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THE COAL MINE NEXT DOOR

How the US Government's Deregulation of Mountaintop Removal Threatens Public Health



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**How the US Government's Deregulation of Mountaintop
Removal Threatens Public Health**

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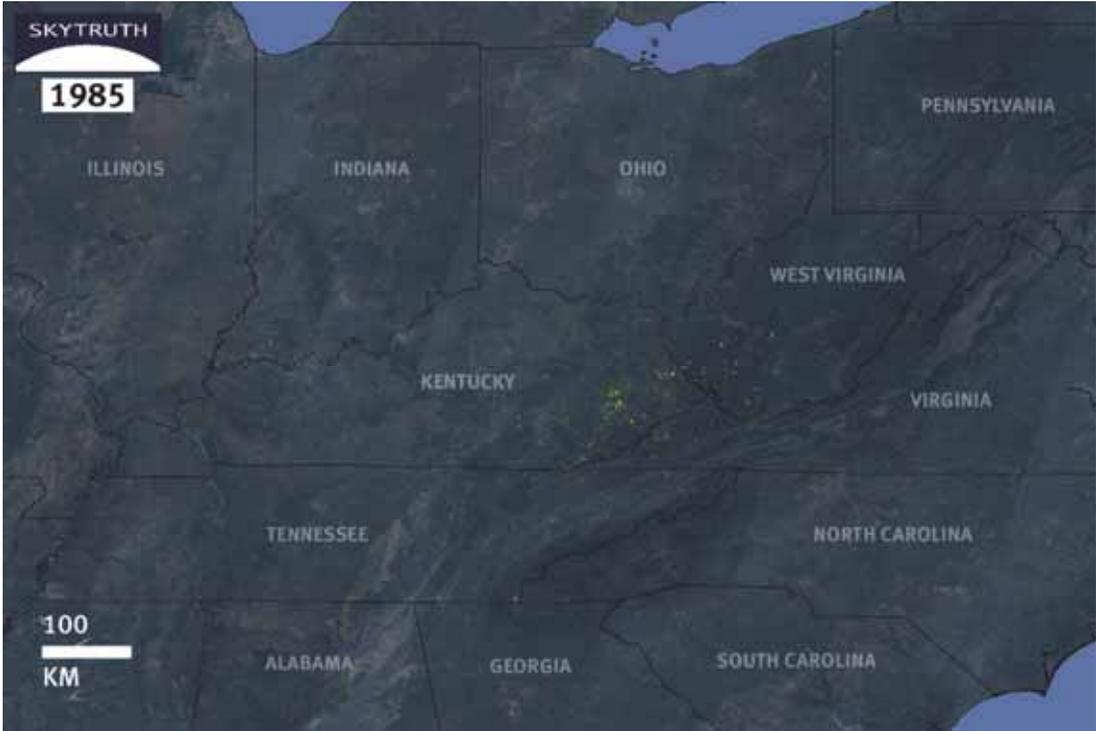
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Maps of Mountaintop Removal



Land impacted by mountaintop removal as of 2015 based on satellite imagery. Map prepared by SkyTruth, an independent organization that promotes transparency on environmental issues. © 2018 SkyTruth

Glossary of Terms

Appalachia: A region in the eastern United States that follows the spine of the Appalachian Mountains and encompasses parts of 13 states from southern New York to northern Mississippi. For over a century, coal has dominated the economy of central Appalachia, an area made up of southern West Virginia, eastern Kentucky, the western edge of Virginia and northeastern tip of Tennessee.

Mountaintop removal: A form of surface coal mining prevalent in central Appalachia that involves removing up to 400 vertical feet of a mountaintop to recover all or most of the coal seam below.

Overburden: The part of the mountain that is blasted and removed to reach a coal seam.

Valley fill: Overburden is typically dumped into the nearby valley, creating a valley fill as big as 1,000 feet wide and one mile long. The valley fill often looks like an inverted stepped triangle and has a line of rocks running along its center, which replaces the stream buried beneath it.

Summary

For 20 years, coal companies blasted off the mountaintops around the house of Rick Bradford, a retired teacher in Edwight, West Virginia, to excavate thin coal seams buried hundreds of feet deep. After detonating millions of pounds of explosives, trucks the size of his house dumped the loosened waste rock, called overburden, into the nearby valleys, burying the streams below. “It’s like a bomb hit,” Bradford said of the mountains he hiked since a child and where many of his loved ones are buried.

Mountaintop removal, a form of surface mining, has already leveled or severely impacted 500 mountaintops in West Virginia, Kentucky, Virginia, and Tennessee, according to Appalachian Voices, an activist group opposed to mountaintop removal. An Environmental Protection Agency assessment calculated that mountaintop removal has buried more miles of stream than the entire length of the Mississippi River.

Coal companies continue to operate these mines without stringent regulation, even as public health researchers have amassed significant evidence over the last decade showing that people like Bradford who live near mountaintop mines disproportionately suffer and even die from a litany of health problems, including cardiovascular disease and cancer. A study conducted by West Virginia University researchers revealed that tiny dust particles released to the air in Edwight promoted cancer growth when injected into human lung cells, while another by the United States Geological Survey, a science agency within the Interior Department, found that nearby streams have lost half their species of fish.

Citing “advances in science,” the US Department of the Interior, which oversees mining in the country, enacted the Stream Protection Rule in 2016 to mitigate some of mountaintop mining’s harmful effects. The rule required mining companies to monitor and restore streams polluted by their activities, but Congress got rid of it in one of its first acts under the Trump administration.

This was only the beginning of an avalanche of deregulation under President Donald Trump, who promised not to stop until the number of federal regulations is “less than where they were in 1960.” To do so could be devastating for public health and the environment since it would return the US to a time when there were virtually no federal



Mountaintop removal mine on Coal Mountain in Wyoming County, West Virginia © 2018 Human Rights Watch

laws prohibiting companies from dumping toxins into the air and water. Trump has blamed regulations for depressing wages and extolled a vision that prioritizes unfettered business activity. He has appointed industry lobbyists and insiders to top regulatory positions, many of whom opposed health and safety regulations.

This report examines how, following aggressive industry lobbying, Congress rolled back a modest regulation, making it easier for the coal industry to destroy mountains and bury the waste rock in streams, and the Interior Department canceled a study it had funded assessing the practice's potential health impacts. It is based on research conducted over the course of one year that included reviewing dozens of scientific studies and government and court documents, as well as 42 interviews with mining and health experts, impacted residents, and others over five visits to the coalfields in West Virginia. The report finds that Congress' decision to repeal the rule ignored significant evidence indicating mountaintop removal poses a health risk to nearby residents and gave undue consideration to a deeply flawed industry-funded study that implausibly concluded that the rule jeopardized nearly all the jobs in the coal industry. Compounding all of this, the Trump administration



One of the mine's valley fills. The rocks replace a buried stream and water collects in a sediment pond below, feeding into a stream that runs alongside a row of homes, all of which rely on private wells.

© 2018 Human Rights Watch

abruptly withdrew funding from a study that could have built new consensus around the practice's health impacts.

The government's response to the health risks of mountaintop removal offers a cautionary tale on the danger of viewing regulations solely as corporate burdens when in fact they are intended to protect health and other basic human rights. Where evidence indicates that corporate activities pose risks to public health or other human rights, the US federal and state governments have a duty to regulate these activities so as to effectively mitigate these risks. They should not eliminate existing regulations that serve to protect people from harm without putting in place effective alternative protections.

Yet that is exactly what the Trump administration has done, particularly by prioritizing the coal industry and aggressively dismantling regulations related to it. Perhaps no industry's history better captures the sheer amount of human tragedy buried in hard fought protections for workers, communities, and the environment that the government now

seeks to eliminate. Sherry Walker, whose husband and father were coal miners and who sued a coal company that she believes contaminated her well, noted that supporting mining goes hand-in-hand with protecting miners and their families. “I have nothing against coal mining. It’s my family’s trade; it’s our way of life. But if you damage someone’s property, take responsibility,” she said.

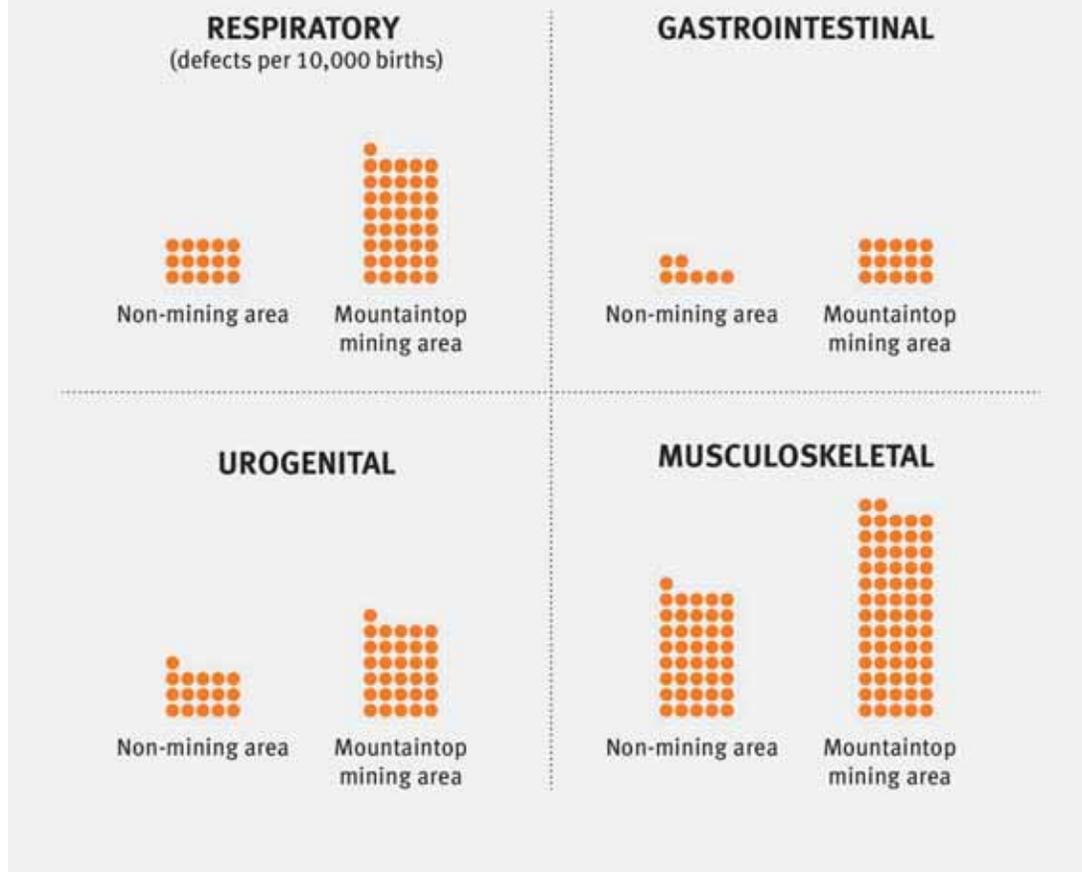
The Trump administration is in the process of rolling back many important regulations meant to mitigate the health and environmental impacts of the coal industry– from monitoring the health of surface miners to safely disposing of coal ash. This report focuses on how Congress invoked the Congressional Review Act, a little-used law that gives it veto power over federal agency rules, to cancel the Stream Protection Rule, enacted after eight years of agency review, that required coal companies to monitor their impact on streams and restore them at the end of a mining project. The Trump administration subsequently canceled a half-completed federally-funded study the National Academy of Sciences was conducting on the potential health effects of surface mining in central Appalachia, even though dozens of scientific studies indicate that it poses serious threats to the health of nearby residents and destroys their environment. In doing so, the administration not only assured the continuation of a hazardous form of mining but also robbed the public of an important tool to assess its true cost.

Trump has justified this deregulation of the coal industry as necessary to save jobs. But the much larger threat to jobs comes from changes to the industry itself that the Trump administration and Congress have largely ignored. The level of US coal production in 2017 was roughly the same as it was in 1980, yet the industry then employed five times the number of workers it does today. Ironically, the sharp rise in surface mining, including mountaintop removal, has helped cause the loss of tens of thousands of mining jobs, since it requires much fewer workers than underground mining.

The Health Threat of Mountaintop Removal

Beginning around 2009, Dr. Michael Hendryx, the then director of West Virginia University’s Rural Health Research Center, found higher rates of disease and death consistently clustered in areas where mountaintop coal mining was prevalent in the coal producing counties in Appalachia, a mountainous region that stretches across 13 states in eastern United States. Since then, he and other researchers have published over a dozen

Mountaintop coal mining counties in Appalachia show higher rates of certain types of birth defects.



Based on Melissa M. Ahern et al., “The association between mountaintop mining and birth defects among live births in central Appalachia, 1996-2003,” *Environmental Research*, vol. 111, 2011, p. 842. © 2018 Human Rights Watch

peer-reviewed studies showing significantly higher rates of cardiovascular disease, lung and other types of cancer, birth defects, and overall mortality, even after they controlled for factors such as poverty, smoking, obesity, education, race, and metropolitan setting. For example, one study Hendryx co-authored calculated an excess of 1,200 deaths in mountaintop removal counties annually since 1990, when the practice became prevalent, after adjusting for other factors, while another found that babies born between 1997-2003 had nearly double the chance of having circulatory or respiratory birth defects.



The kitchen sink and bathtub, discolored by iron and manganese in water, in a home near a mountaintop removal mine on Coal Mountain in Wyoming County, West Virginia © 2018 Human Rights Watch

The voluminous data is consistent with anecdotal suspicions long held by many residents of these areas and some of the doctors who serve them. “No one is really healthy around here, but it’s hard to know why,” Bradford said. Nicole C., who lives near a mountaintop removal mine in Wyoming County, West Virginia, told Human Rights Watch she constantly worries about the health effects of exposing her two young children, one of whom has Down syndrome, to the household’s contaminated water, which she believes is due to the mountaintop mine above her house. James C., her miner husband, and his father, a retired miner, were born in the valley, known as a hollow, and both said they had clear water until it turned bright orange from iron soon after mining began. “I’m worried about my babies. Is it safe to bathe them?” Nicole said. She said was also worried about the dust coming from the mine site. “If I kept my son’s toys on the porch, they’d become black. I couldn’t get the stuff off,” she said.

Doctors and nurses Human Rights Watch spoke with were cautious about drawing conclusions from the anecdotal experience of Nicole and others, but several said they were struck by the number of their patients who had respiratory and other health problems and suspected mining-related environmental causes. “My goodness! We get all kinds of symptoms,” Dr. Wesley Lafferty, a primary care physician in Boone County, West Virginia, said. “Rashes, restrictive airway disease [including asthma and chronic obstructive pulmonary disease], dermatitis, generic skin disease. I definitely feel there is an environmental component to that.”

Human rights law protects the right to health and access to safe drinking water. The US government has a duty to prevent or regulate activities that pose risks to human rights. This can extend to activities that have not been conclusively shown to cause harm, where there is good reason to believe that they may. Because of the diffuse nature of many environmental harms and the long period it may take for health impacts to manifest, governments should take precautionary measures based on the best available science. They should also endeavor to carry out or support studies that will establish the human rights risks in a definitive way.

While proving causation should often not be a precondition for regulation, a recent group of studies by West Virginia University researchers examining air particles in communities near mountaintop removal sites provides evidence suggesting that mountaintop mining is not only associated with poor health but may cause cancer and cardiovascular disease. Air samples revealed high levels of inhalable particles consisting mostly of silica, a toxic heavy metal commonly found in rock dust. Researchers didn't test for potentially hazardous inorganic substances, such as residue from explosives, chemicals used to process coal, and constant diesel emissions from massive trucks. Rather, they sought to gauge the danger to residents' health by injecting the particles into mice and human lung cells. Multiple experiments showed that they promoted tumor growth and changed cellular function in ways consistent with cardiovascular disease.

A team of researchers at Duke University, North Carolina, as well as the US Geological Survey, have conducted extensive research on streams near mountaintop removal and concluded that they are severely polluted by the practice. The US Geological Survey found that impacted streams "have less than half as many fish species and about a third as many fish as non-impacted streams," and other studies similarly found adverse impacts on birds, insects, and even bacteria. Impacted streams' conductivity – a unit often used as a proxy for pollution – frequently measures more than six times the level the Environmental Protection Agency identified as the limit for preserving their health.

The research assessing potential health risks of human exposure to water contaminated due to mountaintop removal is less developed than research on air pollution, but the lack of research and data collection on this issue is itself worrisome. Many people in these communities still rely on private wells, which are not subject to state or federal water standards or monitoring. Human Rights Watch visited seven families who live near Coal

Mountain in Wyoming County, West Virginia and allege that an active mountaintop removal mine near their homes is responsible for contaminating their well water.

Although users of public water systems may be less at risk of negative health impacts from their water because federal law requires regular monitoring and treatment, water quality in public systems may nonetheless be adversely impacted by mountaintop mining pollution if not properly managed and monitored. Hendryx conducted a survey of public water treatment facilities in West Virginia from 2001-09 and found that mountaintop removal counties had over five times the number of Safe Drinking Water Act violations, principally for lack of monitoring, than in other Appalachian counties. Some facilities, particularly small ones, may find it difficult to monitor due to a lack of resources, but it nevertheless raises concerns that authorities and residents may be unaware that water contamination from mountaintop removal has negatively impacted both the source water for public systems and the water these systems then supply to users.

