by cleaning up the outdated power plants affecting Virginia's air quality. Since air pollution does not recognize state borders, this will require a major change of federal policy. Because of the environmental, health and economic benefits it will provide the state, this change should receive the support of all Virginians.

All power plants burning fossil fuel should be required to meet the same emission standards required of plants built today.<sup>35</sup> If all fossil plants in Virginia met this requirement, SO<sub>2</sub> emissions would be reduced by more than 160,000 tons, or 76 percent of current emissions, and NO<sub>x</sub> emissions would be reduced by 78,000 tons, or 75 percent of current emissions. In terms of NO<sub>x</sub> emissions, this reduction would be the equivalent of removing 4 million cars from Virginia's roads. Far bigger gains would be realized regionwide. If power plants in the states contributing the most air pollution to Virginia — West Virginia, Ohio and Kentucky — meet this require-

ment, 82 percent of the SO<sub>2</sub> and 79 percent of the NO<sub>x</sub> that is having the most immediate impact on Virginia's air would be eliminated.

### THE COST OF CLEANER POWER

Many factors will influence the cost of cleaning up outdated power plants in Virginia and elsewhere, including the conditions of individual plants, the development of a competitive electric power market, and whether an appropriate emission trading program can be designed. But conservative estimates of the current cost to clean up SO<sub>2</sub> and NO<sub>x</sub> pollution provides a good idea of the upper limit of the cost involved. In its recent call for NO<sub>x</sub> reductions to reduce ozone in eastern states, the U.S. EPA estimated that it will cost \$1,400 per ton to reduce NO<sub>x</sub> emissions from power plants. The cost of reducing SO<sub>2</sub> emissions is approximately \$600 per ton.<sup>36</sup> This means it will cost \$207 million a year to close the loophole in Virginia, or 0.70 cents per kwh. For residential customers using 1,000 kwh a month, this will mean a monthly increase of \$7 on their electric bills, or roughly the cost of two video rentals.

This figure provides the upper limit of cleanup costs. It is worth noting that in virtually every instance during the past 27 years of implementing Clean Air Act requirements, the predicted cost of compliance has been higher than the actual compliance costs. The most recent example is the acid rain provisions of the 1990 Clean Air Act amendments. When these amendments were being considered, industry predicted that removal costs for SO<sub>2</sub> would be approximately \$1,500 per ton. The actual cost of compliance has turned out to be less than one-tenth this cost.<sup>37</sup>

### CLEAN ENERGY ALTERNATIVES

Reducing the environmental and health impacts from electric power production will require more than reducing pollution from outdated power plants. Ultimately, our ability to solve the environmental problems linked to power production will depend on the success of policies to promote greater energy efficiency and the development of renewable energy technologies.

Virginia utilities project a 19-percent increase in electricity use in the state by 2004. Much of this growth is due to inefficient and wasteful energy use. Energy efficiency offers the greatest short-term potential for meeting new electricity demand without more harmful air pollution. It is estimated that one-quarter to one-third of all electricity use can be eliminated, without any decrease in services, by installing high efficiency lights, motors, heating and cooling equipment, and improving building design and construction practices.

Renewable energy technologies, such as wind and solar power, and biomass, offer a limitless source of energy with little or no pollution and are key to the long-term solution to the air pollution problems associated with power production. Although some of these technologies are cost-competitive today, others will require more investment in research and development before they can become commercially viable on a large scale. Policies such as requiring that a set percentage of energy demand be met by renewable resources, and adopting tax incentives and other strategies will attract renewable energy companies to the state and will stimulate needed investment in renewable resources. Adopting these resources will help ensure that clean energy resources are available to replace our aging power fleet as plants are retired.

## ENVIRONMENTAL DISCLOSURE

We are moving rapidly toward a time when customers will be able to choose their electricity supplier, just as they are able to choose their long distance telephone companies today. Last year, the General Assembly passed a law setting Jan. 1, 2004, as the date this will occur in Virginia.

Polling data, customer focus groups and other customer surveys across the country repeatedly have shown a consumer willingness to pay for electricity that comes from clean resources. Consumer desire for clean power is meaningless, however, unless consumers have access to information that will enable them to make this choice.

Providing consumers with product information is already common practice in other markets. For example, all food products now carry labels providing useful health information. All motor vehicles include mileage ratings prominently displayed. Electric appliances carry labels telling consumers how much energy they use, and how this compares to energy use averages for that type of appliance. Requiring electric power suppliers to disclose the type of fuel used to produce their power, and the amount of pollution they generate, will help consumers make informed and environmentally conscious choices about their power supplier.



