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REPORTS



A Coal Plant's Drain on Health and Wealth

The illnesses, premature deaths, health-related costs, and pollution that would rise from a coal-fired power plant proposed near Hampton Roads, Virginia.

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A Coal Plant's Drain on Health and Wealth

The illnesses, premature deaths, health-related costs, and pollution that would rise from a coal-fired power plant proposed near Hampton Roads, Virginia.

EXECUTIVE SUMMARY

In the heart of one of America's most historic landscapes, a power company called Old Dominion Electric Cooperative (ODEC) is proposing to construct the largest coal-fired power plant ever built in Virginia. The 1,500-megawatt Cypress Creek Power Station would be built near the center of the tiny town of Dendron, not far from Jamestown, the first successful English colony in North America, and the tourism center of Colonial Williamsburg. The company claims the power plant would create jobs and prosperity. But any apparent benefits would be undercut by air pollution and its negative health and economic impacts. The plant's 650-foot smokestacks would release pollutants across a wide area that includes Hampton Roads (with its population of 1.7 million) and Richmond (with about 1.2 million residents in the city and suburbs).

The power plant would pollute the Chesapeake Bay and its tributaries with several contaminants, including mercury, which taints fish, and nitrogen oxides, which feed low-oxygen "dead zones." Public health experts say invisible soot-like particles and other pollutants from the plant's smokestacks would put at risk the health of people across the region. The illnesses and deaths would cost billions of dollars, imposing a heavy burden on the people of the Chesapeake Bay region.

On December 17, 2008, ODEC applied to the Virginia Department of Environmental Quality for an air pollution control permit for the plant in Dendron or a nearby alternative site. The company asked for more time on September 24, 2010, saying it was withdrawing the permit application and would reapply in 18 to 24 months, when the nation's economic and regulatory landscape become clearer.

Since then, the company has indicated its intention to move forward with the project. The Chesapeake Bay Foundation calls on both Virginia and the federal government to deny any permit for the Cypress Creek plant, to prevent the sickness, contamination, and costs that would rise from its smoke stacks.

The plant would create serious public health risks, from:

PARTICULATES: Every year, microscopic soot-like particles from the power plant's smokestacks are projected to cause about 442 asthma attacks, as well as 3,340 work days lost to sickness, 40 heart attacks, and an estimated 26 premature deaths across the mid-Atlantic states, according to energy industry analyst David Schoengold and the Clean Air Task Force, a nonprofit air pollution research and advocacy organization. The cost of all these health problems is expected to exceed \$200 million a year.

OZONE: On hot summer days, the plant's emissions of nitrogen oxides and volatile organic compounds will mix with sunlight to form ground-level ozone. This pollution will add an additional lung irritant to two metropolitan areas that already have a combined 60,000 children suffering from asthma. These areas may soon be out of compliance with new federal ozone standards, and could lose tens of millions of dollars in federal transportation funding as a result.

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FLY ASH: ODEC is proposing to build a landfill for its waste ash in the floodplain of the Blackwater River, which is a source of drinking water for the city of Norfolk. This would create a risk that flooding will wash toxic metals into the waterway. Aquatic life in the river could also be in danger.

MERCURY AND OTHER HAZARDOUS AIR POLLUTANTS: Every year, the proposed power plant would be permitted to release up to 44 pounds of mercury and 921 pounds of lead, both heavy metals that can cause brain damage in children. Among other hazardous air pollutants, the stacks would also emit 6,800 pounds of benzene and 2,200 pounds of arsenic, which the U.S. Environmental Protection Agency classifies as known human carcinogens.

CARBON DIOXIDE: The plant would release 11.7 million tons of carbon dioxide a year. This greenhouse gas contributes to climate change and rising sea levels, which threaten the Chesapeake Bay's sinking shorelines and wetlands. Globally, the World Health Organization has estimated that climate change is causing more than 150,000 deaths a year from heat waves, drowning, malnutrition, and other causes.

All of this potential harm points toward one conclusion: Building this plant is not worth the risk to human health and the environment. Cleaner sources of energy than coal—including wind, solar, and other renewables—are available and would be wiser alternatives.



The proposed ODEC power plant would burn central Appalachian bituminous coal, producing particulate air pollution, mercury, and other emissions that harm human health.

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PARTICULATES



Tom Pettory/CBF Staff

“This air pollution (from the ODEC plant) would have a substantial negative impact on many citizens in this area with asthma. Virginia already ranks number six in the nation for mortality from air pollution, and another coal-fired plant—particularly in such a populous area—would make us shoot up that list even further.”

Dr. Stephen W. Shield,
asthma specialist in
Newport News



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The burning of coal releases microscopic particles so small they can enter the bloodstream and increase the risk of heart attacks.

The burning of coal releases microscopic, soot-like particles 30 times smaller than the width of a human hair.¹ The specks are spread by the wind over hundreds of miles,² contributing to haze and depositing harmful pollutants when they land.³ When the particles are inhaled, they are so tiny that they evade the body’s normal filters and penetrate deep into the lungs, where they can trigger inflammation and respiratory problems.⁴ Their small size allows them to pass right through the lungs into the bloodstream, where they can contribute to the risk of heart attacks and cardiovascular illness, according to EPA.⁵

In the U.S., an estimated 20,000 heart attacks and 13,200 premature deaths per year are caused by fine particle pollution from coal-fired power plants.⁶ The annual cost of these illnesses and deaths has been estimated at between \$62 billion⁷ and \$100 billion,⁸ with the toll falling heaviest on children and the elderly.⁹ Overall, if the health and environmental impacts of coal’s full lifecycle are accounted for—including the costs of extraction, processing, and combustion—the cost to the U.S. public would be as much as a half trillion dollars annually.¹⁰ Taking all of these costs into account would at least double the price of electricity generated from coal and make clean energy more economically competitive.¹¹

In Virginia, ODEC has proposed to install air pollution control devices required by law, including a fabric filter bag house and a scrubber, to limit particulates and other emissions.¹² But these devices will not be enough to stop an estimated 1,842 tons of particles from rising out of the plant’s smokestacks every year (that’s more than five tons per day).¹³ Working with numbers supplied by ODEC and a statistical model provided by the Clean Air Task Force, energy industry analyst David Schoengold estimates that this pollution would cause significant sickness and premature death. The damage every year would include an estimated 16 cases of chronic bronchitis, 23 asthma-related emergency room visits, 26 premature deaths, 40 heart attacks, 442 asthma attacks, 3,340 lost work days, and 19,903 days in which people will have to reduce their activities because they are sick.¹⁴ One third of these health problems would be in Virginia, with the rest spread across the mid-Atlantic region.¹⁵ The total cost to society of these illnesses and deaths would be about \$208 million a year—or more than \$6 billion over a generation (30 years).¹⁶