Health experts with whom Human Rights Watch spoke recognized that other factors, such as high levels of poverty, unemployment, drug addiction, smoking, and obesity in these areas undoubtedly contribute to residents' poor health. But many noted that these added stressors can also make people more vulnerable to air and water pollution from mountaintop removal. "All of our systems push us to homeostatis," Paul Locke, a scientist who chaired the halted National Academy of Sciences' study, explained, "but the more insults I have, the more difficult it is to return to homeostasis." In other words, the pollution attributed to coal activities may exacerbate health problems it is not itself the cause of.

The Coal Industry's Response

As the drumbeat of health studies linking mountaintop removal to poor health intensified, coal companies, and their key trade group called the National Mining Association, launched aggressive efforts to discredit the evidence and beat back any attempts at regulation. The industry had been fighting legal challenges to mountaintop removal since a group of West Virginians sued the federal and state government in 1998, claiming that the practice violated a surface mining rule that, according to its author, was specifically designed to counter the environmental impacts of mountaintop removal and that the



A valley fill with rocks replacing the buried streambed in the background and the surviving stream in the foreground © 2018 Human Rights Watch

government issued the industry permits through a process that violated rules under the Clean Water Act.

The US government settled most of the case's claims by agreeing to conduct a comprehensive study on mountaintop removal's environmental impacts. However, in 2002, the US Army Corps of Engineers worked together with the Interior Department, which was under the direction of a former coal lobbyist, to change the Clean Water Act rules to allow coal companies to easily obtain permits to fill a valley with mountaintop removal overburden (known as valley fills), circumventing one of the legal problems the lawsuit identified. The agency later released a version of the environmental impact study that included no recommendations to limit mountaintop removal or address its toxic legacy. Instead of proposing limits on mountaintop removal, it proposed changing a surface mining rule to remove another legal obstacle to valley fills that the lawsuit raised.



A satellite image of mountaintop removal mines in southern West Virginia. © 2018 Human Rights Watch

Beginning in 2010, the emerging evidence of mountaintop removal's health risks presented a new threat to the practice. Several of the West Virginia University researchers involved in these studies told Human Rights Watch they had the impression that the coal industry, which is a major university funder, put pressure on the university's administration to end the research. While they said the university protected their academic freedom, in October 2011 the university's public relations director wrote to the leading environmental journalist for West Virginia's *Charleston Gazette* requesting that he refrain from using the term "WVU study" in order to clarify "that the institution itself takes no position on the findings." Coal companies also began to fund research, including a \$15 million grant to Virginia Tech, a university, to establish a coal research institute; the grant produced the only studies that found mountaintop removal had no adverse health impacts.

The Obama administration, after studying the issue for eight years and receiving 94,000 public comments, adopted the Stream Protection Rule on December 20, 2016. The rule disappointed environmental activists because it did not ban mountaintop removal. Instead it required coal companies to monitor and restore streams impacted by their

activities – an issue that most significantly affects mountaintop removal because of its reliance on valley fills that bury and contaminate streams. A government-funded assessment of the rule’s impact found it would cost \$52 million to implement and ultimately cost several hundred jobs.

The National Mining Association aggressively opposed the rule and funded a rival assessment, based only on coal operators’ opinions of the rule’s impact. On that basis, the industry study claimed it could wipe out as many as 77,000 jobs – which amounts to nearly the industry’s entire workforce. Stoking the fear of potential massive job losses in already hard-hit areas was an incredibly effective tactic. Congressional representatives who voted to repeal the rule cited this study exclusively, ignoring voluminous scientific evidence of mountaintop removal’s environmental and health impacts. Congress canceled the rule within weeks of starting its term by invoking a little-used law called the Congressional Review Act in February 2017. All but one of the 54 senators who voted in favor had received campaign donations from the coal industry since 2012, the earliest year their term could have begun, totaling over \$3.25 million, compared to only 12 senators who voted to keep the rule, who received a total of \$45,000.

Six months later, the Interior Department ordered the National Academy of Sciences (NAS) to halt a half-completed study it had funded on the potential health effects of surface coal mining operations in central Appalachia, claiming the agency was reviewing all studies over \$100,000. But a NAS spokesperson said that none of its other studies for the agency were stopped and such a decision was highly unusual. Emails obtained by a journalist through the Freedom of Information Act (FOIA) and viewed by Human Rights Watch, although heavily redacted, indicate that the “review” focused solely on this study and that the decision was made almost immediately after it began. Critics of the decision point out the suspicious timing to argue it was the product of inappropriate political interference.

The disregard for public health risks in Congress’ decision to cancel the Stream Protection Rule and the Interior Department’s decision to halt the NAS study exemplifies the problem with carrying out deregulation with industry’s interests as the primary consideration. With no proper assessment of a rule change or rollback’s health risks, Americans, especially the tens of millions of people who rely on private wells, are left vulnerable to paying the price with their health.

Recommendations

To the US Department of the Interior

- Ensure rigorous enforcement of all current rules applicable to mountaintop removal, including the Stream Buffer Rule. Take effective action when state governments fail to adequately enforce these rules.
- Enact a new rule that protects people living near mountaintop removal from health risks and other adverse impacts, including protecting their water and air quality. Ban the practice entirely if no other regulatory approach offers adequate protection from serious harm.
- Reinstate, complete, and publish the canceled National Academy of Sciences study assessing the potential health effects of surface mining operations in central Appalachia.
- Adopt rules and a transparent process to guide agency decisions to halt scientific studies.

To the US Environmental Protection Agency

- Rigorously enforce the Clean Water Act and Clean Air Act in areas where mountaintop removal mining is prevalent. Ensure the permitting process is commensurate with the mining practice's impact on streams, including, if appropriate, no longer issuing permits for valley fills.

To the US Congress

- Enact a law setting out specific criteria federal agencies must meet when deciding to halt or alter the terms of reference for scientific research they have agreed to fund and a transparent, consultative process for determining whether those criteria have been met.
- Enact a law that better protects private wells from the risk of industrial contamination. Such a law should require a risk assessment before an agency may issue a permit where there is a reasonable risk that such contamination may occur. It should also establish mechanisms for monitoring potential impacts on well water while the permit is active and providing redress in cases where contamination has

been established. The law should require companies to engage with potentially impacted residents, including by providing them with accurate and accessible information and a grievance mechanism.

To state environmental agencies where mountaintop removal occurs

- Rigorously enforce all current rules applicable to mountaintop removal, including the Stream Buffer Rule.
- Identify residents in mountaintop removal areas who rely on private wells. Ensure the safety and acceptability of residents' water, including by regulating, monitoring, and treating toxins that go beyond federal requirements where appropriate. Where treatment cannot sufficiently or economically reverse pollution, either extend the municipal water system to impacted areas or ensure the provision of safe water through other means. Consider levying a “water tax” on coal companies in the event revenue is an obstacle to remedying mining-related water contamination.
- Enact and enforce rigorous policies to protect against undue corporate influence over the regulatory process, including protecting the independence of scientific research.

To coal companies and the National Mining Association

- Ensure that any industry-funded research is accurate, independent, and peer-reviewed, and refrain from undermining the impartiality and objectivity of any academic or scientific research.
- Mitigate any adverse health risks of company activities, including in cases where substantial scientific evidence indicates potential impacts. Consider refraining from any activities whose severe harmful impacts cannot be sufficiently mitigated.
- Conduct public meetings in residential areas where well water may be negatively impacted by mining activities prior to initiating mining and periodically throughout the life of the mine. Inform residents of the risks of water contamination and develop a complaint mechanism whereby residents who believe their well water has been damaged can seek redress.

Methodology

This report examines the health impact of mountaintop removal, a form of coal mining that involves destroying mountains with explosives to access coal underneath, and then filling valleys with the overburden. It also looks at the ways in which the close relationship between government officials and the coal industry has led Congress to cancel a regulation that would have required coal companies to monitor and restore streams impacted by their activities and prompted the Interior Department to halt research vital to assessing mountaintop removal's health risks.

In researching this report, Human Rights Watch reviewed hundreds of documents, including numerous peer-reviewed, scientific studies related to mountaintop removal's impact on air quality, water quality, and public health. We also reviewed raw health and mining data and relevant regulatory documents, as well as media articles and other publicly available information.

Human Rights Watch staff conducted field research in areas of southern West Virginia where mountaintop removal is most prevalent, including Boone, Raleigh, Kanawha, Logan, Fayette, and Wyoming counties, as well as in northeastern Tennessee. During five visits conducted in November 2017, and between March and August 2018, Human Rights Watch interviewed scientists, doctors, mining specialists, lawyers, environmental activists, and impacted residents. We conducted additional interviews by phone. In all, Human Rights Watch interviewed 42 people. All interviewees freely consented to the interviews, and Human Rights Watch explained to them the purpose of the interview and did not offer any remuneration.

Human Rights Watch wrote letters to the Interior Department; Environmental Protection Agency; United States Army Corps; West Virginia Department of Environmental Protection; Governor Jim Justice of West Virginia; National Mining Association (NMA); Ramboll Environs, a consulting company hired by the NMA to produce a study on the Stream Protection Rule's impact; Dynamic Energy, a coal company with mountaintop removal operations; Appalachian Research Initiative for Environmental Science (ARIES), an academic initiative funded in part by coal companies; and a scientist who published a study funded by the coal industry. We received substantive responses from the

Environmental Protection Agency; United States Army Corps; National Mining Association; ARIES; and the scientist, which are integrated into the report and included in full as an annex.

The findings of this report are based overwhelmingly on the scientific evidence of mountaintop removal's health impact and other documents indicating the government and coal industry's response to these studies.

I. Background

Since Donald Trump became president in January 2017, his administration and Congress have canceled, withdrawn, or weakened hundreds of rules enacted to protect workers, communities, and the environment.¹ At a press conference capping his first year in office, Trump celebrated this deregulation and made clear he was only getting started.² Standing triumphantly beside a mountain of paper containing all current regulations and a much smaller stack containing regulations in effect in 1960, he promised: “When we’re finished . . . we will be less than where we were in 1960.”³

The date he chose is significant. The 1960s marked a fundamental shift in how the US government regulates businesses. The visible rise in pollution – from the acrid emissions of cars and power plants blackening the air to oil spills and industrial waste poisoning fish – brought public attention to the environmental degradation wrought by unregulated industry. At the same time, a steady drumbeat of ground-breaking studies began to link exposure to various toxins with serious health problems.⁴ The nation’s sense of alarm went beyond air and water pollution as concerns began to emerge about synthetic chemicals and other hazardous substances that had become ubiquitous in consumer products, food, and workplaces.⁵

Capping a decade of growing concern, in 1969, sparks from a train passing through northern Ohio flew onto floating oil-slicked debris on the Cuyahoga River and ignited a fire that flared to 50 feet high. The images of the fire lighting up the heavily polluted river

¹ For a curated list tracking the administration’s deregulation, see The Brookings Institution, “Tracking Deregulation in the Trump Era,” <https://www.brookings.edu/interactives/tracking-deregulation-in-the-trump-era/>.

² “Remarks by President Trump on Deregulation,” December 14, 2017, <https://www.whitehouse.gov/briefings-statements/remarks-president-trump-deregulation/> (accessed August 7, 2018). At that point, the administration had removed around 860 rules, according to Commerce Secretary Wilbur Ross. See Sally Persons, “Trump Has Altered over 800 Obama-era Rules, Wilbur Ross Says,” *The Washington Times*, October 13, 2017.

³ “Remarks by President Trump on Deregulation,” December 14, 2017.

⁴ For example, the geochemist Clair Patterson began warning of the health effects of lead in gasoline, see e.g. C.C. Patterson, *Arch. Environ. Health*, 11 (1965) 344~360, and research began to link polychlorinated biphenyl (PCBs), an industrial chemical used in many electrical appliances, to cancer, see e.g. Soren Jensen, “The PCB Story,” *Ambio*, Vol. 1, No. 4, (Sept. 1972), p. 123-31.

⁵ Rachel Carson’s *Silent Spring*, an expose on the pesticide DDT’s devastating impact on wildlife published in 1962, is often credited with first bringing national attention to these issues.

captivated the country, seeming to encapsulate the failure of a system that gave businesses virtually unfettered freedom to pollute the environment with impunity.⁶ Public pressure jolted the government into action, and within two years Congress passed three landmark pieces of legislation that remain the pillars of the environmental regulatory framework in the United States.

The Clean Air Act, passed in 1963 to provide federal funds for research, was updated in 1970 to set broad federal emissions standards. Also in 1970, President Richard Nixon established the Environmental Protection Agency. Two years later, Congress overrode Nixon's veto to pass the Clean Water Act, which placed restrictions on the discharge of pollutants into US waterways.⁷ A third law passed in 1970 established the Occupational Safety and Health Administration to ensure worker safety by limiting their exposure to hazardous substances. In addition to these wide-ranging laws, Congress passed numerous laws around this time to address specific pollutants that studies had shown posed risks to public health.

In the decades since, new laws and regulations have been put in place or old ones amended to reflect changes in industrial practices, products, and other business activities, as well as new evidence of health risks to workers, consumers, and communities. Governments may legitimately prune rules that are unnecessary or excessive, but the Trump administration's speed, limited public consultations, devaluation of science, and close relationship with industries standing to benefit from deregulation have driven a reckless approach that threatens workers, public health, and the environment.

Trump and senior officials in his administration have broadly painted regulations as an assault on businesses, the economy, and an impediment to creating jobs rather than a set of protections for the public at risk of being harmed by business activities. In its first semi-annual report, the US Office of Management and Budget dismissed 860 rules that the administration withdrew or canceled as "ineffective, duplicative, or obsolete" without

⁶ For an account of the fire's impact on sparking the environmental movement, see Jennifer Latson, "The Burning River that Sparked a Revolution," *Time* magazine, June 22, 2015, <http://time.com/3921976/cuyahoga-fire/> (accessed October 19, 2018).

⁷ *The American Presidency Project*, 1972, s.v. "Veto of the Federal Water Pollution Control Act Amendments of 1972," <http://www.presidency.ucsb.edu/ws/index.php?pid=3634> (accessed October 19, 2018).

even bothering to list them. The director, Mick Mulvaney, who ensures the work of federal agencies conform to the president's policies and produces the president's budget, said such a list is not necessary because "none of them are very sexy...None of them rise to the level of getting national attention."⁸

There are numerous examples of industry-backed deregulation under President Trump that threaten public health, but perhaps none better captures the contradictions inherent in claiming deregulation is good for workers and rural communities so well as the administration's ongoing war on coal regulations. Parroting the industry's claim of a war on coal, Donald Trump made deregulating coal a centerpiece of his campaign promise and, since becoming president, his administration's policy agenda; voters in West Virginia, a state where coal has historically been central to the economy, elected Trump by a margin of more than 40 points, the highest of any state.⁹

Fifty years ago, West Virginian and other Appalachian miners were at the forefront of demanding government protection from mining companies that they saw as taking their lives and health for granted. As described below, miners' strikes and protests across Appalachia were instrumental in securing the Federal Coal Mine Health and Safety Act in 1969, the first industry-wide set of regulations of its kind that predated even the Occupational Safety and Health Act.

Coal Unregulated

The coal industry has a very long record of opposing regulations to protect public health.¹⁰ By the 1880s, when coal overtook wood as the primary source of energy in the US and the

⁸ *The American Presidency Project*, 2017, s.v. "Press Gaggle by Principal Deputy Press Secretary Sarah Sanders and OMB Director Mick Mulvaney," <http://www.presidency.ucsb.edu/ws/index.php?pid=126699> (accessed October 19, 2018).

⁹ For example, in his State of the Union address on January 30, 2018, Trump said he "ended the war on clean coal." For full remarks, see *White House Briefings & Statements Archive*, 2018, s.v. "President Donald J. Trump's State of the Union Address," <https://www.whitehouse.gov/briefings-statements/president-donald-j-trumps-state-union-address/> (accessed October 19, 2018). For examples of the coal industry using this term, see note 54. For state election results, see "West Virginia Results," *New York Times*, June 15, 2018, <https://www.nytimes.com/elections/results/west-virginia> (accessed October 19, 2018).