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**COAL PLANT BACKGROUND DATA**

Plant Name	Utility Name	Location	Boiler	Capacity size (MW)	Heat Input (mmBtu)	On-line Date	Capacity factor (%)
Clinch River	American Electric Power	Russell County	1	238	14,889,614	1958	71%
			2	238	14,747,826	1958	
			3	238	12,325,191	1961	
			Total	714	41,962,631		
Glen Lyn	American Electric Power	Giles County	51	100	1,515,549	1944	53%
			52		1,714,713	1944	
			6	238	16,632,102	1957	
			Total	338	19,862,364		
Potomac River	Potomac Electric Power	Alexandria City	1	92	1,646,565	1949	37%
			2	92	2,221,710	1950	
			3	110	4,403,878	1954	
			4	110	5,805,143	1956	
			5	110	5,631,186	1957	
			Total	514	19,708,482		
Bremo Bluff	Virginia Power	Fluvanna County	3	69	2,916,637	1950	48%
			4	185	8,990,091	1958	
			Total	254	11,906,728		
Chesapeake	Virginia Power	Chesapeake City	1	185	6,709,194	1953	61%
			2	113	6,769,477	1954	
			3	113	10,026,702	1959	
			4	239	14,900,041	1962	
			Total	650	38,405,414		
Chesterfield	Virginia Power	Chesterfield County	3	113	5,359,883	1952	75%
			4	188	10,215,121	1960	
			5	359	23,381,672	1964	
			6	694	45,142,524	1969	
			Total	1,354	84,099,200		
Possum Point	Virginia Power	Prince William County	3	114	5,479,596	1955	16%
			4	239	13,186,601	1962	
			5	882	538,593	1975	
			Total	1,235	19,204,790		
Yorktown	Virginia Power	York County	1	188	11,042,369	1957	23%
			2	188	12,488,397	1959	
			3	882	5,195,301	1974	
			Total	1,258	28,726,067		
Clover	Virginia Power	Halifax County	1	424	25,202,590	1995	34%
			2	424	23,969,224	1996	
			Total	848	49,171,814		
Mt Storm	Virginia Power	Grant	1	570	40,588,560	1965	18%
			2	570	43,397,872	1966	
			3	522	28,675,658	1973	
			Total	1,662	112,662,090		

**COAL PLANT EMISSIONS**

Plant Name	Boiler #	SO2 (tons)	SO2 (lbs/mmBtu)	Excess SO2 (tons)	NOx (tons)	NOx (lbs/mmBtu)	Excess NOx (tons)	CO2 (tons)
Clinch River	1	8,781	1.18	6,548	9,827	1.32	8,710	1,604,358
	2	8,697	1.18	6,485	9,734	1.32	8,628	1,589,080
	3	7,040	1.14	5,191	8,135	1.32	7,211	1,302,326
	Total	24,518	1.17	18,224	27,696	1.32	24,549	4,495,764
Glen Lyn	51	1,064	1.40	837	303	0.40	189	155,498
	52	1,261	1.47	1,004	317	0.37	188	175,926
	6	11,308	1.36	8,813	5,073	0.61	3,826	1,706,454
	Total	13,633	1.37	10,654	5,693	0.57	4,203	2,037,878
Potomac River	1	999	1.21	752	552	0.67	429	185,459
	2	1,241	1.12	908	1,677	1.51	1,510	228,030
	3	2,171	0.99	1,510	1,321	0.60	991	414,844
	4	3,172	1.09	2,301	1,538	0.53	1,103	595,834
	5	3,007	1.07	2,162	1,971	0.70	1,549	577,739
	Total	10,590	1.07	7,634	7,059	0.72	5,581	2,001,906
Bremo Bluff	3	2,044	1.40	1,607	1,152	0.79	933	299,239
	4	6,499	1.45	5,150	4,001	0.89	3,327	922,385
	Total	8,543	1.43	6,757	5,153	0.87	4,260	1,221,624
Chesapeake	1	4,430	1.32	3,424	1,879	0.56	1,376	688,358
	2	4,463	1.32	3,448	1,862	0.55	1,354	693,718
	3	8,841	1.76	7,337	4,161	0.83	3,409	1,028,742
	4	13,155	1.77	10,920	3,353	0.45	2,235	1,528,747
	Total	30,889	1.61	25,128	11,255	0.59	8,375	3,939,565
Chesterfield	3	4,017	1.50	3,213	1,233	0.46	831	549,924
	4	8,313	1.63	6,781	2,707	0.53	1,941	1,048,076
	5	19,298	1.65	15,791	7,015	0.60	5,261	2,398,955
	6	38,378	1.70	31,607	14,897	0.66	11,511	4,631,628
	Total	70,006	1.66	57,391	25,852	0.61	19,545	8,628,583
Possum Point	3	3,434	1.25	2,612	1,288	0.47	877	562,214
	4	8,383	1.27	6,405	2,571	0.39	1,582	1,352,940
	5	166	0.62	85	54	0.20	14	43,594
	Total	11,983	1.25	9,102	3,913	0.41	2,473	1,958,748
Yorktown	1	8,539	1.55	6,883	3,092	0.56	2,264	1,133,492
	2	9,658	1.55	7,785	3,497	0.56	2,560	1,281,925
	3	2,811	1.08	2,032	753	0.29	363	420,506
	Total	21,008	1.46	16,699	7,342	0.51	5,188	2,835,923
Clover	1	850	0.07	- 2,930	3,780	0.30	1,890	2,587,490
	2	586	0.05	- 3,009	3,476	0.29	1,678	2,489,243
	Total	1,436	0.06	- 5,940	7,256	0.30	3,568	5,076,733
Mt Storm	1	51,812	2.55	45,724	17,047	0.84	14,003	4,164,930
	2	55,399	2.55	48,889	18,227	0.84	14,972	4,453,203
	3	5,096	0.36	795	11,327	0.79	9,176	2,942,121
	Total	112,307	1.99	95,408	46,601	0.83	38,151	11,560,254





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