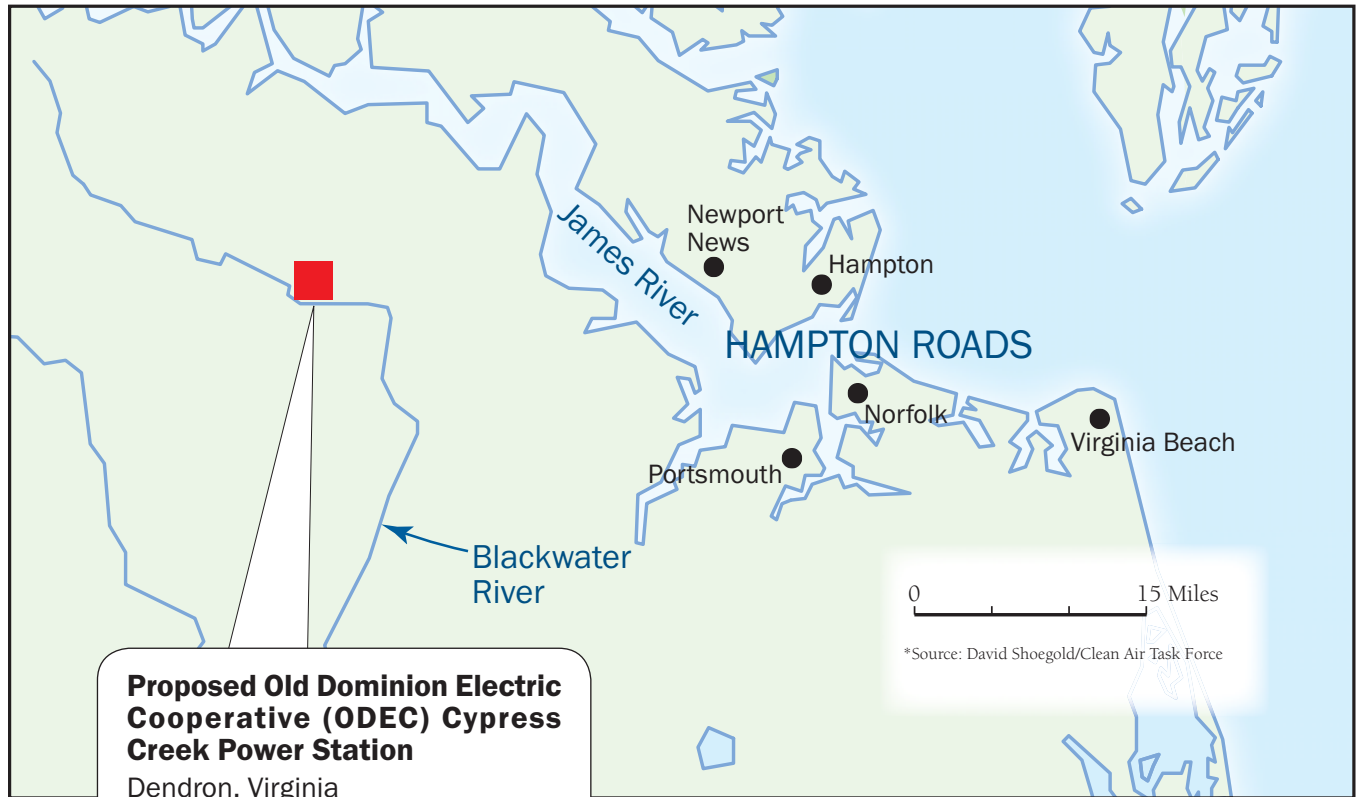
Air pollution from the ODEC plant would add to the health problems experienced by the people of Virginia, which already ranks sixth worst in the nation for health damage from coal-fired power plants.¹⁷ Southeastern Virginia already has a trio of heavily polluting coal plants in its back yard. The Chesterfield Power Station, northwest of Hampton Roads in Chesterfield County, releases enough particulates to cause an estimated 1,600 asthma attacks and 94 deaths a year across the region.¹⁸ Pollution from the Yorktown Power Station in York County causes about 540 asthma attacks and 32 premature deaths a year.¹⁹ The Chesapeake Energy Center in Chesapeake, Virginia, discharges enough particulates to cause an estimated 860 asthma attacks a year and 51 premature deaths.²⁰

Because the proposed Dendron coal plant would add more pollution to an area that already struggles with air-quality problems, the American Lung Association in Virginia, the Virginia Asthma Coalition, and doctors in Hampton Roads and Williamsburg have come out in public opposition to the construction of the plant.²¹

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Impact of Proposed ODEC Power Plant



Proposed Old Dominion Electric Cooperative (ODEC) Cypress Creek Power Station

Dendron, Virginia

Estimated Annual Health Impact to Region:*

- 26 Deaths
- 40 Heart Attacks
- 442 Asthma Attacks
- 16 Cases of Chronic Bronchitis
- 23 Asthma-related E.R. Visits

Total Annual Cost: \$208 million

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SMOKESTACKS LOOM LARGE OVER A SOCCER COACH AND HER SON

Amy Paulson, a mother and soccer coach in Chesapeake, Virginia, watched on a recent evening as her eight-year-old son and teammates kicked a ball across a muddy field.

“Left foot... *use that left foot!*” she shouted from the sidelines. “Great! You got it!”

After the soccer practice ended, she handed her son, Sam, an inhaler with the medication albuterol, which he puffs to manage his asthma.

“I’m very concerned about the proposed coal-burning power plant,” she said as her son breathed deeply and inhaled the medicine. “If it is built, it is definitely going to mean he’s going to have to limit his time playing soccer outdoors. Last summer, when we had a lot of bad air-quality days, he had a lot of trouble playing.”

The proposed ODEC power plant would be built roughly 40 miles west of Chesapeake, Virginia. Despite the distance, Paulson is right to worry that the plant’s pollution would aggravate the lungs of her son and other children in the area, according to Dr. Stephen W. Shield, an asthma and allergy specialist.

Dr. Shield, who practices in Newport News, Williamsburg, and Gloucester, said the microscopic, soot-like particles and ozone from the plant could trigger asthma attacks and cause other serious health problems across the region. For that reason, he said he opposes construction of the plant.

“This air pollution would have a substantial negative impact on many citizens in this area with asthma,” Dr. Shield said. “Virginia already ranks number six in the nation for mortality from air pollution, and another coal-fired power plant—particularly in such a populous area—would make us shoot up that list even further.”

He said it would be wiser for the Commonwealth to look to cleaner sources of energy.

Dr. Cynthia Kelly, a pediatric asthma and allergy specialist who practices at the Children’s Hospital of the King’s Daughters in Norfolk, took the same position.

“I would vote no for another coal plant,” said Dr. Kelly. “What concerns me most are our kids who actively exercise outdoors, during physical education at school or organized activities such as soccer.”



Tom Peltony/CBF Staff

Mom and soccer coach Amy Paulson is worried about ODEC’s proposed power plant and its effects on her eight-year-old son, Sam, who already suffers from asthma.

The American Lung Association in Virginia issued a statement that said the ODEC plant’s air pollution would be too harmful for the state to accept, in part because of the numerous schools and preschool programs that would be downwind.

“The proposed Cypress Creek Power Station would impede the region’s ability to maintain acceptable air-quality standards,” the American Lung Association in Virginia wrote. The plant would “increase the risk of asthma attacks, emphysema with chronic obstructive bronchitis, infant mortality, lung cancer, heart disease, and ischemic strokes.”