¹⁰ For a history of the coal industry's battles against miners demanding legal protections, see e.g. Perry Blatz, *Democratic Miners: Work and Labor Relations in the Anthracite Coal Industry 1875-1925* (Albany: SUNY Press, 1994); James Green, *The Devil is Here in These Hills: West Virginia's Coal Miners and Their Battle for Freedom* (New York: Atlantic Monthly Press, 2015); Thomas Andrews, *Killing for Coal: America's Deadliest Labor War* (Cambridge: Harvard University Press, 2010); and Jeff Goodell, *Big Coal: The Dirty Secret Behind America's Energy Future* (New York: Houghton Mifflin Company, 2006).

industry employed around a quarter of a million miners, the dangers of the coalfields were already well documented.¹¹ Scientific studies since have greatly refined Americans' understanding of the health risks associated with mining, transporting, storing, and combusting coal. In recent years, these concerns have been amplified by greater awareness of coal's contribution to climate change and the impacts of climate change on human health, including its potential to exacerbate some of the localized health risks of coal mining.¹² Still, mining, rail, and power companies profiting from coal continue to wage a more than century-old battle against rules protecting workers and communities from coal's immediate harm to human health.¹³

Denial of Black Lung Disease

It has long been known that exposure to silica, the second-most common element in the earth's surface, can cause a form of lung disease called silicosis.¹⁴ This makes any person whose job involves blasting, drilling, or handling rock dust susceptible to the disease, including coal miners.¹⁵ But as early as the 1830s, doctors began documenting coal miners coughing up black tar that eventually made them unable to breathe, symptoms distinct from silicosis.¹⁶ In the following decades, doctors began to sound the alarm as they

¹¹ For statistics on energy consumption and coal employment, see U.S. Energy Information Administration, "History of Energy Consumption in the United States, 1775-2009," available at <https://www.eia.gov/todayinenergy/detail.php?id=10> (accessed July 25, 2018) and Vera F. Eliasberg, "Some aspects of Development in the Coal Mining Industry 1839-1918," 1966, p. 424. Coalfields' most obvious dangers are falling rock and other mining accidents, see a list of US mining disasters beginning in 1839 maintained by the National Institute for Occupational Safety and Health, <https://www.cdc.gov/niosh/mining/statistics/content/allminingdisasters.html> (accessed July 26, 2018), but by the 1880s scientists had already begun documenting the impact of coal mining on respiratory health, see e.g. K Donaldson et al., "James Crauford Gregory, 19th Century Scottish Physicians, and the Link Between Occupation as a Coal Miner and Lung Disease," *Journal of the Royal College of Physicians of Edinburgh*, vol. 47, September 2017.

¹² Climate change is known to modify weather patterns, which in turn may increase air pollutants. A 2016 US government-funded study on the human health impacts of climate change in the US found that "climate-driven increases in ozone will cause premature deaths, hospital visits, lost school days, and acute respiratory symptoms". In addition, climate change is predicted to raise the number and severity of naturally occurring wildfires, increasing emissions of particulate matter and ozone. U.S. Global Change Research Program, "The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment," 2016, <https://health2016.globalchange.gov/> (accessed October 19, 2018).

¹³ See, e.g., Jeff Goodell, *Big Coal: The Dirty Secret Behind America's Energy Future* (New York: Houghton Mifflin Company, 2006).

¹⁴ More than two millenia ago, Hippocrates, known as the father of modern medicine, reported miners having shortness of breath, but the sixteenth-century physician Agricola is credited for linking the health condition to exposure to rock dust. See Occupational Safety and Health Administration, "Occupational Exposure to Respirable Crystalline Silica -- Review of Health Effects Literature and Preliminary Quantitative Risk Assessment," p. 18,

https://www.osha.gov/silica/Combined_Background.pdf (accessed October 19, 2018).

¹⁵ *Ibid.*

¹⁶ Alan Derickson, *Black Lung: Anatomy of a Public Health Disaster* (Ithaca: Cornell University Press, 1998), pp. 6-7.

documented thousands of cases of miners suffering from what came to be known as black lung disease.¹⁷ Yet the coal industry largely denied its existence, with some representatives even arguing that the black tar coating miners' lungs was good for their health.¹⁸

In one illustrative anecdote from 1901, a coal foreman who served on the health board of a coal community took the rare step of presenting a paper at the Pennsylvania Sanitary Convention that alleged that one in two miners had “miner’s asthma.”¹⁹ A representative of the coal industry countered that “there is nothing in the mining industry that makes it unsanitary” and blamed miners’ health problems as “doubtless closely related to the rum shop.”²⁰ Similarly, a 1909 union activist lamented that his fight for stronger ventilation standards was defeated because the employer says “it is not necessary” and that the cost “is going to put the mines out of business.”²¹ Miners were hard-pressed to fight back without medical data tracking the prevalence of the disease.²² No law required doctors to collect relevant data and health clinics in coal communities were unlikely to do so voluntarily since most were controlled by coal companies.²³

This is an early illustration of a tactic that remains central in the fights around regulation in the country: opponents of regulation exploit the absence or uncertainty of data to fend off rules, including those requiring better data collection and disclosure, even where significant evidence indicates that their activities are causing harm.²⁴ In the 1960s, several doctors who had treated thousands of miners for black lung disease, including Dr. Donald Rasmussen and Dr. Isadore Buff, launched a public campaign to persuade the medical community to recognize the disease and politicians to act. In 1968, they formed the Black

¹⁷ *Ibid.*, pp. 1-42.

¹⁸ *Ibid.*, pp. 44-45 and 65 and Alan Derickson, “The United Mine Workers of America and the Recognition of Occupational Respiratory Diseases, 1902-1968,” *American Journal of Public Health* 81 (1991): pp. 782-790, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1405142/pdf/amjphoo206-0112.pdf>.

¹⁹ Derickson, *Black Lung*, p. 17.

²⁰ *Ibid.*, p. 17.

²¹ *Ibid.*, p. 129.

²² For an account of the Union of Coal Mine Workers’ struggle to persuade the federal government to conduct a prevalence study, see Derickson, “The United Mine Workers of America,” pp. 786-788.

²³ Derickson, *Black Lung*, p. 129.

²⁴ David Michaels, *Doubt is Their Product: How Industry’s Assault on Science Threatens Your Health* (New York: Oxford University Press, 2008).

Lung Association along with miners and others, leading grassroots protests and massive strikes across Appalachia.²⁵ Even then, many industry representatives and government officials continued to deny the existence of the disease.²⁶ Activist pressure, however, ultimately prevailed and legislation protecting miners was finally passed in December 1969, further discussed below.²⁷

Mining Accidents

Black lung wasn't the only thing killing miners: mining accidents claimed thousands of lives each year. It wasn't until 1910, after a mine explosion killed at least 367 workers in Monongah, West Virginia, that the federal government established the US Bureau of Mines to promote mine safety. By then, nearly 43,000 miners had been killed in accidents.²⁸ The Bureau's work was restricted to research, trainings, and rescue assistance and it had only a minimal impact in reducing mining fatalities. In 1941, Congress empowered the Bureau to inspect mines, but the inspections had little value without legally mandated health and safety standards.²⁹

Congress first passed a law requiring minimal mine safety standards in 1947. Although there was no enforcement mechanism and the standards expired after one year, it marked a turning point in miner fatalities: whereas on average 25 out of every 10,000 miners were killed annually from 1943 to 1947, that number dropped to an average of 15 over the next five years.³⁰ In 1952, Congress passed a new set of standards with limited enforcement

²⁵ Richard Fry, "Fighting for Survival: Coal Miners and the Struggle Over Health and Safety in the United States, 1968-1988" (Ph.D. diss., Wayne State University, 2010), p. 53.

²⁶ Richard T. Cathcart, Peter A. Theodos, and William Fraimow, "Anthracosilicosis: Selected Aspects Related to the Evaluation of Disability, Cavitation, and the Unusual X-Ray," *Arch Intern Med.* 106(3) (1960): 368-377.

²⁷ See Coal Regulated: "Federal Coal Mine Health and Safety Act of 1969."

²⁸ US Department of Labor, Mine Safety and Health Administration, "Coal Fatalities for 1900 Through 2017," <https://arlweb.msha.gov/stats/centurystats/coalstats.asp> (accessed October 19, 2018).

²⁹ US Department of Labor, Mine Safety and Health Administration, "History of Mine Safety and Health Legislation," <https://arlweb.msha.gov/MSHAINFO/MSHAINF2.htm> (accessed July 25, 2018).

³⁰ Human Rights Watch calculation based on figures from United States Department of Labor, Mine Safety and Health Administration, "Coal Fatalities for 1900 Through 2017," <https://arlweb.msha.gov/stats/centurystats/coalstats.asp> (accessed October 19, 2018).

power, but the average fatality rate largely held steady until Congress passed the first comprehensive legislation to protect coal miners in 1969.³¹

Coal Regulated

Federal Coal Mine Health and Safety Act of 1969

In the fall of 1968, there was an explosion in a mine in Farmington, West Virginia where 99 miners were working.³² Twenty-one managed to escape, but repeated explosions made it impossible for rescuers to continue their work and nine days later they sealed the mine, leaving no hope for the trapped 78 miners. The mine had a long history of violating safety standards, including high levels of methane, poor ventilation, and excessive amounts of combustible coal dust that had already caused several fatal explosions.³³ In the months before the explosion, both federal and state inspectors who had visited the mine did not cite the company for violations, even though the fire boss charged with the mine's safety recorded serious problems with its ventilation equipment.³⁴

The protracted drama of this and similar disasters brought national attention to the persistent dangers of mining, giving added fuel to the Black Lung Association's struggle for safer conditions.³⁵ In 1969, President Richard Nixon signed the Federal Coal Mine Health and Safety Act, marking a sea change not only in the protection of coal workers, but in the regulation of hazardous business activities more broadly.³⁶ The law, often called the Coal Act, provided for a number of measures to protect underground and surface miners, including limiting exposure to dust. It also provided for regular inspections and criminal

³¹ US Department of Labor, Mine Safety and Health Administration, "History of Mine Safety and Health Legislation," <https://arlweb.msha.gov/MSHAINFO/MSHAINF2.htm> (accessed July 25, 2018).

³² Melissa Block, "A Look Back at the Farmington Mine Disaster," *National Public Radio*, January 5, 2006, <https://www.npr.org/templates/story/story.php?storyId=5131746> (accessed July 27, 2018).

³³ Bonnie E. Stewart, *No. 9: The 1968 Farmington Disaster* (Morgantown: West Virginia University Press, 2011), pp. 10-36.

³⁴ *Ibid.* pp. 50-51.

³⁵ The Mine Safety and Health Administration's website calls the Farmington Disaster a "flashpoint for reform" that led to the Federal Coal Mine Health and Safety Act of 1969. US Department of Labor, Mine Safety and Health Administration, "45 Years of the Federal Coal Mine Health and Safety Act," <https://www.msha.gov/45-years-federal-coal-mine-health-and-safety-act> (accessed July 30, 2018). See Richard Fry, "Making Amends: Coal Miners, The Black Lung Association, and Federal Compensation Reform, 1969-1972," *Federal History* 5 (2013), pp. 37-42.

³⁶ Derickson, *Black Lung*, pp. 244-263.

and civil penalties for violations, respiratory health surveillance to underground (but not surface) miners, and compensation for miners with black lung disease.³⁷

Coal industry representatives largely opposed the law, arguing variously that it would harm the national economy, was overly burdensome, and overstepped the proper role of the federal government.³⁸ In another example of exploiting scientific uncertainty, a senior member of the National Coal Association argued that more research was necessary to determine safe dust exposure levels.³⁹ While miners and their allies were ultimately successful in getting the law passed, it demanded constant vigilance to ensure enforcement and protest efforts to weaken it.⁴⁰ The law's black lung compensation requirement was particularly poorly implemented, leading to miner strikes and the Black Lung Benefits Act in 1973.⁴¹

Subsequent Legislation

These legislative achievements improved the situation of miners, but mining disasters and black lung continued to claim lives.⁴² In 1972, a dam failed above Buffalo Creek in West Virginia, sending an avalanche of black slurry, residue from cleaning coal, down the mountain. The disaster killed 125 people and swept away hundreds of homes, bringing attention to the risks to nearby communities of mining.⁴³ The plight of these communities, which had been all but ignored, was further brought into focus by the rise in surface mining and its visible devastation of the environment.⁴⁴

³⁷ US Department of Labor, Mine Safety and Health Administration, "45 Years of the Federal Coal Mine Health and Safety Act," <https://www.msha.gov/45-years-federal-coal-mine-health-and-safety-act> (accessed July 30, 2018). In 2014, respiratory surveillance was legally extended to surface miners – a rule that the Trump administration has placed under review.

³⁸ The National Coal Association met in June 1969 to discuss the law. For examples of some of the leading officials' remarks, see Richard Fry, "Fighting for Survival: Coal Miners and the Struggle Over Health and Safety in the United States, 1968-1988" (Ph.D. diss., Wayne State University, 2010), p. 130-134, https://digitalcommons.wayne.edu/cgi/viewcontent.cgi?article=1087&context=oa_dissertations.

³⁹ *Ibid.*, p. 133.

⁴⁰ *Ibid.*

⁴¹ Richard Fry, "Making Amends: Coal Miners, The Black Lung Association, and Federal Compensation Reform, 1969-1972," *Federal History* 5 (2013).

⁴² Fry, "Fighting for Survival," pp. 319-321.

⁴³ *Ibid.*, p. 300.

⁴⁴ *Ibid.*, p. 301.

In response to these developments, President Jimmy Carter signed a new law that strengthened the 1969 Coal Act and transferred enforcement from the Interior Department to the newly established Mine Safety and Health Administration housed under the Department of Labor.⁴⁵ While the Clean Water Act, passed in 1972, limited some water pollution from mining, in 1977 Congress enacted the Surface Mining Control and Reclamation Act (SMCRA) to more comprehensively address pollution caused by surface mining.⁴⁶ The law established the Office of Surface Mining Reclamation and Enforcement, an agency under the Interior Department.⁴⁷

This legal framework remains in effect today, effectively dividing the regulation of mining between three federal agencies (see text box). In the decades since, these agencies have updated the rules implementing the relevant laws to reflect technological and scientific changes. The Obama administration promulgated several new rules that affect the coal industry. Some target practices that expose workers and others to immediate health risks, while others seek to reduce the industry's contribution to climate change. This report focuses on the Stream Protection Rule, which required coal companies to monitor streams impacted by their activities for contamination and restore them at the end of a project.⁴⁸ The rule primarily targeted mountaintop removal, a form of surface mining that heavily pollutes nearby streams and evidence indicates exposes nearby communities to serious health risks.⁴⁹ The Obama administration also enacted a rule lowering workers' permissible exposure to coal dust and expanding the monitoring of respiratory health to include surface miners.⁵⁰

Other Obama-era rules affect power companies rather than the mining industry. One such rule regulates the disposal coal combustion residuals – a heavily toxic byproduct of burning coal that is often dumped into unlined pits that leach heavy metals into

⁴⁵ Ibid., p. 324.

⁴⁶ Surface Mining Control and Reclamation Act (SMCRA). P.L. 95-87, Enacted August 3, 1977.

⁴⁷ Office of Surface Mining Reclamation and Enforcement, "Laws, Regulations, and Guidance," <https://www.osmre.gov/LRG.shtm> (accessed July 30, 2018).

⁴⁸ Stream Protection Rule by the Surface Mining Reclamation and Enforcement Office, *Federal Register* 93066, December 20, 2016.

⁴⁹ Congressional Research Service, *The Office of Surface Mining's Stream Protection Rule: An Overview*, January 11, 2017.

⁵⁰ Mining Safety and Health Administration, "Respirable Dust Rule: A Historic Step Forward in the Effort to End Black Lung Disease," <https://www.msha.gov/news-media/special-initiatives/2016/09/28/respirable-dust-rule-historic-step-forward-effort-end> (accessed July 30, 2018).

groundwater and present the risk of a catastrophic spill.⁵¹ Two other rules limit the amount of toxic metals power plants may discharge into waterways and clarify that tributaries and wetlands are under federal jurisdiction as “waters of the US.”⁵² Rules addressing climate change include the Clean Power Plan, which mandates a 32 percent reduction in carbon dioxide emissions and another rule limiting methane emissions.⁵³

The coal industry responded to these regulations by claiming that they constitute a “war on coal,” inaccurately blaming them for the decline in the domestic demand for coal.⁵⁴ Many industry representatives and government officials who agree with them have even claimed that President Obama’s real goal was to put the industry out of business.⁵⁵ The Trump administration is currently in the process of weakening or doing away with virtually all these Obama-era rules. But while their rollback might help coal and power company executives, it is at the price of risking the health of their employees, nearby communities, and the environment on which we all depend.

⁵¹ Environmental Protection Agency, “Disposal of Coal Combustion Residuals from Electrical Utilities,” <https://www.epa.gov/coalash/coal-ash-rule> (accessed July 30, 2018).

⁵² Environmental Protection Agency, “Steam Electric Power Generating Effluent Guidelines – 2015 Final Rule,” <https://www.epa.gov/eg/steam-electric-power-generating-effluent-guidelines-2015-final-rule> (accessed July 30, 2018) and Clean Water Rule: Definition of ‘Waters of the United States’ by the Engineers Corps and EPA, *Federal Register* 37054, June 29, 2015.

⁵³ Clean Power Plan by the EPA, *Federal Register* 64661, October 23, 2015 and Methane and Waste Prevention Rule by the Bureau of Land Management, *Federal Register* 27637, November 18, 2016.

⁵⁴ See e.g. Luke Popovich, Vice President for External Communications at the National Mining Association, “Trump’s Day-One Chance to Turn Back ‘War on Coal,’” *LifeZette*, December 27, 2016, <https://www.lifezette.com/2016/12/trumps-day-one-chance-to-turn-back-war-on-coal/> (accessed July 30, 2018). Independent analysts generally blame the decrease in price of natural gas for the steep decline in coal production beginning in 2009. See e.g. Charles D. Kolstad, “What is Killing the US Coal Industry?” Stanford Institute for Economic Policy Research, March 2017, <https://siepr.stanford.edu/research/publications/what-killing-us-coal-industry> (accessed July 30, 2018).

⁵⁵ For example, during the debate to cancel the Stream Protection Rule, numerous congresspeople and senators claimed that the rule protecting streams from mining contamination “wasn’t intended to protect the environment. It was intended to put coal miners out of work.” Rep. Bost (IL), see also comments of Rep. Johnson (OH) and McKinley (WV) and Sen. Cornyn and Sullivan.

HOW THE US GOVERNMENT ENACTS AND ENFORCES REGULATIONS

The process of enacting and enforcing regulations in the United States is a complex interplay between Congress, the president, federal agencies, and state governments. Under the US Constitution, Congress, made up of a 100-member Senate and 435-member House of Representatives, has sole authority to pass laws, and the president must faithfully execute them. In practice, presidents often influence legislation by working closely with members of Congress to pass – or oppose – bills, and they have the power to veto laws that Congress passes.

Moreover, presidents oversee and have some influence over the large network of federal agencies that make, and often enforce, the rules necessary for implementing laws. For example, in 1972, Congress passed the Clean Water Act, which granted the Environmental Protection Agency authority to regulate pollutants in the “waterways of the United States.” The EPA, under the direction of an administrator appointed by the president, is charged with defining these terms and setting pollution limits. However, agencies are expected to make such decisions independent of political considerations and must follow specific rule-making processes, which generally include consulting with other agencies and state governments, a public comment period and public hearings, a review of scientific literature, and an assessment of the rule’s impact.

Some federal laws, especially environmental ones, grant states the right to enforce them. States may exercise this right by passing a law at least as protective as the federal law and its implementing regulations. In that case, the relevant federal agency oversees state governments to ensure they are adequately enforcing the law.

The 1969 Federal Coal Mine Health and Safety Act sets requirements to protect the health and safety of miners. It is implemented and enforced by the Mine Safety and Health Administration in the Department of Labor.

The 1972 Clean Water Act empowered the Environmental Protection Agency to regulate pollutants in “waterways of the United States.” The US Army Corps of Engineers shares authority in enforcing the Clean Water Act and, since 1989, it has been responsible for

issuing permits for mountaintop removal valley fills. The Clean Air Act, which is implemented and enforced by the EPA, may also be relevant to surface mining due to the dust it generates, but it has rarely been enforced in this way.

The 1977 Surface Mining Control and Reclamation Act lays out specific requirements for preventing, mitigating, and addressing the environmental impacts of surface mining. The Office of Surface Mining and Reclamation Enforcement, housed within the Department of Interior, is responsible for implementing the law. In enacting rules, it often relies on the scientific findings of the US Geological Survey, an agency within the Interior Department, or the National Academy of Sciences, an independent institute established by a law passed in 1863. All Appalachian states where mountaintop removal is present, except for Tennessee, have opted to enforce the law on their own.

HOW THE US GOVERNMENT REGULATES COAL MINING



Mountaintop Removal

Beginning in the 1970s, mining companies began to experiment with new ways of excavating coal from the central Appalachian Mountains, an area that covers parts of West Virginia, Kentucky, Virginia, and Tennessee. Rather than hauling coal piece by piece through underground tunnels, they began to remove sections of the mountain to expose buried coal seams.⁵⁶ Within a decade, these surface mines became more ambitious, eventually removing hundreds of vertical feet of entire mountains to expose ever-larger areas of coal, a form of mining now known as mountaintop removal.⁵⁷ Official mining data does not generally disaggregate different types of surface mining, but according to Jack Spadaro, a mining engineer and mountaintop removal expert, the vast majority of surface mining in central Appalachia is mountaintop removal.⁵⁸

Between 1985 and 2015, 2,900 square kilometers (1,120 square miles) of land, an area around the size of Rhode Island, was newly surface mined in central Appalachia, according to a mapping project using satellite imagery that was done by SkyTruth, Appalachian Voices, and Duke University.⁵⁹ A separate Appalachian Voices study, based on satellite imagery and mining permit data, found that by 2009, mountaintop removal had severely impacted or leveled more than 500 mountains.⁶⁰ These figures update the scarce publicly available government data on the extent of mountaintop removal. In 2002, the EPA calculated that permits approved in the prior decade allowed coal companies to mine around 1,600 square kilometers of forested mountain – roughly three to four percent of the

⁵⁶ Mintz, “Strip Mining: A Policy Evaluation,” p. 465. Maryanne Vollers, “Razing Appalachia,” *Mother Jones*, July/August 1999, <https://www.motherjones.com/politics/1999/07/razing-appalachia/> (accessed July 30, 2018). The mining industry prefers the terms “mountaintop mining.”

⁵⁷ The affected area is mostly in eastern Kentucky and southern West Virginia, but there is also significant mountaintop removal on the western edge of Virginia and a small amount in northeast Tennessee.

⁵⁸ Mountaintop removal, also called mountaintop mining, is when all or most overburden is removed to recover the entire coal seam. In other types of surface mining, such as contour, highwall, auger, and area mining, only part of the coal seam is recovered, which requires some blasting and valley filling, but not nearly on the same scale as mountaintop removal. Based on phone interview with Jack Spadaro, mining engineer, June 15, 2018.

⁵⁹ Andrew A. Pericak et al., “Mapping the Yearly Extent of Surface Coal Mining in Central Appalachia Using Landsat and Google Earth Engine,” *PLOS One*, July 25, 2018.

⁶⁰ Appalachian Voices, “Extent of Mountaintop Mining in Appalachia,” 2009, http://www.ilovemountains.org/reclamation-fail/details.php#extent_study.

Appalachian coal region.⁶¹ A separate EPA-commissioned study found that few trees, or even shrubs, survive on the reclaimed mines, threatening 244 terrestrial species and eliminating a major source of carbon capture.⁶² Although the amount of mountaintop removal has significantly declined over the past decade, it continues to produce millions of tons of coal per year, particularly in southern West Virginia.⁶³

Regulatory Context

Removing a mountain to extract coal has dramatic environmental consequences not only for the densely forested mountains that are demolished, but also for the streams that run through their valleys. In order to reach coal seams, miners clear a mountain of its trees and topsoil and drill holes deep in its surface in which they then detonate thousands of tons of explosives, blasting off up to 400 feet of vertical rock.⁶⁴ They then use 100-ton haul trucks to dispose of the loosened soil and rock, called overburden, by dumping it into the nearby valley, filling an area as much as 1,000 feet wide and one mile long and burying streams below.⁶⁵ According to the EPA, there were nearly 7,000 valley fills by 2005 and that number was expected to grow to bury 2,400 miles of stream by 2012, for a total distance longer than the Mississippi River.⁶⁶ Duke University scientists estimated that valley fills have severely damaged an additional 2,500 miles of streams by contaminating them with heavy metals.⁶⁷

⁶¹ Environmental Protection Agency, “The Effects of Mountaintop Mines and Valley Fills on Aquatic Ecosystems of the Central Appalachian Coalfields,” 2011, page 10.

⁶² See Steven N. Handel, “Mountaintop Removal Mining Valley Fill Environmental Impact Statement: Technical Study Project Report for Terrestrial Studies,” March 2003; Environmental Protection Agency, “Mountaintop Mining/Valley Fills in Appalachia Draft Programmatic Environmental Impact Assessment,” June 2003, <https://nepis.epa.gov/Exe/ZyPDF.cgi/P100G25P.PDF?Dockey=P100G25P.PDF>, p 66; Brian D. Lutz et al., “The Environmental Price Tag on a Ton of Mountaintop Removal Coal,” *PLoS One*, volume 8:9, September 2013.

⁶³ US Energy Information Administration, “Coal Data Browser: Aggregate Coal Mine Production for Surface, Annual,” <https://www.eia.gov/coal/data/browser/#/topic/33?agg=2,0,1&rank=g&geo=000000010001&mntp=8&freq=A&start=2008&end=2016&ctype=linechart<ype=pin&rtype=s&matype=o&rse=0&pin=> (November 26, 2018).

⁶⁴ Statement of Joe Lovett, Appalachian Center for the Economy and Environment, delivered to the House Committee on Government and Regulatory Reform, Subcommittee on Regulatory Affairs, July 14, 2011, https://oversight.house.gov/wp-content/uploads/2012/01/7-14-11_Lovett_RegAffairs_EPA_Testimony.pdf.

⁶⁵ Congressional Research Service, “Mountaintop Mining Background on Current Controversies,” April 20, 2015, p. 1.

⁶⁶ EPA, “The Effects of Mountaintop Mines and Valley Fills on Aquatic Ecosystems of the Central Appalachian Coalfields,” page 10. Environmental Protection Agency, “Mountaintop Mining/Valley Fills in Appalachia: Final Programmatic Environmental Impact Assessment,” 2005, <https://nepis.epa.gov/Exe/ZyPDF.cgi/20005XA6.PDF?Dockey=20005XA6.PDF>.

⁶⁷ Lutz, “The Environmental Price Tag on a Ton of Mountaintop Removal Coal,” 2013, p. 4.

The environmental ravage caused by mountaintop removal was immediately obvious, even if it is only in the last decade that scientific research began measuring its impact on human health. Yet the ways in which the regulatory agencies charged with protecting the water and air from mining pollution have approached the problem has shifted constantly over the past 35 years, shaped by countervailing political pressures and legal rulings. The two principle laws regulating mountaintop removal's impact on streams are the 1977 Surface Mining Control and Reclamation Act and the 1970 Clean Water Act.⁶⁸ The decades-long struggle over the language, interpretation, and enforcement of these laws is addressed in detail in Chapter IV of this report.

Economic Context

As might be expected in a state whose residents call themselves mountaineers, mountaintop removal is not popular in West Virginia, or elsewhere in the Appalachian states where the practice occurs. A 2011 poll conducted by three major environmental groups found that, after a short description of the practice, just 20 percent of voters across the four states where it is prevalent favored allowing it to continue.⁶⁹ Those findings were similar to a CNN poll that found only 37 percent of the general public supported mountaintop removal.⁷⁰ Despite its unpopularity, the coal industry has successfully upended efforts to better implement existing rules or create new ones that would mitigate mountaintop removal's environmental impact by emphasizing the potential loss of well-paying jobs. According to the US Energy Information Administration, a federal body that collects energy-related information, there were 4,878 people in central Appalachia employed as surface miners in 2017, making it a modest, but not trivial, source of employment in one the poorest areas in the United States.⁷¹

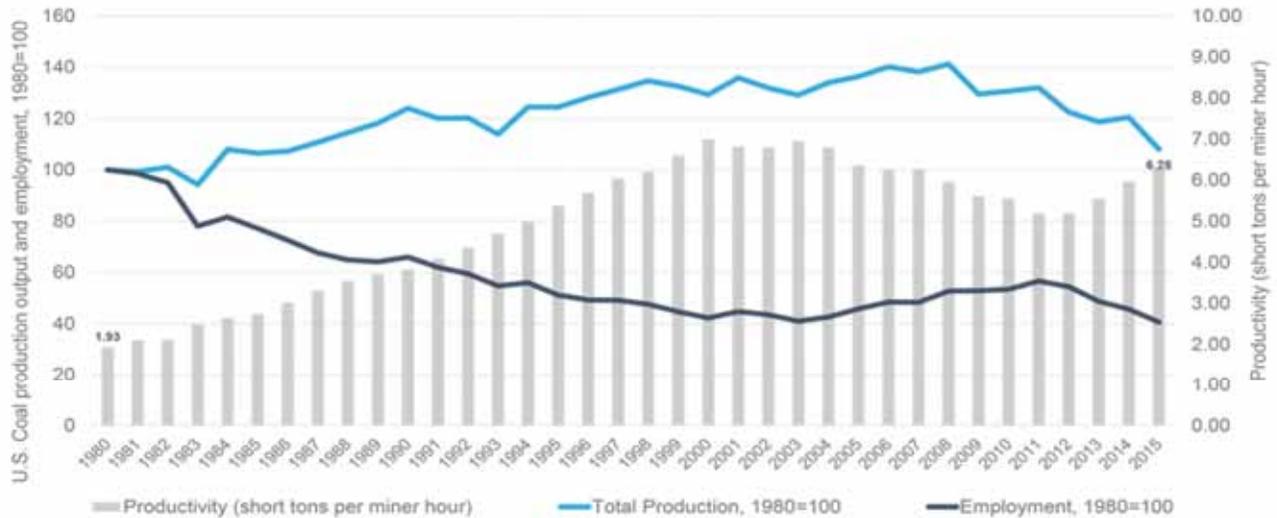
⁶⁸ The Clean Air Act is also relevant because of the dust and particulate matter the mining generates, but it has received relatively little attention in the context of mountaintop removal.

⁶⁹ Ben Geman, "Poll: Appalachian voters oppose mountaintop mining, back regulation," *The Hill*, August 16, 2011, <http://thehill.com/policy/energy-environment/177015-poll-appalachian-voters-oppose-mountaintop-mining-want-strong-protections>.

⁷⁰ Michelle Rozsa and Robert Howell, "Poll: Majority oppose controversial coal mining practice," *CNN*, August 11, 2011, <http://www.cnn.com/2011/US/08/10/west.virginia.coal/index.html>.

⁷¹ EIA, "Annual Coal Report 2017, Table 21: Coal Productivity by State and Mine Type, 2017 and 2016," <https://www.eia.gov/coal/annual/pdf/table21.pdf>.

Automation has significantly contributed to declining employment in coal mining
 U.S. coal production, employment, and productivity trends, 1980-2015



Source: Brookings' analysis of EIA annual coal report data



The coal industry’s public concern for preserving jobs, however, stands in sharp contrast to its decades-long history of shedding jobs as it increased surface mining production, including mountaintop removal, because of automation and other developments. A sharp decline in coal production in recent years has brought levels to roughly where they were in 1980, when the industry employed 242,000 people compared to today’s 52,000.⁷²

The industry was able to increase production while decreasing employment largely by increasing surface mining production, which is much more efficient and outpaced underground mining production in the early 1970s.⁷³ Between 1980 and 2015, coal mining productivity jumped from just under two tons per miner hour to over six tons; in 2015, productivity of surface mining was 11 tons per employee hour compared to 3.5 tons for

⁷² The totals include all mining operators and contractors, and exclude office workers. Mine Safety and Health Administration, “Average Number of Employees, CY 1978-CY2015” https://dol-msha-peir-mshagov-prod.s3.amazonaws.com/s3fs-public/Data_Reports/Charts/Average_Number_of_mine_employees._mine_employee_hours_worked._and_coal_production_1978-2015.pdf; and EIA, “Annual Coal Report, 2017.”

⁷³ Ibid., p. 464. See also US Energy Information Association, “Coal Production, Selected Year, 1949-2011,” https://www.eia.gov/totalenergy/data/annual/pdf/sec7_7.pdf (accessed July 30, 2018).

underground mining.⁷⁴ Mountaintop removal is much less efficient than surface mining in western United States, but it is still less labor intensive than underground mining.⁷⁵

Moreover, the claim that mountaintop removal economically benefits local communities is a dubious one. A study by Dr. Michael Hendryx of West Virginia University conducted analyzing poverty in central Appalachia reveals that the more coal is mined from an Appalachian county, the poorer it tends to be – and counties where mountaintop mining is prevalent are among the poorest.⁷⁶ Remarkably, the data analyzed is from 2000 to 2007, the height of the mountaintop removal boom. Whereas average adult poverty rates ranged from 12.9 to 15.3 percent for non-mining Appalachian counties during those years, they were between a staggering 22.1 and 26.8 percent for counties with mountaintop removal and 17.7 and 21.3 percent for counties with other types of mining. McDowell County in West Virginia serves as striking example of how poverty and mining often go hand in hand: mining companies have excavated more than 140 million tons from this county since 1990, yet it has consistently ranked the poorest county in the state.⁷⁷

⁷⁴ Devashree Saha and Sifan Liu, “Increased Automation Guarantees a Bleak Outlook for Trump’s Promises to Coal Miners,” post to “The Avenue” (blog), The Brookings Institution, January 25, 2017, <https://www.brookings.edu/blog/the-avenue/2017/01/25/automation-guarantees-a-bleak-outlook-for-trumps-promises-to-coal-miners/> and EIA, “Annual Coal Report 2017: Coal Production and Number of Mines by State and Mine Type, 2017 and 2016,” <https://www.eia.gov/coal/annual/pdf/table1.pdf>. One ton is equivalent to two thousand US pounds.

⁷⁵ Ibid.