Tom Peltony/CBF Staff

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OZONE

On hot summer days, ground-level ozone forms from pollutants discharged from power plants, vehicles, and other sources. Volatile Organic Compounds (VOCs) and nitrogen oxides mix in sunlight to form a gas²² that can irritate the lungs. This causes a sensation of burning, as well as asthma attacks, coughing, wheezing, and shortness of breath.²³ At the location and height of the proposed ODEC power plant's smokestacks, winds in the summer blow predominantly from the west and southwest.²⁴ Hampton Roads is about 40 miles east of the power plant site, and Williamsburg is about 20 miles northeast of it. Both are directly downwind from this proposed new source of pollution, and in a "sweet spot" for the formation of ozone, according to an analysis of the plant's potential impact performed for the Chesapeake Bay Foundation by Dr. Jeffrey W. Stehr, Assistant Research Scientist in the Department of Atmospheric and Oceanic Science at the University of Maryland, College Park.²⁵ Dr. Stehr concluded that the power plant would worsen already significant ozone pollution problems in the Hampton Roads area.²⁶

More ground-level ozone would likely trigger more asthma attacks.²⁷ The American Lung Association has concluded the area cannot afford more air pollution.²⁸ Richmond already ranks as the number one "Asthma Capital" of the United States, and Virginia Beach is number 45.²⁹ As many as 40,000 children in the Hampton Roads region, and about 20,000 children in the Richmond metropolitan area, already suffer from asthma.³⁰ Researchers have concluded that ground-level ozone and particulate pollution aggravate asthma, and could be one of the factors playing a role in causing it.³¹

Ozone pollution in Hampton Roads exceeded health standards five times during the summer of 2010.³² The frequency of public health alerts about high ozone levels would likely increase if the ODEC plant is built, according to Robert G. Burnley, former Director of the Virginia Department of Environmental Quality.³³ Stricter federal ozone standards could prompt even more ozone alert days. EPA is scheduled to impose tougher new federal ozone standards soon, and both the Hampton Roads area (including Williamsburg) and the Richmond areas are expected to fail these standards, according to the Virginia Department of Environmental Quality.³⁴ When this happens, the proposed ODEC plant will be surrounded on three sides by ozone non-attainment areas.³⁵

Hampton Roads and Richmond could face the loss of federal funds for highway construction—which total \$72 million for Hampton Roads and \$32 million for the Richmond area³⁶ in fiscal 2011—if they fail to reduce air pollution to meet these new federal ozone standards.^{37,38} Meeting these standards would be harder with a large new source of air pollution from the ODEC plant.



Ground-level ozone is formed on hot days by a mixture of air pollutants from vehicles, like these at the Hampton Roads Bridge Tunnel, coal-fired power plants, and other sources.

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FLY ASH



“They should not build the landfill there (in the floodplain). This is an environmental hazard waiting to happen. It could contaminate the water with arsenic, mercury, and chromium, among other metals.”

Dr. H. Anna Jeng,
Associate Professor of
Environmental Health
at Old Dominion University

The burning of pulverized coal at the ODEC power plant would create about 260,000 tons a year of ash waste, including fly ash and other material.³⁹ Fly ash is a powdery substance that rises into the air, and is typically caught by filters and other pollution-control equipment before it leaves the smokestack. This ash contains small, albeit concentrated, amounts of toxic metals including arsenic and chromium,⁴⁰ which EPA classifies as carcinogens. ODEC hopes to recycle some of the ash (the material currently can be used in construction materials) and dispose of the rest in 176 acres of lined landfills it proposes to build just south of the plant.⁴¹

One of the company’s proposed ash landfill sites is in a wetland that lies in the floodplain of the Blackwater River and its tributaries, according to ODEC’s preliminary project drawings on file with the U.S. Army Corps of Engineers and 100-year floodplain maps maintained by the Federal Emergency Management Agency.⁴² Virginia’s solid waste regulations generally prohibit disposing of industrial waste in a floodplain.⁴³ Toxic metals and other pollutants that escape from ash landfills can kill aquatic life in rivers and streams.⁴⁴ Dr. H. Anna Jeng, Associate Professor of Environmental Health at Old Dominion University who serves as the Public Environmental Health Representative on the Virginia State Board of Health, said that depositing ash so close to the water would be an “environmental hazard”⁴⁵ because flooding could wash toxic metals into the Blackwater River, which is a source of drinking water for people downstream. The city of Norfolk draws 1.7 million gallons of water a year out of the Blackwater River as part of a system that supplies water for approximately 800,000 residents of Norfolk, the Norfolk Naval Station, Virginia Beach, and Chesapeake. Charles H. Norris, a Colorado-based hydrologist who has been studying fly-ash disposal sites across the U.S. for a quarter century, said that Dr. Jeng has raised a reasonable concern. “Putting the landfill in a floodplain is adding a risk of contamination into the river and into the groundwater in the floodplain that can be avoided,” Norris said.⁴⁶ “Fly ash has contaminated ground water and surface water all over the country.”



Fly ash is waste that is produced by the burning of coal and captured in power plant pollution-control systems, before being landfilled.

ODEC is proposing to build a dry-ash landfill with a liner in Dendron. But it is important to note that pollution problems have been caused by dry-ash landfills with liners.⁴⁷ Documented cases of lined landfills failing to stop contamination of groundwater or waterways have occurred in Elrama, Pennsylvania; Bangor, Pennsylvania; Orlando, Florida; Cheshire, Ohio; Beulah, North Dakota; and Hallam, Nebraska.⁴⁸ After decades of little or no oversight from EPA, the federal agency is now proposing to regulate fly ash to address the pollution risks that come from disposal of the waste.⁴⁹

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NEIGHBOR OF PROPOSED FLY-ASH LANDFILL WORRIES ABOUT POLLUTION

Joseph Copeland crunches through leaves to the banks of the scenic Blackwater River near his 176-year-old farmhouse outside Dendron, Virginia.

He points off into the wetlands, beyond the cathedral-like roots of the bald cypress trees that make this area look like a Louisiana bayou. It is out there that ODEC is proposing to build a landfill to hold tons of coal fly-ash waste from its power plant.

"I am very worried about the fly ash and the contamination of the water that might come from it, especially if there is any flooding," said Copeland, a retired U.S. Air Force captain.

Copeland, an engineer, said it doesn't make sense that ODEC is proposing to build a landfill in such a swampy and flood-prone area. Part of the landfill site lies in wetlands that are in the floodplain of the Blackwater River and its tributaries.

And Copeland is not the only one worried about this. Concerns about the water and air pollution from the plant have split the rural community and drawn the attention of scientists and physicians across the Chesapeake Bay region.

Dr. H. Anna Jeng, Associate Professor of Environmental Health at Old Dominion University, said Copeland and other neighbors are right to raise objections.

"They should not build the landfill there (in the floodplain)," Dr. Jeng said. "This is an environmental hazard waiting to happen. It could contaminate the water with arsenic, mercury, and chromium, among other metals."

Dr. Christopher L. Rowe, Environmental Toxicologist at the University of Maryland Center for Environmental Science who has studied the ecological impact of fly-ash landfills, also questioned the concept of putting a landfill in wetlands.

"Putting a coal-ash facility anywhere near where water could come in is not a great idea," Dr. Rowe said. "If (the metals in coal waste) were to leach out, there is the potential for it to harm aquatic life."