⁷⁶ Michael Hendryx, “Poverty and Mortality Disparities in Central Appalachia: Mountaintop Mining and Environmental Justice,” *Journal of Health Disparities Research and Practice*, 2011, <https://digitalscholarship.unlv.edu/cgi/viewcontent.cgi?article=1005&context=jhdrp>

⁷⁷ County production based on West Virginia Office of Miners’ Health Safety and Training, “West Virginia Mining Statistics 1996-2012,” October 26, 2018, www.wvminesafety.org/stats.htm; Poverty ranking based on United States Department of Agriculture Economic Research Service, “Percent of Total Population in Poverty, 2015,” January 25, 2018, https://data.ers.usda.gov/reports.aspx?ID=17826#Pfc3d8701e0e14ec9b68058731d9ae82a_4_382iT4. In 2016, 36.3 percent of McDowell county residents lived in poverty, compared to 10.1 percent of the state’s wealthiest county.

II. The Health Threat of Mountaintop Removal

A mountaintop removal mine stretches for around four miles along the ridge of Coal Mountain in Wyoming County, West Virginia. The nearly 1,400-acre mine, which according to nearby residents began operating in around 2004, produces enough overburden to cover a 172-acre valley fill that ends a few hundred feet from the home of “Nicole Cook” and “James Cook.”⁷⁸ James, a miner who traces his roots to the settler who founded Wyoming County, was born in the same valley, known as a hollow, where he now lives with Nicole and their two children. The family gets its water from a well near the house, which James said had always been crystal clear, until around 2007, when it began to become discolored. They have since tested their well water and found contaminants consistent with coal pollution.⁷⁹

Nicole and James’ four-year-old daughter was born with Down syndrome and has a heart defect that required her to have open-heart surgery when she was six months old, Nicole said. They don’t drink or cook with their tap water – Nicole said she tried cooking with the water when she moved in after marrying James in 2009 but stopped when her cooked black beans turned purple – but they still use it to shower and brush their teeth. “I’m worried about my babies. If it’s safe to bathe them,” she said, adding that she only gives them quick showers and purchased water to bath her daughter in the weeks after her surgery.⁸⁰ Nicole also complained of black dust coming from the mine, especially from 2012 to 2013 when the mining company was filling the valley with overburden. “The toys on the porch were black. I couldn’t get the stuff off,” she said.⁸¹

⁷⁸ The size of the mine and valley fill are based on state records; Human Rights Watch measured the length of the mine using Google Earth. The permit for the mine was issued on May 7, 1997, but in interviews with Human Rights Watch, residents estimated that it began operating around 2004, which is consistent with when state records began recording numerous boundary revisions. West Virginia Department of Environmental Protection, “Permit Details,” no date, https://apps.dep.wv.gov/WebApp/_dep/search/Permits/OMR/Permit_details.cfm?permit_id=S402096&dep_office_id=OMR&responsible_party_name=CM%20ENERGY%20OPERATIONS%2C%20LP.

⁷⁹ Human Rights Watch interview with Nicole and James Cook (not real names), August 30, 2018, Wyoming County, West Virginia; Ben Stout and Jomana Papillo, “Well water quality in the vicinity of a coal slurry impoundment near Williamson, West Virginia,” Wheeling Jesuit University, December 10, 2004.

⁸⁰ Human Rights Watch interview with Nicole and James Cook (not real names), August 30, 2018, Wyoming County, West Virginia.

⁸¹ Ibid.

Nicole told Human Rights Watch that she often worries about the health risks of living so close to mountaintop mining. “We love where we live. We love to can our food and having chickens and pigs,” Nicole said. “We could survive without the outside world except for the water problem.”⁸² Her husband said he saw no contradiction between his work as a miner and his expectation that the mining company take responsibility for their pollution. The contaminated water is too serious a threat to dismiss as a cost of doing business: “One day hopefully this land will go to my daughter and son,” he said.⁸³

The Appalachian Mountains are among the oldest and most biodiverse in the world and the environmental and cultural cost of destroying them is enormous.⁸⁴ But nearby communities and workers may also be paying with their health: blasted rock fills the air with toxic dust and the valley fills contaminate streams with toxic metals. Over a dozen studies published in peer-reviewed journals show significantly higher levels of mortality, cardiovascular disease, birth defects, and cancer in counties with mountaintop removal, compared to those with only underground mining or no mining at all, even when controlling for factors such as poverty and smoking.

Studies conducted by university scientists of air and water pollution from mountaintop removal strongly indicate that exposure to toxins could explain these disparities. Two such studies testing air samples showed high concentrations of particulates too small for the lungs to filter consisting of silica and coal dust as far as one mile from an active mountaintop removal site.⁸⁵ In multiple experiments, a team of West Virginia University researchers injected particulate matter from one of these sites into mice and human lung cells and concluded that the matter promoted tumor formation and cardiovascular

⁸² Ibid.

⁸³ Ibid.

⁸⁴ United States Geological Survey, “Geologic Provinces of the United States: Appalachian Highlands,” April 21, 2017, <https://geomaps.wr.usgs.gov/parks/province/appalach.html>; Greater Appalachian Conservation Partnership, “Biodiversity ‘Hotspot,’” no date, <https://applcc.org/cooperative/our-plan/section-1/biodiversity-hotspot>. See also US Energy Information Administration, “Coal Data Browser: Aggregate Coal Mine Production for Surface, Annual,” <https://www.eia.gov/coal/data/browser/#/topic/33?agg=2,0,1&rank=g&geo=000000010001&mntp=8&freq=A&start=2008&end=2016&ctype=linechart<ype=pin&rtype=s&maptype=o&rse=o&pin=>.

⁸⁵ Viney P. Aneja et al., “Characterization of Particulate Matter (PM₁₀) Related to Surface Coal Mining Operations in Appalachia,” *Atmospheric Environment* 54 (2012) and Laura M. Kurth et al. “Atmospheric Particulate matter size distribution and concentration in West Virginia coal mining and non-mining areas,” *Journal of Exposure Science and Environmental Epidemiology*, 2014.

disease.⁸⁶ In another indication of the toxicity of mountaintop removal dust, Appalachian surface miners are disproportionately diagnosed with black lung disease, including those who have never worked in underground mines.⁸⁷ Streams near mountaintop removal sites are contaminated with a range of heavy metals, including selenium, that have devastated their fish and insect populations.⁸⁸ Residents may be exposed to this contamination, particularly if they rely on well water, which is not regulated by the state or federal governments, leaving residents fully responsible for monitoring and treating for pollutants.

Human rights law requires governments to protect the right to health and access to safe drinking water, which includes a duty to prevent or regulate activities that pose risks to these rights. This holds true even if serious risks have not been proven to the point of complete certainty. Because of the diffuse nature of many environmental harms and the long period of time it may take for health impacts to manifest, governments should take precautionary measures based on the best available science.

In January 2018, John Knox, the UN Special Rapporteur on the issue of human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment, called on states to enact environmental standards, including “precautionary measures to protect against” harm. Importantly, he noted that, while “the standard should take into account the best available science . . . the lack of full scientific certainty should not be used to justify postponing effective and proportionate measures to prevent environmental harm, especially when there are threats of serious or irreversible damage.”⁸⁹

⁸⁶ Sudjit Luanpitpong, “Appalachian Mountaintop Mining Particulate Matter Induces Neoplastic Transformation of Human Bronchial Epithelial Cells and Promotes Tumor Formation,” *Environmental Science & Technology*, 2014, p. 12913 and Cody E. Nichols et al., “Cardiac and mitochondrial dysfunction following acute pulmonary exposure to mountaintop removal particulate matter,” *American Journal of Physiology—Heart Circulation and Physiology*, December 15, 2015.

⁸⁷ See subsection on mountaintop removal miners below.

⁸⁸ See subsection on water contamination below.

⁸⁹ United Nations Human Rights Council, “Report of the Special Rapporteur on the issue of human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment,” A/HRC/37/59, March 23, 2018, http://srenvironment.org/wp-content/uploads/2018/02/A_HRC_37_59_AdvanceEditedVersion.pdf, comment to principle 11. The original text directs readers to the Rio Declaration on Environment and Development, principle 15. See Section VII for a more thorough discussion of this framework.

The European Union requires regulatory measures for any activity that “raises threats of harm to human health or the environment . . . even if some cause and effect relationships are not fully established scientifically.”⁹⁰ For a period, the US took a precautionary approach to regulation. For example, the US adopted a law in 1958 that prohibited the addition of carcinogenic chemicals to food.⁹¹ Since 1990, however, that trend has reversed, and the US government has required increasingly high levels of scientific certainty of causation before enacting regulations.⁹² In April 2018, the Trump administration proposed a rule that would raise the bar even higher by only permitting the EPA to consider scientific evidence where the underlying data is publicly available.⁹³

As the black lung epidemic illustrates, people may fall ill or die in the time it takes to scientifically prove a causal link between exposure and disease, particularly in cases where it takes years for latent diseases to manifest themselves. This approach also risks turning scientific research into a battleground in the war over regulations since one of the ways that business interests can most effectively stymie regulations is by challenging, blocking, or controlling research to undermine achieving a scientific consensus.

“A Lot Sicker, a Lot More Often”

“People around here get a lot sicker, a lot more often,” Junior Walt, 27, an activist against mountaintop removal from Eunice in Raleigh County told Human Rights Watch.⁹⁴ Others with whom Human Rights Watch spoke in affected communities expressed a similar sentiment, as well as two doctors and three nurses who work in areas with high levels of mountaintop removal.⁹⁵ Most said they suspect mining-related environmental factors played a role, although they cautioned that this was based only on anecdotal

⁹⁰ Definition from the 1998 Wingspread Statement on the Precautionary Principle

⁹¹ David Vogel, *The Politics of Precaution: Regulating Health, Safety, and Environmental Risks in Europe and the United States*, 2015, p. 6.

⁹² Ibid.

⁹³ “EPA Administrator Pruitt Proposes Rule to Strengthen Science Used in EPA Regulations,” Environmental Protection Agency press release, Washington, April 24, 2018, <https://www.epa.gov/newsreleases/epa-administrator-pruitt-proposes-rule-strengthen-science-used-epa-regulations>.

⁹⁴ Human Rights Watch interview with Junior Walt, March 14, 2018, Naoma, Raleigh County, West Virginia.

⁹⁵ Human Rights Watch interviews with Dr. Dan Doyle, March 15, 2018, Fayetteville, Fayette County, West Virginia; Dr. Wesley Lafferty, April 26, 2018, Boone County, West Virginia; a nurse who works at a Raleigh county clinic, April 27, 2018, Charleston, West Virginia; a nurse who works at an infusion center in Charleston, March 14, 2018, Raleigh County, West Virginia; a nurse who works in Boone and Raleigh counties, March 15, 2018, Fayette County, West Virginia.

observations. Dr. Wesley Lafferty, a family physician who works at Boone Memorial Health Clinic said, “Anecdotally, my goodness! We get all kinds of symptoms: rashes, restrictive airway disease [including asthma and chronic obstructive pulmonary disease], dermatitis, generic skin disease. I definitely feel there is an environmental component to that.”⁹⁶ Dr. Lafferty also remarked that he has diagnosed “multiple” nonsmokers with lung cancer in the ten years he has been a doctor.⁹⁷

A nurse who works at a Raleigh county clinic similarly noted that she sees a high number of patients with respiratory problems as well as with “unexplained rashes,” especially in the warmer months “when people spend more time outside and kids play in the stream.”⁹⁸ She gave her own experience: “I’ve never smoked but in the past few years I get worse and worse cases of bronchitis.” It’s impossible to determine the cause on an individual level, but “think about it this way,” she said, “a small rural health clinic has its own pulmonologist,” a doctor specializing in respiratory health.⁹⁹

Another nurse who works in an infusion center in Charleston, the state capital located in an area with mountaintop removal, said that she frequently sees asthma patients whose symptoms are so severe that she administers a monoclonal antibody drug that targets asthma, a “pretty extreme treatment” considered to be a last resort due to the drug’s known side effect of increasing the risk of compromised immune system.¹⁰⁰ The nurse, who had previously worked at a hospital in another state, was also shocked at the number of people with cancer she treated relative to the population size. “Cancer is busting at the seams,” she said; the treatment center where she works was recently built to accommodate the lack of space in the nearby hospital, but even they are backed up, she said.¹⁰¹

⁹⁶ Human Rights Watch interview with Dr. Wesley Lafferty, April 26, 2018, Boone County, West Virginia.

⁹⁷ Ibid. Lung cancer mortality among nonsmokers is considered “rare,” according to a National Institute of Health study concluding that around 10-15 percent of lung cancer deaths in the United States are caused by factors other than active smoking. The study estimates that 16,000-24,000 Americans who have never smoked died of lung cancer in 2008, primarily due to exposure to radon, second-hand smoke, air pollution, and other risk factors. Jonathan M. Samet et al, “Lung Cancer in Never Smokers: Clinical Epidemiology and Environmental Risk Factors,” *American Association for Cancer Research*, September 10, 2011, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3170525/>

⁹⁸ Human Rights Watch interview with a nurse who works at a Raleigh county clinic, April 27, 2018, Charleston, West Virginia.

⁹⁹ Ibid.

¹⁰⁰ Human Rights Watch interview a nurse who works at an infusion center in Charleston, March 14, 2018, Raleigh County, West Virginia.

¹⁰¹ Ibid.

Over a dozen peer-reviewed studies, mostly conducted by West Virginia University researchers, confirm these anecdotal observations about the prevalence of certain diseases: counties with mountaintop removal have higher rates of lung and other types of cancer, cardiopulmonary disease, respiratory disease, birth defects, and premature mortality than those with only underground mining or no mining at all, even when controlling for age, gender, poverty, smoking, and other factors.¹⁰² Appalachians, in general, have poorer health than other Americans, and people living in coal-producing counties tend to be sicker than in the rest of Appalachia, but even when compared against this bleak context those in counties with mountaintop removal fare worse.¹⁰³

In August 2017, the Appalachian Regional Council, a partnership between federal and state governments, published a study revealing stark disparities in health between Appalachia – especially in counties with mountaintop removal – and the rest of the United States, and in comparison to data compressed from 1989-95.¹⁰⁴ Premature mortality, for example, *increased* in 39 of 45 Appalachian counties with mountaintop removal since 1989-95, whereas it decreased eight percent in Appalachia overall and 25 percent in the rest of the United States.¹⁰⁵ In West Virginia, nine of the 10 counties with the state’s highest cancer mortality rates have surface mining; only five ranked in the top 10 in 1989-95.¹⁰⁶ Among Kentucky’s 120 counties, all five counties ranked highest for cancer mortality have surface mining, whereas only one did in 1989-95.

¹⁰² For a curated list of these studies, see Ohio Valley Environmental Coalition, “Health Studies on the Effects of MTR Coal Mining,” <https://ohvec.org/mountaintop-removal-articles/health/>. For a review of all related studies, see Abee L. Boyles et al., “Systematic Review of Community Health Impacts of Mountaintop Removal Mining,” *Environment International* 107 (2017), p. 167.

¹⁰³ See Appalachian Regional Commission, *Data File: Appalachian Health Disparities*, August 2017, https://www.arc.gov/research/researchreportdetails.asp?REPORT_ID=138.

¹⁰⁴ Appalachian Regional Commission, “Health Disparities in Appalachia,” August 2017, https://www.arc.gov/research/researchreportdetails.asp?REPORT_ID=138.

¹⁰⁵ Measured by years of potential life lost and based on a comparison of compressed data from 1989-95 and 2008-14 from Appalachian Regional Council, *Data File: Appalachian Health Disparities*, August 2017. In contrast, premature mortality rose in only 4 of the 11 counties in West Virginia with underground mining but no or minimal surface mining – and the increases were significantly less sharp than in many of the counties with mountaintop removal. Counties with mountaintop removal taken from a map produced for Appalachian Voices, https://www.arc.gov/research/researchreportdetails.asp?REPORT_ID=138.

¹⁰⁶ West Virginia has 55 counties, 13 of which have above-minimal levels of surface mining and 11 of which have above-minimal levels of only underground mining.

Researchers at West Virginia University and elsewhere have analyzed whether health disparities between mountaintop removal and other counties can be accounted for by factors such as poverty, smoking, obesity, race, metropolitan setting, and education. Their studies show “the same thing again and again and again,” said Dr. Michael Hendryx, who directed West Virginia University’s Rural Health Research Center until 2013 and pioneered the research.¹⁰⁷ Health outcomes in mountaintop removal counties are much worse “and they’re not explained through any combination of these other risks,” he said.¹⁰⁸ Hendryx began investigating the health impacts of mountaintop removal in 2010 after spending three years researching the health impacts of coal activities. His studies on coal-producing areas found higher rates of hospitalizations; lung and other types of cancer; general mortality; and mortality from heart, respiratory and kidney disease.¹⁰⁹ But he narrowed his research when it became clear that these “disparities are concentrated in the portion of Appalachia where [mountaintop mining] occurs.”¹¹⁰

In a 2016 study, Hendryx calculated that “an excess of approximately 1,200 adjusted deaths per year” occurred in counties where mountaintop removal takes place since the practice took off in 1990.¹¹¹ While the overall mortality is striking, he noted to Human Rights Watch that one of the difficulties researchers face is that there is not just one distinct health problem associated with mountaintop removal.¹¹² Instead, communities, and individual residents, can be exposed to different activities and pollutants that translate into a wide range of health risks. He and other researchers have sought to address this problem by gauging disparities in the prevalence of specific diseases while

¹⁰⁷ Hendryx left the program for a position at Indiana University’s School of Public Health.