Tom Peitony/CBF Staff

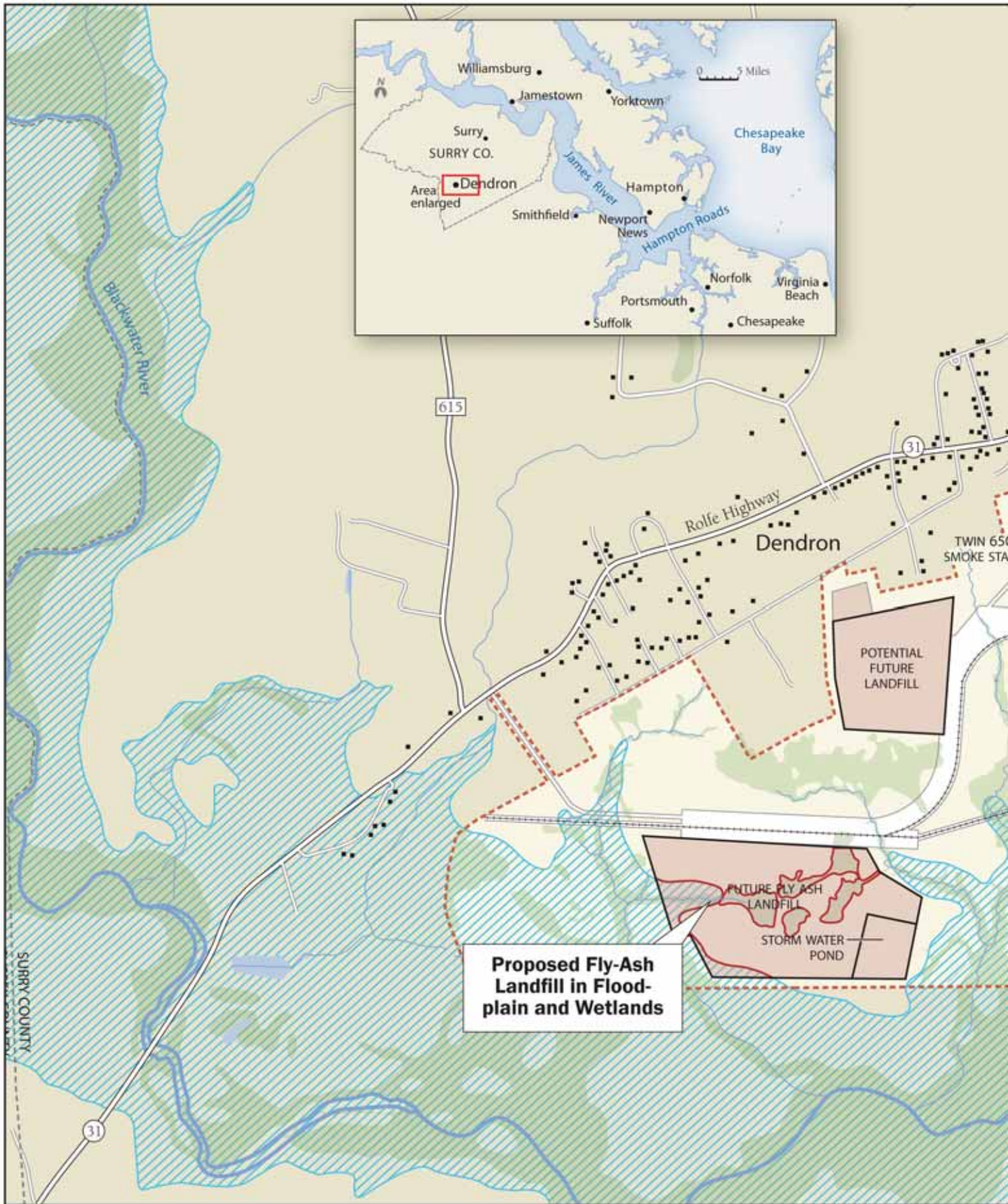
Joseph Copeland, who lives just outside Dendron, Virginia, points across the Blackwater River toward wetlands where ODEC is proposing to build an ash landfill in a floodplain.

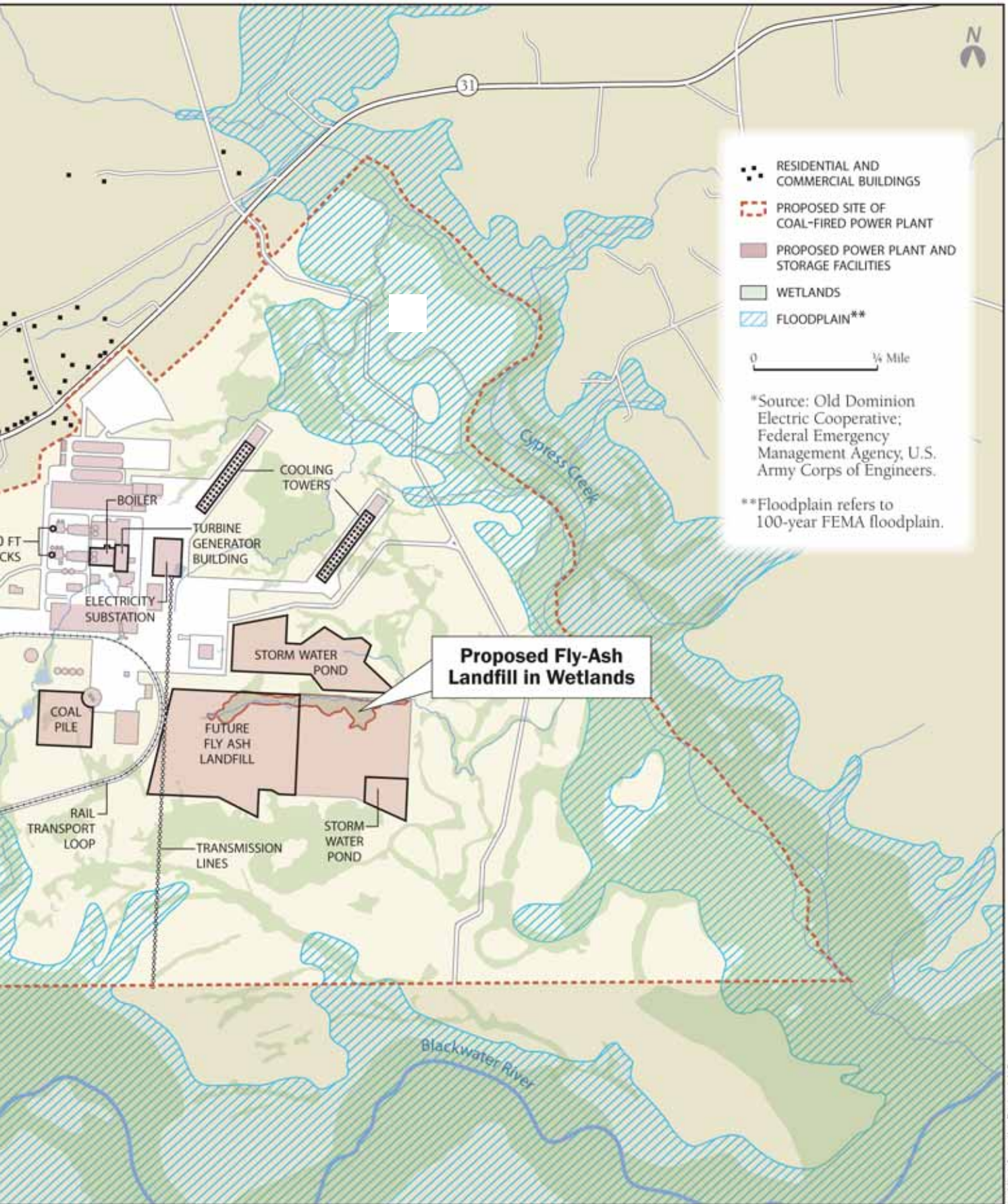


Tom Peitony/CBF Staff

The ODEC power plant would be built near the Blackwater River in Virginia. The plant's waste-ash landfill would be constructed partially in a floodplain, creating a risk that floods could wash pollution into the river, which is a source of drinking water to people downstream.