¹⁰⁸ Human Rights Watch telephone interview with Dr. Michael Hendryx, June 14, 2018.

¹⁰⁹ Michael Hendryx et al., “Hospitalization Patterns Associated with Appalachian Coal Mining,” *Journal of Toxicology and Environmental Health*, 2007; Michael Hendryx et al., “Lung Cancer Mortality Is Elevated in Coal-Mining Areas of Appalachia,” *Lung Cancer*, 2008; Michael Hendryx “Mortality rates in Appalachian coal mining counties: 24 years behind the nation,” *Environmental Justice*, 2008; Michael Hendryx, “Mortality from Heart, Respiratory, and Kidney Disease in Coal Mining Areas of Appalachia,” *International Archives of Occupational and Environmental Health*, 2009; Michael Hendryx and Keith Zullig, “Higher Coronary Heart Disease and Heart Attack Morbidity in Appalachian Coal Mining Regions,” *Preventive Medicine*, 2009; Michael Hendryx and Melissa Ahern, “Mortality in Appalachian Coal Mining Regions: The Value of Statistical Life Lost,” *Public Health Reports*, July/August 2009

¹¹⁰ Michael Hendryx, “Poverty and Mortality Disparities in Central Appalachia: Mountaintop Mining and Environmental Justice,” *Journal of Health Disparities Research and Practice*, vol. 4, Spring 2011, p 51.

¹¹¹ Michael Hendryx and Benjamin Holland, “Unintended consequences of the Clean Air Act: Mortality rates in Appalachian coal mining communities,” *Environmental Science and Policy*, vol. 63, September 2016, p. 1-6.

¹¹² Human Rights Watch telephone interview with Dr. Michael Hendryx, June 14, 2018.

controlling for covariates, as detailed below. They have found that cardiovascular and respiratory diseases, including lung cancer, are particularly high among people living in Appalachian counties with mountaintop removal.¹¹³

Chronic cardiovascular disease mortality “increased as a function of greater levels of surface mining,” one of their studies found.¹¹⁴ According to another, in West Virginia, the more surface mining there was in a county, the more frequently residents were hospitalized for respiratory problems – a correlation that disappeared when measured against total or underground coal production.¹¹⁵ In Kentucky, researchers found two lung cancer clusters – the highest concentrations in the state – that overlap almost entirely with counties where mountaintop removal is prevalent; interestingly, they did not find elevated rates of lung cancer in areas of western Kentucky that are heavily strip mined but not through mountaintop removal.¹¹⁶

Researchers also found other types of health disparities between residents of mountaintop removal counties and the rest of Appalachia. In a 2011 study of babies born in central Appalachia between 1996-2003, Dr. Melissa Ahern, Hendryx and other researchers found those whose mothers lived in mountaintop removal counties were 1.26 times more likely to have birth defects, even after adjusting for factors such as the mother’s age, education level, and smoking status.¹¹⁷ Babies from these counties were nearly twice as likely to have circulatory or respiratory defects than those from non-mining Appalachian counties.¹¹⁸ Moreover, the prevalence for all birth defects in these counties was significantly higher in

¹¹³ See e.g. Laura Esch and Michael Hendryx, “Chronic Cardiovascular Disease Mortality in Mountaintop Mining Areas of Central Appalachian States,” *Journal of Rural Health*, October 11, 2011; Michael Hendryx and Juhua Luo, “An examination of the effects of mountaintop removal coal mining on respiratory symptoms and COPD using propensity scores,” *International Journal of Environmental Health Research*, 2014; LuAnn L. Brink et al., “The Association of Respiratory Hospitalization Rates in WV Counties, Total, Underground, and Surface coal Production and Socioeconomic Covariates,” *Journal of Occupation and Environmental Medicine*, vol. 56:11, November 2014; Michael Hendryx et al., “Self-Reported cancer rates in two areas of West Virginia with and without mountaintop coal mining,” *Journal of Community Health*, vol. 37:2, April 2012, pp. 320-27.

¹¹⁴ Laura Esch and Michael Hendryx, “Chronic Cardiovascular Disease Mortality in Mountaintop Mining Areas of Central Appalachian States,” *Journal of Rural Health*, October 11, 2011.

¹¹⁵ LuAnn L. Brink et al., “The Association of Respiratory Hospitalization Rates in WV Counties, Total, Underground, and Surface coal Production and Socioeconomic Covariates,” *Journal of Occupation and Environmental Medicine*, vol. 56:11, November 2014.

¹¹⁶ W. Jay Christian et al., “Exploring Geographic Variation in Lung Cancer Incidence in Kentucky Using a Spatial Scan Statistic: Elevated Risk in the Appalachian Coal-Mining Region,” *Public Health Reports*, vol. 125, November/December 2011.

¹¹⁷ Melissa M. Ahern et al., “The association between mountaintop mining and birth defects among live births in central Appalachia, 1996-2003,” *Environmental Research*, vol. 111, 2011, p. 842.

¹¹⁸ *Ibid.*

the second half of that time frame, suggesting a potential cumulative effect.¹¹⁹ “That’s a stronger effect than mothers who said they were smokers,” Hendryx, who co-authored the study, told Human Rights Watch.¹²⁰ An industry-funded study, further discussed in the next section of this report, disputed the results of the study, claiming one hospital was overinclusive in how it recorded birth defects, skewing the results.¹²¹

The disparities identified in these health studies rely on county-level data, which is an imperfect measure of mountaintop removal’s highly localized impacts. Dr. Keith Zullig, a professor at West Virginia University’s School of Public Health who co-authored several studies related to mountaintop removal, cautioned that this may dilute mountaintop removal’s actual health impacts. “I would guess that if you got down even finer to the community level, the results would be even stronger for those adjacent to surface mines.”¹²²

A 2010 geographical information system-based analysis of cancer mortality rates Hendryx conducted found that distance-weighted exposure to coal mining activities in West Virginia was more highly correlated with several types of cancer than county-level analyses.¹²³ Hendryx also conducted several studies based on door-to-door interviews that sought to more precisely measure mountaintop removal’s localized impact. A study based on interviews with 773 adults living in two rural areas of West Virginia found that those near mountaintop removal were significantly more likely to report having cancer.¹²⁴ Another based on interviews with 682 adults living in two rural areas of Virginia similarly found that those in the area near mountaintop removal had higher rates of respiratory symptoms and chronic obstructive pulmonary disease.¹²⁵ A third, based on interviews with 952 adults in

¹¹⁹ Ibid.

¹²⁰ Human Rights Watch telephone interview with Dr. Michael Hendryx, June 14, 2018.

¹²¹ See subsection “Funding Research” in Chapter IV below. Steven H. Lamm et al., “Are Residents of Mountaintop-Mining Counties More Likely to Have Infants with Birth Defects? The West Virginia Experience,” *Clinical and Molecular Teratology*, vol. 103:2, February 2015, pp. 76-84.

¹²² Human Rights Watch interview with Dr. Keith Zullig, March 14, 2018, West Virginia University, Morgantown, West Virginia.

¹²³ Michael Hendryx et al., “A geographical information system-based analysis of cancer mortality and population exposure to coal mining activities in West Virginia, United States of America,” *Geospatial Health*, vol. 4:2, 2010, pp. 243-56.

¹²⁴ Michael Hendryx et al., “Self-Reported cancer rates in two areas of West Virginia with and without mountaintop coal mining,” *Journal of Community Health*, vol. 37:2, April 2012, pp. 320-27.

¹²⁵ Michael Hendryx and Juhua Luo, “An examination of the effects of mountaintop removal coal mining on respiratory symptoms and COPD using propensity scores,” *International Journal of Environmental Health Research*, 2014.

Eastern Kentucky, found self-reported rates of asthma and hypertension and other health problems was worse in the area near mountaintop removal.¹²⁶ And yet another found significantly higher levels of blood inflammation, a potential marker of cardiovascular disease, in 33 non-smoking, non-miner adults living near mountaintop removal sites than in 15 adults who did not live near mining.¹²⁷

While the scientific studies discussed above found that there is a higher rate of health problems in areas near mountaintop removal, they did not consider how mountaintop removal may cause these problems. Other scientific studies, described below, document mountaintop removal's polluting impact on air and water and may reveal evidence of a causal link. But even if, as Hendryx told Human Rights Watch, "we don't know exactly the causal pathways or the specific chemical" that is causing harm, "we know enough to know it's a harmful practice and people living nearby are severely impacted."¹²⁸

Air Pollution

"Awful Dusty": Residential impacts

Dr. Viney Aneja, a scientist specializing in air quality at North Carolina State University, tested the air in the front yards of two homes in Roda, Virginia, a town near the Kentucky border – one located at the entrance of a mountaintop removal site and another approximately one mile away.¹²⁹ He measured both the size and the contents of the particulate matter he collected over a 12-day period. At both locations, he found unsafe concentrations of "inhalable particles," which, measuring 10 micrograms or smaller, are at least seven times smaller than the diameter of a typical human hair.¹³⁰ Because of the health risk, the EPA mandates that average concentrations cannot exceed 150 micrograms

¹²⁶ Michael Hendryx, "Personal and Family Health in Rural Areas of Kentucky with and without Mountaintop Coal Mining," *The Journal of Rural Health*, March 12, 2013.

¹²⁷ Michael Hendryx and Jennifer Entwhistle, "Association Between Residence Near Surface Coal Mining and Blood Inflammation," *The Extractive Industries and Society* 2, 2015, p. 247.

¹²⁸ Human Rights Watch telephone interview with Dr. Michael Hendryx, June 14, 2018.

¹²⁹ Viney P. Aneja et al., "Characterization of Particulate Matter (PM₁₀) Related to Surface Coal Mining Operations in Appalachia," *Atmospheric Environment* 54, 2012.

¹³⁰ Environmental Protection Agency, "Implementation of the National Ambient Air Quality Standards (NAAQS) for Fine Particulate Matter (PM_{2.5}): State Implementation Plan Requirements," updated March 27, 2018, <https://www.epa.gov/pm-pollution/implementation-national-ambient-air-quality-standards-naaqs-fine-particulate-matter>.

per meter cubed ($\mu\text{g}/\text{m}^3$) in a 24-hour period (or $50 \mu\text{g}/\text{m}^3$ annually).¹³¹ “Ten out of twelve samples taken from the [closer] site exceeded this limit, with one sample more than three times the national standard,” while six samples from the second site also exceeded it.¹³² These levels “are in the same range” as those “near an opencast coal mines in India,” the study noted, “and significantly higher than . . . near opencast coal mines in England and the Czech Republic.”¹³³ His tests also revealed “particulate matter containing coal dust at levels far above what is considered safe.”¹³⁴

In several studies, scientists sought to more precisely measure particulate matter size near mountaintop removal, since its danger grows as particulates decrease in size.¹³⁵ The EPA, for example, has more stringent regulations for fine particulate matter smaller than 2.5 micrograms.¹³⁶ In one study, over the course of nearly a year between 2011 and 2012, West Virginia University scientists took air samples from Edwight in Raleigh County and Twilight in Boone County, both residential areas near mountaintop removal in West Virginia, as well as third site in a nearby county without mining. The samples from Edwight and Twilight had a significantly higher mass of particulates, as well as higher concentrations between 0.01 and 0.4 micrograms, which are small enough to deposit or adhere to the lung’s surface.¹³⁷

A different group of West Virginia University scientists tested the composition of particulate matter found in two sites within one mile of Edwight, as well as a third non-mining site. They found that the particulate matter from the sites near Edwight was largely made up of silica, which was present at much lower levels in the matter from the non-

¹³¹ Environmental Protection Agency, “What Are the Air Quality Standards for PM?” updated April 10, 2017, <https://www3.epa.gov/region1/airquality/pm-aq-standards.html>.

¹³² Viney P. Aneja et al., “Characterization of Particulate Matter (PM₁₀) Related to Surface Coal Mining Operations in Appalachia,” *Atmospheric Environment* 54, 2012, p. 498.

¹³³ *Ibid.*, p. 500.

¹³⁴ *Ibid.*, p. 499.

¹³⁵ Laura M. Kurth et al. “Atmospheric Particulate matter size distribution and concentration in West Virginia coal mining and non-mining areas,” *Journal of Exposure Science and Environmental Epidemiology*, 2014, pp. 405-411.

¹³⁶ EPA, “Implementation of NAAQS,” <https://www.epa.gov/pm-pollution/implementation-national-ambient-air-quality-standards-naaqs-fine-particulate-matter>

¹³⁷ EPA, “What Are the Air Quality Standards for PM?” <https://www3.epa.gov/region1/airquality/pm-aq-standards.html>. See also Laura M. Kurth et al. “Atmospheric Particulate matter size distribution and concentration in West Virginia coal mining and non-mining areas,” *Journal of Exposure Science and Environmental Epidemiology*, 2014, p. 405, 9. The study did not find significantly higher levels of total suspended particles (TSP) in MTR sites, but did find significantly higher levels of ultrafine particles, defined as measuring below 0.1 microns in diameter, than in the reference site, including a higher percentage, number, and mass of particles able to be deposited in the respiratory tract.

mining site, and molybdenum, a metal that a Centers for Disease Control report links to “decreases in lung function” that was not at all present in the matter from the non-mining site.¹³⁸ Yet another study conducted by West Virginia University tested the air one mile of an active mountaintop removal site in Sundial, located near Edwight, and similarly found that particulate matter below 0.2 micrograms “dominate[d]” the air sample and contained high levels of silica and compounds consistent with coal dust.¹³⁹

Chronic exposure to silica, even in low doses, can cause lung cancer as well as silicosis, a potentially fatal disease characterized by chest pain and difficulty breathing.¹⁴⁰ But the mixture of silica and coal dust may be even more toxic than each individually.¹⁴¹ Moreover, Hendryx told Human Rights Watch that these studies may underestimate the toxicity of the particulate matter, since they did not test for organic compounds, which could include chemicals from explosives, the coal cleaning process, and diesel exhaust.¹⁴²

For Rick Bradford, a retired teacher who lives in Edwight, mountaintop removal dust was a fact of life for the 20 years he said the mines were active around his house. “When they were running coal dust through here it was awful dusty. Pretty constant for 20 years,” he told Human Rights Watch.¹⁴³ A single mountain is often mined for more than 10 years, generating a constant source of air pollution: dust from blasting, grinding and crushing rock, detonating millions of tons of explosives, and excavating and hauling coal, as well as off-road diesel exhaust from massive trucks.¹⁴⁴ “They took 200 feet off the mountain right there,” Bradford told Human Rights Watch, pointing to a blunted mountain visible from his front porch where he said he used to walk the dog with his father. My neighbor “has his daughter buried in a graveyard there,” he said, pointing to another mountain that had

¹³⁸ Sudjit Luanpitpong, “Appalachian Mountaintop Mining Particulate Matter Induces Neoplastic Transformation of Human Bronchial Epithelial Cells and Promotes Tumor Formation,” *Environmental Science & Technology*, 2014, p. 12913.

¹³⁹ Travis L. Knuckles et al., “Air Pollution Particulate Matter Collected from an Appalachian Mountaintop Mining Site Induces Microvascular Dysfunction,” *Microcirculation* 20: 165-166, 2013.

¹⁴⁰ EPA, “What Are the Air Quality Standards for PM?” <https://www3.epa.gov/region1/airquality/pm-aq-standards.html>.

¹⁴¹ Human Rights Watch interview with Dr. Cara Halldin, April 25, 2018, NIOSH, Morgantown, West Virginia. See also Jennifer L. Perret et al., “Coal Mine Dust Lung Disease in the Modern Era,” *Respirology*, 2017, p. 662-670.

¹⁴² Human Rights Watch interview with Dr. Michael Hendryx, June 14, 2018.

¹⁴³ Human Rights Watch interview with Rick Bradford, March 14, 2018, Edwight, Raleigh County, West Virginia.

¹⁴⁴ Brian D. Lutz, Emily Bernhardt, and William H. Schlesinger, “The Environmental Price Tag on a Ton of Mountaintop Removal Coal,” *PLoS One*, September 11, 2013, <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0073203>.

been mined behind his house. “Now when I go with him there, it’s like a big desert, like a bomb hit.”¹⁴⁵

Bradford said they would crush rock right in front of his house, which he worried exacerbated lung problems from before the mining began. “I feel much better since it’s stopped,” he said. Huge plumes of dust are visible when miners blast mountains – it once was so bad, Bradford says he reported it to his state Department of Environmental Protection – but recent scientific research indicates that the particulates filling the air at Edwight that are too small for the eye to see could be responsible for some of the health disparities in his area.

After identifying the size and composition of particulate matter near mountaintop removal sites, West Virginia University scientists conducted multiple experiments on rats and human cells that found the dust can be carcinogenic and cause cardiovascular disease.¹⁴⁶ These ailments have been found to be more prevalent in counties where mountaintop removal occurs.¹⁴⁷ In one study, researchers exposed human lung cells and mice to the particulate matter from Edwight.¹⁴⁸ The exposure was equivalent to breathing the air at Edwight for 8.5 years. The study found that after three months of exposure, the lung cells showed significantly higher rates of cell growth and motility, which are carcinogenic properties of malignant cells, than those exposed to a control sample.¹⁴⁹ The mice showed similar results: after two weeks of exposure, they had higher tumor luminescence intensity

¹⁴⁵ Human Rights Watch interview with Rick Bradford, March 14, 2018, Edwight, Raleigh County, West Virginia.