Proposed ODEC Power Plant Plan*





MERCURY AND OTHER HAZARDOUS AIR POLLUTANTS



Tom Pelton/CBF Staff

***“Let’s say it bluntly:
Pollution from coal-fired
power plants kills people.”***

Dr. Michael Hendryx,
Director of the Rural Health
Research Center at
West Virginia University

The burning of coal releases over 70 harmful chemicals, many of which are carcinogens or can harm brain development in children.⁵⁰ People who are exposed to these pollutants in sufficient concentrations also have an increased chance of developing other serious health problems, such as damage to their immune, pulmonary, nervous, and reproductive systems.⁵¹

According to ODEC data contained in its application to the Virginia Department of Environmental Quality for an air pollution control permit, the proposed plant would release 6,800 pounds of benzene annually, as well as 2,200 pounds of arsenic, and 440 pounds of hexavalent chromium,⁵² all of which EPA classifies as human carcinogens.^{53,54,55} Each year, the plant’s stacks would also release 1,282 pounds formaldehyde,⁵⁶ a probable human carcinogen.⁵⁷ The plant would vent 356,000 pounds of hydrochloric acid gas,⁵⁸ which is corrosive to the eyes and skin and can cause coughing and ulceration of the throat and lungs.⁵⁹ Another emission would be 921 pounds a year of lead dust,⁶⁰ which can settle onto the ground and expose young children to neurological damage and other health risks.⁶¹

Perhaps the biggest threat to children, however, would come from the plant’s release of up to 44 pounds of mercury every year.⁶² Mercury can cause mental disabilities or loss of intelligence in children who are exposed to enough of it. Usually the exposure comes through eating contaminated fish or through the umbilical cord blood of pregnant mothers who eat fish.⁶³ An astonishingly small amount of mercury can cause harm. Approximately one gram per year (.002 of a pound) is capable of contaminating a 20-acre lake and making the fish in it unsafe to eat on a regular basis.⁶⁴

Mercury is a naturally occurring element in coal, and coal-burning power plants are the single largest source of mercury air emissions in the U.S., accounting for about 41 percent of mercury pollution.⁶⁵ Mercury rises from smokestacks into the atmosphere, and falls back down into waterways with rain, snow, or soot particles. Mercury is transformed into a more toxic form (called methyl mercury) by microorganisms in wetlands and bottom sediments.⁶⁶ Methyl mercury accumulates in organisms that are eaten by fish. The concentration is magnified as the mercury moves up the food chain to large, predatory fish that are consumed by people.⁶⁷ Between 316,588 and 637,233 children a year in the U.S. (or between 7.8 percent and 15.7 percent of all American children) are born with mercury levels in their umbilical cord blood high enough to reduce their intelligence.⁶⁸ That loss of IQ is associated with lifetime reduced economic productivity worth about \$8.7 billion a year (with about \$1.3 billion of this loss attributable to mercury pollution just from U.S. power plants, and the rest to industrial and other types of emissions around the globe.)⁶⁹ Mercury pollution is associated with 1,566 cases of mental disabilities a year in the U.S., which costs society about \$2 billion a year for health care, special education, and other services.⁷⁰ Two hundred and thirty-one of these cases of mental disabilities, and about \$289 million a year in health and education costs, are associated with mercury pollution from American power plants.⁷¹

Mercury contamination is so widespread in Virginia that 1,344 miles of rivers and 38,493 acres of lakes across the state⁷² are listed by the federal and state governments as impaired by this toxic metal. As a result, the Virginia Department of Health has warned people to limit their consumption of fish in 27 bodies of water, including the Blackwater River, Nottoway River, Great Dismal Swamp Canal, and Dragon Run Swamp.⁷³ An analysis of

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the proposed ODEC power plant performed for the Chesapeake Bay Foundation by Dr. H. Andrew Gray of Gray Sky Solutions, an air pollution modeling firm, concluded that the mercury from the plant would fall on these already contaminated areas and further contribute to the mercury pollution in them, with the greatest concentration falling around Hampton Roads.⁷⁴



Coal-fired power plants are a major source of mercury pollution, which contaminates fish and can pose a health threat to people who eat them.

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Tom Peltory/CBF Staff



Tom Peltory/CBF Staff

Richard White of Boone County, West Virginia, is one of many retired coal miners suffering from black lung disease.

Coal mining contributes to as many as 10,000 premature deaths a year across the Appalachian states, including West Virginia, the location of this graveyard.

A COAL MINER'S PLEA TO BURY COAL

Richard White drives up to a cemetery on a ridge above the coal-washing plant in Boone County, West Virginia, where he worked for 33 years. He points to the graves of his father and father-in-law, also miners.

All around, hillsides have been sheared. A mountain has been cleared of trees and dynamited. Down the road, the windows of abandoned homes are shattered and doors hang open. The setting sun illuminates what looks like a golden cloud of smoke.

"You see all the dust in the air up here?" he asks.

Richard has a good reason to be worried about coal dust. He has black lung disease, as did his father and father-in-law. "They would actually cough up pieces of their lungs, with big handfuls of dust, because their lungs were deteriorating," he says.

He gazes all around him at the devastation caused by mountaintop coal mining. He inhales deeply, and concludes: "If we could put a man on the moon, we can come up with alternative sources for energy."

This miner's call for clean energy may sound like it is coming a long way from the Chesapeake Bay. But in reality, coal casts a long shadow over the Bay and its rivers and streams. The burning of coal to generate electricity is a major source of mercury pollution, which contaminates fish in the Bay and many of its tributaries. Smokestacks also contribute nitrogen to the nation's largest estuary, which feeds algal blooms and low-oxygen dead zones.

These are among the reasons CBF is fighting to prevent the construction of ODEC's proposed coal-fired power plant in Dendron, Virginia. The plant would burn central Appalachian bituminous coal, according to ODEC's application for a permit. That means the generator would run on the backs of West Virginia miners like Richard White.

Dr. Michael Hendryx, Director of the Rural Health Research Center at West Virginia University, calculated that coal mining contributes up to 10,000 premature deaths a year across the Appalachian states. These deaths are expensive, costing about \$42 billion a year, according to Hendryx's paper *Mortality in Appalachian Coal Mining Regions: The Value of Statistical Life Lost* published in the U.S. Public Health Service's journal.

His bottom line: Coal mining is actually five times more expensive to the region's economy than the financial gain, if public health costs are considered.

Dr. Hendryx said the construction of the Dendron power plant would only make life harder on people who live in mining communities, like Richard White, as well as people in Virginia who would suffer from the plant's air pollution.

"Let's say it bluntly: Pollution from coal-fired power plants kills people," Dr. Hendryx said. "If we started investing more seriously in alternatives like solar, wind, hydro, and geothermal energies, it would be healthier for the people, better for the environment, and we could still provide the power we need to run our economy."

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CARBON DIOXIDE

With its low-lying topography, extensive coastlines, and dense populations near the water, the Chesapeake Bay region is one of the most vulnerable in the country to sea-level rise caused by climate change.⁷⁵ As many as 807,720 people in the region live on land that is a meter (3.2 feet) or less above sea level.⁷⁶ The sea level in the Bay has been rising at a relative rate of about one to two feet per century.⁷⁷ Increasing global temperatures have been melting glaciers and ice sheets, and warmer temperatures expand the volume of water.⁷⁸ This problem is compounded in the Chesapeake region by a sinking of the land here.⁷⁹ Roughly half of the relative sea-level rise around the Bay is due to natural land subsidence⁸⁰ caused by a delayed geological reaction to the retreat of glaciers more than 12,000 years ago, as well as more recent withdrawal of drinking water from aquifers, and other factors.

The ODEC plant would contribute to sea-level rise in a small but real way by releasing about 11.7 million tons of carbon dioxide every year.⁸¹ Coal-fired power plants, in general, are a significant source of greenhouse gas pollution that is driving up sea levels and causing temperature and weather shifts around the globe.⁸² Coal plants produce more than one third of carbon dioxide emissions from the U.S.⁸³ It would be impossible to associate any particular coal plant with any specific heat wave, flood, or death; however, each new coal plant contributes more to a global problem. The World Health Organization has estimated that climate change causes more than 150,000 deaths a year, including heart attacks triggered by heat waves, and malnutrition from droughts and crop failures.⁸⁴

An analysis by the National Wildlife Foundation concluded that a two-foot rise in sea level over the next century would sweep away 69 percent of the Chesapeake Bay's beaches, and 58 percent of the Atlantic beaches in the region.⁸⁵ The disappearances of beaches could harm, among other things, the region's large tourism industry, which is worth \$32 billion a year to Virginia and Maryland.⁸⁶ A two-foot rise in sea level would also flood 167,000 acres of undeveloped dry land and 161,000 acres of brackish marsh around the Bay.⁸⁷ The loss of marshes makes coastal properties more vulnerable to flooding, and removes important habitat for fish and waterfowl,⁸⁸ which could hurt the region's fishing, crabbing, hunting, and outdoor recreation industries. "We often talk about the value of wetland 'functions'—what they do to create environmental value—but few people take the next step to recognize that these wetland functions produce economic value," according to Wetlands Watch, a nonprofit organization.⁸⁹

In southeastern Virginia, an estimated 10 percent of developed land in the Hampton/Mobjack Bay area could be lost to flooding by 2100 under a modest projection of a 1.6 foot rise in sea levels.⁹⁰

In part because of its low elevation and heavy development along the water, the Hampton Roads area is at special risk from storm-surge flooding, according to an analysis by Pennsylvania State University researchers.⁹¹ Rising sea levels worsen the damage from storm-surge flooding.⁹² With a two-foot rise in sea level, more than half (409 of 744) of Hampton Roads' "critical" buildings, such as hospitals, fire stations, and schools, would likely be flooded if the area were hit by a severe storm.⁹³ Additional greenhouse gas pollution could mean increased sea-level rise, which would make future storms

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even more harmful. “The messages from this analysis are clear: Hurricane storm surge presents a considerable hazard to the inhabitants of Hampton Roads,” Dr. Brent Yarnal and his colleagues at Penn State wrote.⁹⁴ “Moreover, future sea-level rise, population growth, and poorly planned development will result in significantly greater risk of storm-surge flooding.”



Wetlands Watch

Because of its low elevation and heavy development along the water, the Hampton Roads region is at special risk from storm-surge flooding. Rising sea levels caused by greenhouse gas pollution, including carbon dioxide, can worsen the damage from storm-surge flooding.

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A TALE OF TWO CITIES

Many of the 300 residents of Dendron, Virginia, see the economic salvation of their rural town in the construction of ODEC's proposed coal-fired power plant.

History, however, suggests otherwise. About 130 miles west of Dendron, the town of Clover, Virginia, tried a similar path to renaissance 16 years ago, and learned a sobering lesson.

ODEC and its business partners built the Clover Power Station just outside of Clover in 1995. Many people in the slowly depopulating community hoped the power plant would turn the town's fortunes around and boost its economy. But after the plant opened, the town of Clover continued to lose population, and its only school closed, followed by its restaurant and grocery store.

By 1998, Clover had so few residents and so little money, local officials took the rare step of dissolving the town.

It no longer exists.

The one store that remains open among the vacant buildings, shattered windows, and abandoned homes in downtown Clover is Carol's Beauty and Barber Shop.

Carol Martin, the owner, recalled that there was an initial surge of new business downtown during construction of the power plant. But the economic surge quickly faded when the builders left, she said.

"The people who built the power plant, they were telling us all this stuff that was going to happen. But it didn't happen," Martin said.

Martin has a message for the people in Dendron who see their town's rebirth in a coal-fired plant.

"Just don't get your hopes up too high," Martin said, as she flipped through the pages of the final yearbook of the Clover School, which closed its doors in 2002.

Dendron, like Clover, is a small, rural town in a slow decline.

Once the home of a booming lumber mill, Dendron today only has one remaining business: Bailey's Convenient Mart. The signs out front proclaim "Mountain Dew" and "God Loves You."

"There is nothing here right now....But change is coming with the power plant," said Fred Moore, a longtime area resident, as he leaned against an out-of-service gas pump in front of Bailey's. "This power plant could bring in a lot of people."

Last year, the Dendron Town Council approved a rezoning that will allow the construction of ODEC's proposed Cypress Creek coal-fired power plant. If the project is granted state and federal permits, the plant would be built right in the

After the Clover Power Station opened outside Clover, Virginia, the town lost population and unincorporated following the closure of its school, restaurant, and grocery store.



Tom Peltony/CBF Staff

middle of a residential neighborhood, behind a white clapboard house with a picket fence and porch rockers.

The plant's 650-foot smokestacks would soar higher than the Washington Monument, dwarfing everything in town—including the Victorian homes, brick post office, and steepled church.

The proposal has bitterly divided the community. Dozens of yard signs proclaiming "No Coal Plant!" face off against signs reading "Cypress Creek Power Station Yes!"

Kimberly Griffin, a medical writer who lives on a farm nearby, is one of those strongly opposed to the plant. "I think it would be bad, because all the pollution that goes up into the air will end up in our water and on our land," she said.

ODEC argues that it is difficult to compare Dendron and Clover, in part because the Cypress Creek Power Station would be built in the town of Dendron, while the Clover Power Station is just outside of Clover.

In a written statement on the company's website, ODEC says the construction of the Clover Power Station had nothing to do with the population decline in Clover. The now-unincorporated community of Clover has only about 100 people left, roughly half the number as in the 1990 Census.

The flight of residents "was due more to the results of its declining area industries and attractive career opportunities elsewhere," as well as the re-routing of a highway, according to the ODEC statement.

But Shelby Newcomb, who was a member of the Clover Town Council when it voted to dissolve the town, recalled the sharp disappointment she and many others felt when the opening of the power plant failed to live up to its promise to lift the community.

"We hoped that the plant was going to bring people into town, and build the town up. But it did not do it," said Newcomb, speaking outside the darkened windows and peeling paint of the closed Rosie's Restaurant in Clover.

"A lot of the workers they brought in from outside of Clover" to work at the plant, Newcomb said. "So in that way, they didn't help us."

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CONCLUSION

The ODEC power company claims that building the Cypress Creek Power Station would bring jobs and prosperity. In reality, it would bring something quite different. The microscopic soot particles released by the burning of coal would trigger heart attacks, premature deaths, and hundreds of millions of dollars in medical bills. The ozone would make it harder for the region to meet federal air-pollution standards, and could reduce the availability of federal funds for road construction. The building of an ash landfill in a flood zone would carry the risk of tainting the Blackwater River and drinking water supplies with toxic metals. The mercury floating from the plant's smokestacks would contaminate fish and cause mental disabilities in children. The greenhouse gases would add to the global problem of sea-level rise, which already threatens Hampton Roads and many other coastal communities.

In short, constructing the ODEC coal-fired power plant would carry a bill of illness, death, and environmental harm that the people of the Chesapeake Bay region should not be forced to pay.

The Virginia Department of Environmental Quality and the federal government should say no to the proposed facility, and yes to the health and wealth of its citizens. The state and federal governments should reject this antiquated coal-burning technology, and look to a future of clean, renewable energy.