¹⁴⁶ Sudjit Luanpitpong, “Appalachian Mountaintop Mining Particulate Matter Induces Neoplastic Transformation of Human Bronchial Epithelial Cells and Promotes Tumor Formation,” *Environmental Science & Technology*, 2014, p. 12914 and Travis L. Knuckles et al., “Air Pollution Particulate Matter Collected from an Appalachian Mountaintop Mining Site Induces Microvascular Dysfunction,” *Microcirculation* **20**: 167, 2013.

¹⁴⁷ See e.g. Laura Esch and Michael Hendryx, “Chronic Cardiovascular Disease Mortality in Mountaintop Mining Areas of Central Appalachian States,” *Journal of Rural Health*, October 11, 2011 and Michael Hendryx et al., “Self-Reported cancer rates in two areas of West Virginia with and without mountaintop coal mining,” *Journal of Community Health*, vol. 37:2, April 2012, pp. 320-27.

¹⁴⁸ Sudjit Luanpitpong, “Appalachian Mountaintop Mining Particulate Matter Induces Neoplastic Transformation of Human Bronchial Epithelial Cells and Promotes Tumor Formation,” *Environmental Science & Technology*, 2014, p. 12914.

¹⁴⁹ Researchers also exposed one group of lung cells solely to silica, another to molybdenum, and left another untreated. The cells exposed to molybdenum had similar rates of cell proliferation and motility as those exposed to the Edwight dust sample; the cells exposed to the control sample, or only to silica, had higher rates than untreated cells, but not nearly at the same rate as the others. Sudjit Luanpitpong, “Appalachian Mountaintop Mining Particulate Matter Induces Neoplastic Transformation of Human Bronchial Epithelial Cells and Promotes Tumor Formation,” *Environmental Science & Technology*, 2014, p. 12914.

than those injected with the control sample, “suggesting the tumor-promoting effect” of particulate matter near mountaintop removal sites.¹⁵⁰

Two additional studies tested the impact of the dust on cardiovascular health. In one, scientists injected rats with a dose equivalent to 1.7 years of accumulated exposure. Afterwards, the rats showed signs of “systemic microvascular dysfunction” consistent with cardiovascular diseases, including “angina, myocardial infarction, stroke, and hypertension.”¹⁵¹ The second study went even deeper: it found the particulate matter caused cardiac and mitochondrial dysfunction in rats, a response consistent with cardiovascular disease.¹⁵²

Impact on Mountaintop Miners

Appalachian surface miners, who largely work on mountaintop removal mines, suffer from disproportionately higher rates of black lung disease compared to other surface miners, which may be another indication of the toxicity of the dust mountaintop removal generates.¹⁵³ The Centers for Disease Control and Prevention’s National Institute for Occupational Health and Safety (NIOSH) conducted two studies, published in 2012 and 2002, on the prevalence of coal workers’ pneumoconiosis (CWP), the scientific term for black lung disease. In 2012, it found CWP “was 2.7 times greater among Central Appalachian miners compared with other [surface] miners,” after adjusting for tenure of mining.¹⁵⁴ Surface miners from the region also had “significantly higher” rates of progressive massive fibrosis, the most severe form of CWP, and opacities indicating silicosis.¹⁵⁵ In 2002, NIOSH found an even more striking disparity: the rate of CWP among Central Appalachian surface miners was almost four times that of other surface miners. NIOSH found that 3.7 percent of working surface miners examined from the four states

¹⁵⁰ Like in the experiment with lung cells, mice injected with molybdenum cells showed similar bioluminescence to those injected with Edwight particulate matter. *Ibid.*

¹⁵¹ Travis L. Knuckles et al., “Air Pollution Particulate Matter Collected from an Appalachian Mountaintop Mining Site Induces Microvascular Dysfunction,” *Microcirculation* **20**, 2013, pp. 159, 167.

¹⁵² Cody E. Nichols et al., “Cardiac and mitochondrial dysfunction following acute pulmonary exposure to mountaintop removal particulate matter,” *American Journal of Physiology—Heart Circulation and Physiology*, December 15, 2015.

¹⁵³ Given its mountainous topography, the vast majority of surface mining in Appalachia is mountaintop removal. See note 58.

¹⁵⁴ Center for Disease Control and Prevention, “Pneumoconiosis and Advanced Occupational Lung Disease Among Surface Coal Miners – 16 states, 2010-2011,” *Morbidity and Mortality Weekly Report*, June 15, 2012, p. 432.

¹⁵⁵ *Ibid.*

where mountaintop removal is carried out had CWP, compared to one percent of surface miners from other states.¹⁵⁶ To put this in perspective, of 1,221 surface miners examined from West Virginia, 58 had CWP; of 1,252 examined in Wyoming, only 3 did.¹⁵⁷

Bill Carter, who worked as a trucker on mountaintop removal sites for 25 years and now has black lung disease, said that he would haul excavated rock up to two miles before dumping it. “The dust is just grinding your throat,” he said.¹⁵⁸ While nearby communities are not exposed to the same concentration of dust as miners, and therefore are not susceptible to same types of diseases, the studies discussed in the previous section analyzing air quality near mountaintop removal sites indicate that residents may be chronically exposed to dust for years.

There are only two publicly available studies on the prevalence of CWP among surface miners because the 1969 Coal Act required regular surveillance of only underground miners’ respiratory health. For decades, NIOSH recommended extending surveillance to surface miners.¹⁵⁹ In the 1980s, for example, NIOSH tests of dust samples from surface mines had shown dangerously high levels of quartz silica.¹⁶⁰ In 2014, the Obama administration extended surveillance to surface miners – a change the Trump administration is currently reviewing. The data collected under that program is not disaggregated by state, but the overall numbers indicate higher rates of CWP among surface miners than the previous ad hoc program had measured.¹⁶¹

¹⁵⁶ Centers for Disease Control and Prevention, “Pneumoconiosis prevalence among Working Coal miners Examined in Federal Chest Radiograph Surveillance Programs, United States, 1996-2002,” *Morbidity and Mortality Weekly Report*, April 18, 2003, p. 337. Percentages based on Human Rights Watch calculations.

¹⁵⁷ *Ibid.*

¹⁵⁸ Human Rights Watch interview with Bill Carter, April 26, 2018, Beckley, West Virginia.

¹⁵⁹ National Institute for Occupational Safety and Health, “Occupational Exposure to Respirable Coal Mine Dust,” September 1995, p. 127, <https://www.cdc.gov/niosh/docs/95-106/pdfs/95-106.pdf?id=10.26616/NIOSH PUB95106>; National Institute for Occupational Safety and Health, “Chapter IV Environmental Data: Dust Measurement,” 1974, <https://www.cdc.gov/niosh/pdfs/75-120c.pdf?id=10.26616/NIOSH PUB75120>.

¹⁶⁰ The tests did not separate based on geography. Greg M. Piacitelli et al., “Respirable Dust Exposures in US Surface Coal Mines,” *Archives of Environmental Health*, Vol. 45, Issue 4, 1990.

¹⁶¹ Under the new surveillance program, 4.6 percent of surface miners had CWP, compared to three percent for the entire duration of the previous program, which began in 1968. National Institute for Occupational Safety and Health, “Coal Workers’ Health Surveillance Program (CWHSP) Data Query System,” July 31, 2018, <https://webappa.cdc.gov/ords/cwhsp-database.html>; Office of Information and Regulatory Affairs, “Regulatory Reform of Existing Standards and Regulations; Retrospective Study of Respirable Coal Mine Dust Rule,” Fall 2017, <https://www.reginfo.gov/public/do/eAgendaViewRule?publd=201710&RIN=1219-AB88>; “US Department of Labor Seeks Input on Retrospective Study of Respirable Coal Mine Dust Rule,” United States Department of Labor press release, Arlington,

Dr. Cara Halldin, the supervisor of the Coal Workers' Health Surveillance Program at NIOSH, explained to Human Rights Watch that one possible reason for the higher prevalence of CWP among Central Appalachian surface miners is that silica – present in the plumes of rock dust generated from blasting and excavating mountains – is more toxic than coal dust, and the combination of both may be more toxic than each individually. She noted that experts are beginning to call the disease Coal Mine Dust Lung Disease to capture this risk.¹⁶² She also said that “drillers and blasters are at the highest risk” for CWP, an observation that comports with the heightened risk of rock dust.¹⁶³

The US Centers for Disease Control and other experts have cited increased exposure to silica-rich rock dust for an unprecedented level of black lung disease in central Appalachian miners over the past two decades.¹⁶⁴ They offer several possible explanations: thinner coal seams and new types of mining that require cutting through more rock than in the past; advances in technology that crush rock into finer dust particles; and longer working hours.¹⁶⁵ In 2016, a new rule lowered workers' permissible exposure to silica dust, adopting a recommendation NIOSH has been urging for years, but the Trump Administration delayed its implementation while the industry challenged it in court.¹⁶⁶ The court upheld the rule and on July 6, 2018, the Mining Safety and Health

July 6, 2018, <https://www.msha.gov/news-media/press-releases/2018/07/06/us-department-labor-seeks-input-retrospective-study-respirable>.

¹⁶² Human Rights Watch interview with Dr. Cara Halldin, April 25, 2018, NIOSH, Morgantown, West Virginia. See also Jennifer L. Perret et al., “Coal Mine Dust Lung Disease in the Modern Era,” *Respirology*, 2017, pp. 662-70.

¹⁶³ Human Rights Watch interview with Dr. Cara Halldin, April 25, 2018, NIOSH, Morgantown, West Virginia. See also Cara N. Halldin et al., “Debilitating Lung Disease Among Surface Coal Miners with No Underground Mining Tenure,” *Journal of Occupational and Environmental Medicine*, vol. 57:1, January 2015.

¹⁶⁴ Howard Berkes, “Advanced Black Lung Cases Surge in Appalachia,” *NPR*, December 15, 2016, <https://www.npr.org/2016/12/15/505577680/advanced-black-lung-cases-surge-in-appalachia>; Centers for Disease Control and Prevention, “Resurgence of Progressive Massive Fibrosis in Coal Miners – Eastern Kentucky, 2016,” *Morbidity and Mortality Weekly Report*, December 16, 2016.

¹⁶⁵ See e.g. *ibid.* and Jennifer L. Perret et al., “Coal Mine Dust Lung Disease in the Modern Era,” *Respirology*, 2017, p. 662-670.

¹⁶⁶ See “US Labor Department Announces Final Rule to Improve U.S. Workers' Protection from the Dangers of ‘Respirable’ Silica Dust,” Occupational Safety and Health Administration press release, Washington, March 24, 2016, <https://www.dol.gov/newsroom/releases/osh/osh20160324>; Memorandum from Occupational Safety and Health Administration Acting Deputy Assistant Secretary Galen Blanton to Regional Administrators, on the “Enforcement Launch for the Respirable Crystalline Silica Standard in General Industry and Maritime, 29 CFR § 1910. 1053,” June 7, 2018, <https://www.osha.gov/laws-regs/standardinterpretations/2018-06-07> (accessed October 19, 2018).

Administration began to solicit information to review the rule.¹⁶⁷ But what the scientific analysis of the air in mountaintop removal communities makes clear is that it's not only miners whose health is at risk from the dust: people living near mountaintop removal breathe these tiny, toxic particles, too, likely at serious risk to their health.

Water Contamination

Sherry Walker lives in a hollow near Coal Mountain, a 10-minute drive away from Nicole and James Cook. Sherry, who lives with her granddaughter, shares a well with her son, Jason, who lives next door. According to Sherry and Jason, the water started to become discolored around 2011 and over the years their 100-foot well slowly dried up so that today they have no choice but to bathe and wash their clothes and dishes in water pumped from the creek behind their house – a creek that they assume is polluted by the mountaintop coal mine, as well as from sewage piped directly into it by neighbors living upstream.¹⁶⁸ Jason said he's saving up to contract the drilling of a new well, which costs \$2,500, but there's no guarantee that the water would be safe to use, especially since that is the price for a well around the same depth as the one that dried up. He had hoped to use a small bank loan for the well, but he needed the money to fix his mother's roof. "I had to choose between a roof and a well. I'd rather have a roof over my head than water coming out of my faucet."¹⁶⁹

Sherry, along with 15 other families who live nearby, sued the coal company operating the mine, Dynamic Energy, a subsidiary of a company that at the time was owned by the governor of West Virginia, Jim Justice.¹⁷⁰ They lost the case, but 10 more families have sued

¹⁶⁷ "US Department of Labor Seeks Input on Retrospective Study of Respirable Coal Mine Dust Rule," Mine Safety and Health Administration press release, July 6, 2018, <https://www.msha.gov/news-media/press-releases/2018/07/06/us-department-labor-seeks-input-retrospective-study-respirable>.

¹⁶⁸ Speaking in general terms, Jack Spadaro, a mining engineer with an expertise in mountaintop mining, explained to Human Rights Watch that blasting from mountaintop mining can sink wells, causing them to fill with dirt. Human Rights Watch interview with Jack Spadaro, August 30, 2018, Wyoming County, West Virginia.

¹⁶⁹ Human Rights Watch interview with Jason Walker and Sherry Walker, August 30, 2018, Wyoming County, West Virginia.

¹⁷⁰ *Belcher v. Dynamic Energy*, Civil Action No. 14-C-67, Wyoming Cty Circuit Ct, May 16, 2014. A Justice-owned company repurchased Dynamic's parent company, Bluestone Resource, in 2015 for \$5 million, after having sold the same mines to Mechel OAO, a Russian conglomerate, in 2009 for \$436 million and \$83.3 million in preferred stock; Paul J. Nyden, "Justice paid \$5 million for Bluestone Coal," *Charleston Gazette-Mail*, February 19, 2015, https://www.wvgazette.com/business/justice-paid-million-for-bluestone-coal/article_31b31e74-10c9-50da-9boe-of4f9bc8096e.html. Dynamic sold the Coal Mountain Surface Mine to CM Energy Operations in February 2017. MSHA, "Mine Data Retrieval System," <https://arlweb.msha.gov/drs/ASP/BasicMineInfolstatecounty.asp> (accessed November 27, 2018).

and are awaiting trial.¹⁷¹ Human Rights Watch spoke to seven families who live near Coal Mountain and all shared similar stories: they have lived in these homes all or most of their lives and had clear well water until it turned orange or black some time after the mining began.¹⁷² Claims such as these –that coal mining has contaminated drinking water – are common in the coalfields of Appalachia and are not unique to mountaintop removal. Examples abound of people who believe their water – and health – has been harmed by coal mining.¹⁷³ The risk of coal processing chemicals polluting drinking water sources garnered attention in 2014 when around 7,500 gallons of a chemical used to clean coal, called MCHM (4-methylcyclohexanemethanol), spilled into the Elk River one mile upstream from a West Virginian drinking water intake for 300,000 people.¹⁷⁴

But the risk of water pollution is inherent to coal mining, since it can trigger changes in the chemical composition and flow patterns of surface and groundwater. There is always the risk that polluted surface water can contaminate groundwater, and vice versa, but, according to a US Geological Survey report on water flows in West Virginia, underground mining can increase that risk by “induc[ing] changes in natural patterns of groundwater flow resulting from interconnected mine voids.”¹⁷⁵ Where streams flow above abandoned underground mines, there is “increased potential” for fractures that “can provide a pathway for stream water to enter abandoned-coal-mine aquifers.”¹⁷⁶

The vulnerability of groundwater to contamination is therefore “based on the presence or absence of potential contaminants in the area overlying the mine or in a stream that

¹⁷¹ *Jennifer Chambers et al v. Dynamic Energy*, Civil Action No. 17-C-58, Wyoming Cty Circuit Ct, November 12, 2015.

¹⁷² Human Rights Watch interviews with Rose (not real name); Rachel Belcher; Sherry and Jason Walker; Nicole and James Cook; and Gaston Hatfield, Wyoming, County, WV, August 30, 2018.

¹⁷³ For example, in 2011 Massey Energy settled a lawsuit brought by around 700 residents of Rawl in Mingo County, WV, who alleged that their water had become contaminated by coal slurry and a year later Alpha Natural Resources settled a case with around 350 residents of Prenter in Boone County, WV who alleged the same. Ken Ward Jr., “Deal reached in Prenter coal slurr lawsuit,” *Charleston Gazette-Mail*, June 12, 2012, https://www.wvgazette.com/news/special_reports/deal-reached-in-prenter-coal-slurry-lawsuit/article_a0243fe8-06cd-54af-b1d2-856c9e42d70b.html.

¹⁷⁴ According to the National Institute of Health’s Toxicology Data Network, exposure to MCHM is known to cause dizziness, skin irritations, and gastric problems; acute exposure in animal studies was associated with kidney and liver effects, available at <https://toxnet.nlm.nih.gov/cgi-bin/sis/search/a?dbs+hsdb:@term+@DOCNO+8182> (accessed August 1, 2018).