ENDNOTES

- ¹ U.S. Environmental Protection Agency online publication, *Particulate Matter Basic Information*. <http://www.epa.gov/pm/basic.html>.
- ² Telephone interview on March 11, 2010, with Dr. Jonathan Levy, Mark and Catherine Winkler Associate Professor of Environmental Health and Risk Assessment at the Harvard School of Public Health.
- ³ Virginia State Advisory Board on Air Pollution, *Evaluation of Virginia's Air Monitoring Network*.
- ⁴ Levy interview.
- ⁵ EPA, *Particulate Matter*.
- ⁶ Clean Air Task Force, *The Toll From Coal*, September 2010. The report relies on analyses by Abt Associates, a business and government research and consulting firm based in Cambridge, Massachusetts. <http://www.catf.us/resources/publications/view/138>.
- ⁷ National Research Council of the National Academies of Science, *Hidden Costs of Energy: Unpriced Consequences of Energy Production and Use*. National Academies Press, Washington, DC, 2010, page 6.
- ⁸ Clean Air Task Force, *The Toll From Coal*, page 4.
- ⁹ EPA, *Particulate Matter*.
- ¹⁰ Paul R. Epstein, Jonathan J. Buonocore, and colleagues, "Full Cost Accounting for the Life Cycle of Coal," *Annals of the New York Academy of Sciences*, 1219 (2011), pages 73-98.
- ¹¹ Ibid.
- ¹² Old Dominion Electric Cooperative December 2008 application to Virginia Department of Environmental Quality (VDEQ) for an air pollution control permit, *Prevention of Significant Deterioration Construction Permit Application for the Cypress Creek Power Station Project in Surry County, Virginia*.
- ¹³ Old Dominion Electric Cooperative, *Cypress Creek Best Available Control Technology Analysis*, Appendix D, page 2-2, February 2010. This number reflects both PM2.5 and PM10, because ODEC did not follow VDEQ request and provide separate figures for each size of particulate.
- ¹⁴ August 11, 2010, memo from David Schoengold of MSB Energy Associates, *Health Impacts of Proposed Old Dominion Cypress Creek Power Plant*, which applied established EPA methodologies to numbers from ODEC's permit application to the VDEQ. Statistical modelling was provided to Schoengold by the Clean Air Task Force and Abt Associates.
- ¹⁵ Ibid.
- ¹⁶ Ibid. The Schoengold memo estimates a cost of society of more than \$12 billion over 60 years, which would be \$6 billion over 30 years.
- ¹⁷ Clean Air Task Force, *The Toll from Coal*, page 12. Health impacts are estimated.
- ¹⁸ Clean Air Task Force, *The Toll from Coal*, online database, "Death and Disease from Power Plants." http://www.catf.us/coal/problems/power_plants/existing/map.php?state=Virginia.
- ¹⁹ Ibid.
- ²⁰ Ibid.
- ²¹ American Lung Association (ALA) in Virginia, Virginia Asthma Coalition, and the Consortium for Infant and Child Health oppose the construction of the ODEC plant, according to the December 2010 joint resolution that can be viewed on the ALA website at <https://secure3.convio.net/ala/site/Advocacy?cmd=di>

splay&page=UserAction&id=4487. In addition to these groups, some physicians were interviewed by the Chesapeake Bay Foundation and expressed their opposition to the ODEC plant. These were Dr. Stephen W. Shield, an asthma, allergy, and immunology specialist who treats patients in Williamsburg, Virginia, with Allergy Partners of Eastern Virginia (interviewed on November 3, 2010); Dr. Cynthia Kelly, a pediatric allergy and asthma specialist with the Children's Hospital of the King's Daughters in Norfolk (interviewed on November 11, 2010); and Dr. Christine Llewellyn, a diagnostic radiologist and Assistant Professor at the Virginia Commonwealth University Medical Center in Richmond (interviewed on October 29, 2010).

²² EPA online publication, *Ground Level Ozone*. <http://www.epa.gov/glo>.

²³ Physicians for Social Responsibility, *Coal's Assault on Human Health*, November 2009, page 10.

²⁴ Telephone interview on November 18, 2010, with Dr. Jeffrey W. Stehr, Assistant Research Scientist in the Department of Atmospheric and Oceanic Science at the University of Maryland, College Park, who studied the potential ozone impact of the ODEC plant for the Chesapeake Bay Foundation.

²⁵ Ibid.

²⁶ Ibid.

²⁷ Telephone interview November 11, 2010, with Dr. Cynthia Kelly, a pediatric allergy and asthma specialist with the Children's Hospital of the King's Daughters in Norfolk.

²⁸ October 29, 2010, e-mail from Kimberly Williams, Manager of Advocacy and Communications for the American Lung Association in the District of Columbia, Maryland, Virginia, and North Carolina.

²⁹ Asthma and Allergy Foundation of America's ranking of "Asthma Capitals 2010" http://www.aafa.org/pdfs/2010_AC_FinalPublicList.pdf.

³⁰ Joint position statement by the Virginia Asthma Coalition, Consortium for Infant and Child Health, and American Lung Association in Virginia. <https://secure3.convio.net/ala/site/Advocacy?cmd=display&page=UserAction&id=4487>.

³¹ Physicians for Social Responsibility, *Coal's Assault on Human Health*, November 2009, page 10.

³² VDEQ, "Eight Hour Ozone Exceedences (2010)." The five exceedences in the summer of 2010 were above 80 parts per billion ozone.

³³ Telephone interview on October 29, 2010, with former VDEQ Director Robert G. Burnley.

³⁴ Telephone interview on October 27, 2010, with Thomas Ballou, Director of Air Data Analysis for VDEQ.

³⁵ VDEQ, "Map of 8 Hour Ozone Planning Areas in the Commonwealth of Virginia."

³⁶ The Virginia Department of Transportation Budget for fiscal 2011 says Hampton Roads will receive \$101 million for highway system acquisition and construction, and that 71 percent of these funds come from the Federal Highway Administration and Federal Transit Administration (or a total of about \$72 million). The state budget says that the Richmond area will receive \$45 million for highway system acquisition and construction, and that 71 percent of these funds come from the federal government (or a total of about \$32 million). Budget documents available at: <http://www.virginiadot.org/projects/reports-budget.asp>.

³⁷ Burnley interview.

³⁸ Ballou interview.

³⁹ ODEC March 18, 2009, Question and Answer information sheet for the public, posted on the Cypress Creek website. <http://www.cypresscreekpowerstation.com/questions031809.php>.

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⁴⁰ Maryland Department of the Environment, “Fact Sheet: Coal Fly Ash and Its Health Risks,” November 2007. http://www.mde.state.md.us/programs/Marylander/PublicHealthHome/Documents/www.mde.state.md.us/assets/document/AA_Fly_Ash_QA.pdf.

⁴¹ ODEC March 18, 2009, Question and Answer information sheet for the public.

⁴² Preliminary drawings of fly-ash landfill location can be found in ODEC’s map titled “Dendron Site Area Proposed Site Layout” on file with the U.S. Army Corps of Engineers. This can be found on the Army Corps website at: http://www.nao.usace.army.mil/Library/Factsheets/CypressCreekPowerStation/documents/WebMap_Dendron_DRAFT_04222010.pdf. This was compared to Federal Emergency Management Agency 100-year floodplain maps for the Dendron area. U.S. Army Corps of Engineers wetlands map for the Dendron area sent via e-mail to CBF on November 2, 2010, from U.S. Army Corps of Engineers, Norfolk District.

⁴³ Virginia Administrative Code. 9 VAC 20-80-25 prohibits citing sanitary landfills within 100-year floodplain. 9 VAC 20-80-270 prohibits citing of industrial waste landfills within 100-year floodplain unless site can be protected from inundation. 9 VAC 20-80-10 defines 100-year flood.

⁴⁴ Telephone interview on October 29, 2010, with Christopher L. Rowe, Environmental Toxicologist at the University of Maryland Center for Environmental Science.

⁴⁵ Telephone interview on November 9, 2010, with Dr. H. Anna Jeng, Associate Professor of Environmental Health at Old Dominion University who serves as the Public Environmental Health Representative on the Virginia State Board of Health.

⁴⁶ Telephone interview on March 30, 2011, with Charles H. Norris, hydrologist and founder of Geo-Hydro Inc. of Denver, Colorado, who has studied dozens of fly-ash-disposal sites across the country since 1985.

⁴⁷ Report by Environmental Integrity Project, Earthjustice, and Sierra Club, *Out of Control: Mounting Damages From Coal Ash Waste Sites*, February 24, 2010, page iv. http://www.environmentalintegrity.org/news_reports/documents/OutOfControl-MountingDamagesFromCoalAshWasteSites.pdf. Report by Environmental Integrity Project, Earthjustice, and Sierra Club, *In Harm’s Way: Lack of Federal Coal Ash Regulations Endangers Americans and Their Environment*, August 26, 2010, page vi. http://www.environmentalintegrity.org/news_reports/documents/INHARMSWAY_FINAL2.pdf Cases described throughout the report discuss whether the ash landfills are dry or wet and whether they have liners.

⁴⁸ Ibid. In *Out of Control*, the Elrama, Pennsylvania, case is discussed on pages 76-80; Bangor, Pennsylvania, on pages 85-88; and Orlando, on pages 6-8. In *In Harm’s Way*, the Cheshire, Ohio, case is discussed on pages 125-132; Beulah, North Dakota, on pages 101-104; and Hallam, Nebraska, on pages 109-112.

⁴⁹ EPA online publication, *Coal Combustion Residuals—Proposed Rule*. <http://www.epa.gov/waste/nonhaz/industrial/special/fossil/ccr-rule/index.htm>.

⁵⁰ Physicians for Social Responsibility, *Coal’s Assault on Human Health*, November 2009, pages x, xi, and 8. <http://www.psr.org/assets/pdfs/psr-coal-fullreport.pdf>.

⁵¹ EPA online publication, *About Air Toxics*. <http://www.epa.gov/ttnatw01/allabout.html>.

⁵² ODEC report to VDEQ, *Cypress Creek Maximum Achievable Control Technology Analysis, Appendix E*, February 2010, page 2-2.

⁵³ EPA Integrated Risk Information System: <http://www.epa.gov/ncea/iris/subst/0276.htm#woe>.

⁵⁴ EPA Air Toxics website on arsenic: <http://www.epa.gov/ttn/atw/hlthef/arsenic.html>.

⁵⁵ EPA Air Toxics website on chromium compounds: <http://www.epa.gov/ttn/atw/hlthef/chromium.html>.

⁵⁶ ODEC application to VDEQ, *Prevention of Significant Deterioration Construction Permit Application for the Cypress Creek Power Station, revised Appendix C, “Cypress Creek Power Station Boiler HAP Emissions,”* February 10, 2009.

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- ⁵⁷ EPA Air Toxics website on formaldehyde: <http://www.epa.gov/ttn/atw/hlthef/formalde.html>.
- ⁵⁸ ODEC report to VDEQ, *Cypress Creek Maximum Achievable Control Technology Analysis, Appendix E*, February 2010, page 2-2.
- ⁵⁹ EPA Air Toxics website on hydrochloric acid gas: <http://www.epa.gov/ttn/atw/hlthef/hydrochl.html>.
- ⁶⁰ ODEC application to VDEQ, *Prevention of Significant Deterioration Construction Permit Application for the Cypress Creek Power Station, revised Appendix C, "Cypress Creek Power Station Boiler HAP Emissions,"* February 10, 2009.
- ⁶¹ EPA Air Toxics website on lead: <http://www.epa.gov/ttnatw01/hlthef/lead.html>.
- ⁶² ODEC has used different figures in estimating to VDEQ how much mercury would be emitted by the plant. The company used the figure of 44 pounds of mercury a year in its February 2010 report to the state agency, *Cypress Creek Maximum Achievable Control Technology Analysis, Appendix E*, page 2-2. But the company used the figure of 118 pounds a year of mercury in its February 10, 2009 report, *Prevention of Significant Deterioration Construction Permit Application for the Cypress Creek Power Station, revised Appendix C, "Cypress Creek Power Station Boiler HAP Emissions."*
- ⁶³ EPA online publication, *Mercury: Human Health*. <http://www.epa.gov/hg/health.htm>.
- ⁶⁴ VDEQ mercury website: <http://www.deq.state.va.us/p2/mercury/fluorescents/>. The approximate "one gram in a 20 acre lake" figure is based on a 1992 study by the Minnesota Pollution Control Agency that found that virtually all of the mercury in Minnesota lakes is the result of atmospheric deposition (through rain and snow and dry deposition of particulate matter) at a rate of 12.5 micrograms per square meter per year. The exact amount of mercury needed to impair a body of water depends upon the location.
- ⁶⁵ Leonardo Transande, Philip J. Landrigan, and Clyde Schechter, "Public Health and Economic Consequences of Methyl Mercury Toxicity to the Developing Brain," *Environmental Health Perspectives*, May 2005, Volume 113, Number 5, page 590. An estimated 70 percent of mercury emissions are man-made, and 30 percent are from natural sources. When this report uses the term "mercury pollution," it refers to man-made mercury emissions.
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- ⁶⁷ Ibid.
- ⁶⁸ Ibid.
- ⁶⁹ Ibid.
- ⁷⁰ L. Transande, C.B. Schechter, K.A. Haynes, P.J. Landrigan, "Mental Retardation and Prenatal Methylmercury Toxicity," *American Journal of Industrial Medicine*, March 2006, 49 (3), pages 153-8.
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⁷⁶ U.S. Climate Change Science Program, “Coastal Sensitivity to Sea Level Rise: A Focus on the Mid-Atlantic Region,” January 2009, page 110. <http://www.climatechange.gov/Library/sap/sap4-1/final-report/default.htm>.

⁷⁷ John D. Broom, John M. Brubaker, and David R. Forrest of the Virginia Institute of Marine Science, “Chesapeake Bay Land Subsidence and Sea Level Change: An Evaluation of Past and Present Trends and Future Outlook,” November 2010 report to the Norfolk District of the U.S. Army Corps of Engineers.

⁷⁸ Maryland Department of Natural Resources analysis of 2007 Intergovernmental Panel on Climate Change Fourth Assessment Report. http://www.dnr.state.md.us/dnrnews/infocus/sealevel_rise.asp.

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⁸¹ February 26, 2010, letter from Lisa D. Johnson, Senior Vice President of Power Supply for Old Dominion Electric Cooperative, to James E. Kyle, Air Permit Manager, VDEQ, subject: “Old Dominion Electric Cooperative—Cypress Creek Power Station—Submittal of Responses to DEQ’s May 18, 2009, Letter,” Attachment 7.

⁸² National Air and Space Administration World Book entry on global warming. http://www.nasa.gov/worldbook/global_warming_worldbook.html.

⁸³ Physicians for Social Responsibility, *Coal’s Assault on Human Health*, page IX.

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⁹⁴ Ibid.

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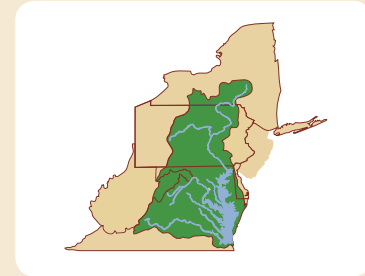
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HOW THIS REPORT WAS COMPILED:

Chesapeake Bay Foundation Senior Writer Tom Pelton wrote this report after examining public records on file with the Virginia Department of Environmental Quality, U.S. Army Corps of Engineers, and other government agencies; reviewing scientific journal articles and other publications; and interviewing public health experts and residents of southeastern Virginia.

CHESAPEAKE BAY WATERSHED



The Chesapeake Bay's 64,000-square-mile watershed covers parts of six states and is home to more than 17 million people.