¹⁷⁵ United States Geological Survey, “Assessment of Hydrogeologic Terrains, Well-Construction Characteristics, Groundwater Hydraulics, and Water-Quality and Microbial Data for Determination of Surface-Water-Influenced Groundwater Supplies in West Virginia,” October 2016, p. 24.

¹⁷⁶ *Ibid.*

crosses over the mine.”¹⁷⁷ In other words, in areas where there are underground mines, there is heightened risk that pollution from streams will contaminate groundwater. The problem is that mountaintop removal severely contaminates streams.

In 2002, the EPA estimated that if all existing permits were implemented, by 2012 valley fills of excavated rock would have buried an estimated 2,500 miles of stream.¹⁷⁸ According to a study conducted by Duke University environmental scientists, the erosion from valley-fills, acid drainage from the mine sites, and coal processing chemicals have contaminated at least as many miles, impacting nearly one-quarter of southern West Virginia’s rivers.¹⁷⁹

The health risks of groundwater contamination are discussed in further detail below, but people who rely on private wells may be especially vulnerable to exposure because there are no state laws mandating water quality standards and testing of well water or programs to monitor for mining-related contamination, so they could be unaware of contamination that is going untreated. Users of public water supplies may also be at risk, but there is often more source water protection for public supplies, the water is treated and its quality monitored before being delivered through a public system.

Ecological Impact on Streams

Junior Walt has been fishing, hunting, and picking ginseng around mountains now being mined for as long as he can remember; he said he killed his first deer when he was four years old on Cherry Pond Mountain, which has since been blasted for coal. Echoing many others, he told Human Rights Watch that at 27 years old he can already see the devastation of the streams. “We used to have freshwater mussels. That died out in my lifetime. We used to have hellbenders”—a giant salamander—“now they’re few and far between.”¹⁸⁰

¹⁷⁷ Ibid.

¹⁷⁸ Environmental Protection Agency, “The Effects of Mountaintop Mines and Valley Fills on Aquatic Ecosystems of the Central Appalachian Coalfields,” 2011, p. 2. By now, that number is likely significantly higher, although no more recent data is available.

¹⁷⁹ Lutz, “The Environmental Price Tag on a Ton of Mountaintop Removal Coal,” 2013.

¹⁸⁰ Hellbenders are large salamanders native to central Appalachia. Mussels are a bioindicator of the health of streams. See Abbie Gascho Landis, *Immersion: The Science and Mystery of Freshwater Mussels*, 2017. Human Rights Watch interview with Junior Walt, Naoma, Raleigh County, West Virginia, March 14, 2018.

Studies conducted by the US Geological Survey and a team of Duke University scientists led by Dr. Emily Bernhardt, a specialist on watershed biogeochemistry, confirm Junior's observations. The ecoregion is home to 10 percent of the world's global salamander and freshwater mussel diversity, but mountaintop mining has precipitated a sustained drop in their populations.¹⁸¹ In over a dozen studies, they have also found that degraded water quality has had a toxic effect on the fish, birds, insects, and even bacteria.¹⁸² The US Geological Survey found that impacted streams "have less than half as many fish species and about a third as many fish as non-impacted streams," a finding echoed in several other studies.¹⁸³ Many surviving fish were also smaller in size and some were visibly deformed with spines shaped like an "s."¹⁸⁴ Insect populations around impacted streams are also much less diverse; one study found virtually no mayflies downstream from a mined area, an insect abundant only one kilometer (0.6 miles) upstream and particularly vulnerable to environmental stress.¹⁸⁵ Duke University biologists found that even the bacteria communities of impacted streams have lost taxonomic richness.¹⁸⁶

The EPA conducted water analyses of streams near mountaintop removal and found that the contamination was wreaking havoc on these ecosystems. Numerous tests by the agency found exceptionally high levels of conductivity, an indication of water's ability to conduct electricity that is often used as an easily measured indicator of water quality because it is affected by the presence of heavy metals, salts, and other inorganic compounds.¹⁸⁷ The EPA identified 300 micro-Siemens per centimeter ($\mu\text{S}/\text{cm}$), a unit to

¹⁸¹ Emily S. Bernhardt and Margaret A. Palmer, "The environmental costs of mountaintop mining valley fill operations for aquatic ecosystems of the Central Appalachians," *Annals of the New York Academy of Sciences* (2011): p. 41. <https://pubs.er.usgs.gov/publication/70171453>; <https://pubs.er.usgs.gov/publication/70171461>

¹⁸² A list of Duke University's publications is available at <http://bernhardtlab.weebly.com/publications.html> (accessed August 1, 2018). United States Geological Survey, "Mountaintop Mining Changing Composition of Songbird Populations," May 11, 2015, <https://www.usgs.gov/news/mountaintop-mining-changing-composition-songbird-populations> (accessed October 19, 2018).

¹⁸³ United States Geological Survey, "Fish Populations Down Due to Mountaintop Mining," July 1, 2014, p. 916 https://www.usgs.gov/news/fish-populations-down-due-mountaintop-mining?qt-news_science_products=3#qt-news_science_products (accessed October 19, 2018).

¹⁸⁴ T. Ty Lindberg et al., "Cumulative Impacts of Mountaintop Mining on an Appalachian Watershed," *PNAS*, December 27, 2011, p. 20933.

¹⁸⁵ Kristofor A. Voss and Emily Bernhardt, "Effects of Mountaintop Removal Coal Mining on the Diversity and Secondary Productivity of Appalachian Rivers," *Limnology and Oceanography*, vol. 62, 2017, pp. 1754-1770.

¹⁸⁶ Raven L. Bier, "Bacterial Community Responses to a Gradient of Alkaline Mountaintop Mine Drainage in Central Appalachian Streams," *International Society of Microbial Ecology*, 2015, p. 1378-90.

¹⁸⁷ Environmental Protection Agency, "Water: Monitoring and Assessment, 5.9 Conductivity," March 12, 2012, <https://archive.epa.gov/water/archive/web/html/vms59.html> (accessed October 19, 2018).

measure electric conductivity, as the upper limit necessary to preserve the quality of Appalachian streams, but impacted streams measured several times this amount and often well above 2,000 $\mu\text{S}/\text{cm}$.¹⁸⁸

These streams' increased conductivity correlates with the presence of "constituents typically derived from rock and coal weathering," such as sulfates, selenium, iron, manganese, calcium, and magnesium, according to Duke University biologists.¹⁸⁹ The process of excavating rock and depositing it into valley fills causes these minerals, which are naturally present in the rock, to leach into nearby streams; the minerals may then cause erosion that releases other metals harmful to stream's ecosystems.¹⁹⁰ The biologists blame high levels of selenium in particular for the damage to aquatic life.¹⁹¹ Selenium is a heavy metal beneficial to animal health in small doses but toxic in higher concentrations, and it bioaccumulates, so chronic exposure to even a small amount can be dangerous.¹⁹² The EPA recommends a limit of 3.1 micrograms per liter ($\mu\text{g}/\text{L}$); streams impacted by mountaintop removal have as much as 20 $\mu\text{g}/\text{L}$ and high levels of the metal were detected in fish.¹⁹³

Particularly troubling, for several of the markers of degraded stream quality, Duke University biologists found there was no difference between active and reclaimed sites, indicating "that the extensive chemical and hydrologic alterations" cannot "be offset or reversed by currently required reclamation and mitigation practices."¹⁹⁴ Moreover, many of

¹⁸⁸ Environmental Protection Agency, "A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams," March 2011, p. 31; Raven L. Bier, "Bacterial Community Responses to a Gradient of Alkaline Mountaintop Mine Drainage in Central Appalachian Streams," *International Society of Microbial Ecology*, 2015, p. 1381; T. Ty Lindberg et al., "Cumulative Impacts of Mountaintop Mining on an Appalachian Watershed," *PNAS*, December 27, 2011, p. 20931.

¹⁸⁹ Lindberg et al., "Cumulative Impacts of Mountaintop Mining," p. 20930.

¹⁹⁰ Ibid. See also Peter Morgan, "Selenium: Mountaintop Removal Coal Mining's Toxic Legacy," posted to The Planet: Sierra Club Stories from the Front Lines (blog), April 16, 2014, <http://blogs.sierraclub.org/planet/2014/04/selenium-mountaintop-removal-coal-minings-toxic-legacy.html> (accessed October 19, 2018).

¹⁹¹ Lindberg et al., "Cumulative Impacts of Mountaintop Mining on an Appalachian Watershed," *PNAS*, December 27, 2011, p. 20934.

¹⁹² See the EPA's fact sheet on selenium, "Aquatic Life Ambient Water Quality Criterion for Selenium in Freshwater 2016 – Fact Sheet," June 2016, https://www.epa.gov/sites/production/files/2016-06/documents/se_2016_fact_sheet_final.pdf (accessed October 19, 2018).

¹⁹³ Environmental Protection Agency Office of Water, "Aquatic Life Ambient Water Quality Criterion for Selenium in Freshwater 2016 – Fact Sheet," June 2016, https://www.epa.gov/sites/production/files/2016-06/documents/se_2016_fact_sheet_final.pdf (accessed October 19, 2018).

¹⁹⁴ Emily S. Bernhardt and Margaret A. Palmer, "The environmental costs of mountaintop mining valley fill operations for aquatic ecosystems of the Central Appalachians," *Annals of the New York Academy of Sciences*, 2011, p. 39.

the impacts on wildlife were found in the rivers into which these streams run, meaning that the pollution persists even when diluted with waters unimpacted by mining.¹⁹⁵ And according to the mining engineer Jack Spadaro, “once the groundwater is contaminated, it can take 400 to 500 years until it’s drinkable again.”¹⁹⁶

Health Risks to Nearby Communities

The metals and other pollutants devastating streams’ ecosystems can also be dangerous to humans. There are few scientific studies examining communities’ exposure to water contaminated by mountaintop mining or associated health risks. Respiratory, digestive, urinary, and breast cancer mortality rates increase in areas of central Appalachia with ecologically damaged streams, according to one study by a US Geological Survey biologist and Hendryx examining linkages between polluted streams and human cancer rates.¹⁹⁷ However, the study did not isolate exposure to contaminated water and whether it may cause health problems.¹⁹⁸

A number of the metals found in streams contaminated from mountaintop mining pose health risks if ingested. According to the World Health Organization, selenium in high doses can cause gastrointestinal problems and harm skin, teeth, and hair; it also had adverse reproductive impacts in animal studies.¹⁹⁹ Arsenic is also present in some coal formations and may leach from valley fills into nearby streams and groundwater.²⁰⁰ Arsenic exposure can affect nearly every major organ and system in the body and increases the risk of cancer of the liver, kidney, bladder, and lungs; respiratory diseases; and cardiovascular diseases.; It is also associated with increased infant mortality and impaired cognitive development in children.²⁰¹

¹⁹⁵ Ibid., p. 52.

¹⁹⁶ Human Rights Watch interview with Jack Spadaro, Wyoming County, WV, August 30, 2018.

¹⁹⁷ Nathaniel P. Hitt and Michael Hendryx, “Ecological Integrity of Streams Related to Human Cancer Mortality Rates,” *EcoHealth*, April 2, 2010.

¹⁹⁸ Ibid.

¹⁹⁹ World Health Organization, “Selenium in Drinking-Water: Background document for the development of WHO Guidelines for Drinking-water Quality,” 2011, http://www.who.int/water_sanitation_health/dwq/chemicals/selenium.pdf (accessed October 19, 2018).

²⁰⁰ David C. Holzman, “Mountaintop Removal Mining: Digging into Community Health Concerns,” *Environmental Health Perspectives*, November 1, 2011, <https://ehp.niehs.nih.gov/119-a476/> (accessed October 19, 2018).

²⁰¹ Marisa Naujokas et al., “The broad scope of health effects from chronic arsenic exposure: update on a worldwide public health problem,” *Environmental Health Perspectives*, vol. 121(3) (2013), pp. 295-302

Dr. D. Scott Simonton, an environmental engineer with an expertise in the health impacts of mining-related water contamination, stressed in an interview with Human Rights Watch that there is insufficient research into health effects of mining-related water contamination. However, his and others' research indicates that even in cases where mining pollution consists only of metals that are not considered by the EPA to be unsafe, they may nonetheless pose health risks at extremely elevated levels, in combination with one another, or in children, older people, or those who have preexisting health problems.

Manganese, found in streams impacted by mountaintop removal as well as in the Coal Mountain families' well water at alarmingly high levels, has been linked to neurological damage.²⁰² For example, a study examining children aged 11 to 13 who were exposed to drinking water with 241 parts per billion (ppb) of manganese exhibited adverse neurological effects compared to a control group of children matched for age, sex, grade, family income and parental education.²⁰³ The EPA does not have mandatory limits on manganese in drinking water, but the US Centers for Disease Control lists exposure to manganese in dust or fumes as an occupational hazard that can damage the lung, liver, and kidneys.²⁰⁴ The EPA also doesn't set mandatory limits on iron, but an epidemiological study in Norway found that the relative risk of developing inflammatory bowel disease, including Crohn's disease, "increased by 21 percent when iron content in the drinking water increased by 0.1 mg/L."²⁰⁵

Sulfates, found in streams near mountaintop mining and considered "a reliable indicator of mining impacts," are not regulated by the EPA although they can produce toxic air pollution by transforming into hydrogen sulfide gas when exposed to air, which gives off a unique "rotten egg" odor many residents described to Human Rights Watch and which was

²⁰² World Health Organization, "Manganese in Drinking-Water: Background document for the development of WHO Guidelines for Drinking-water Quality," 2011, p. 13, http://www.who.int/water_sanitation_health/dwq/chemicals/manganese.pdf (accessed October 19, 2018).

²⁰³ WHO, "Manganese in Drinking-water," http://www.who.int/water_sanitation_health/dwq/chemicals/manganese.pdf.

²⁰⁴ National Institute for Occupational Safety and Health, "Manganese," June 26, 2018, <https://www.cdc.gov/niosh/topics/manganese/default.html>.

²⁰⁵ Geir Aamodt et al., "The Association Between Water Supply and Inflammatory Bowel Disease Based on a 1990-1993 Cohort Study in Southeastern Norway," *American Journal of Epidemiology* 168 (2008): 1065-1072, <https://academic.oup.com/aje/article/168/9/1065/143180>

apparent during our visits to impacted homes.²⁰⁶ According to the WHO, exposure to the gas can negatively affect respiratory and brain function, and may be associated with an increased risk of miscarriage.²⁰⁷

Most studies analyze the occupational risk of acute, short-term exposure, rather than chronic low-level exposure in homes, but adverse health impacts, especially for sensitive people such as asthmatics, have been found after short-term exposure at concentrations as low as two parts per million (ppm).²⁰⁸ The WHO recommends limiting exposure to an average of .11 ppm over a 24-hour period.²⁰⁹ Simonton measured concentrations of as high as one ppm in the air of homes in central Appalachian mining communities with high levels of sulfates in their well water – and as high as 21 ppm in a shower stall with running water and 17 ppm over a kitchen sink when the faucet is running.²¹⁰

Sulfates and other metals found in impacted streams can also cause lead pipes and joints to erode, which may explain the presence of lead in several of the wells near Coal Mountain. Moreover, Human Rights Watch is unaware of any study that has examined the presence of chemicals from coal processing, diesel exhaust, explosives, and other mining-related activities, many of which are unregulated, in surface or groundwater near mountaintop removal mining activities.²¹¹

²⁰⁶ D. Scott Simonton, “Hydrogen Sulfide Exposure and Human Health Risk in Mining-Impacted Regions,” American Society of Civil Engineers, 2014, p. 1007. See also D. Scott Simonton and M. Spears, “Human health effects from exposure to low-level concentrations of hydrogen sulfide.” *Occupational Health and Safety*, October 2007.

²⁰⁷ World Health Organization, Hydrogen Sulfide: Human Health Aspects, 2003.
<http://www.who.int/ipcs/publications/cicad/en/cicad53.pdf>

²⁰⁸ Ibid.

²⁰⁹ Ibid.

²¹⁰ Simonton, “Hydrogen Sulfide Exposure,” p. 1006.

²¹¹ Human Rights Watch phone interview with Dr. Avner Vengosh, Duke University geochemist and co-author of several studies on mountaintop removal’s impact on streams, February 1, 2018.

The Case of Coal Mountain

The private wells tested near Coal Mountain, Wyoming County, West Virginia, all had alarmingly high levels of heavy metals consistent with coal mining pollution, such as iron and manganese, that made them unfit for use, although residents continued to use water from these wells for bathing and cleaning.²¹² For example, the Walkers' well, before it dried up, had more than 25,000 parts per billion (ppb) of iron, a level astronomically higher than the EPA's recommended limit of 300 ppb to preserve the taste and clarity of the water.²¹³ Manganese levels in all the wells exceeded the EPA's recommended limit of 50 ppb to preserve water quality, and many were several times that amount. Nearly all had lead in their water, including four above 20 ppb, the level at which the EPA is required to action for public water systems.²¹⁴ Six of the wells also had unsafe levels of arsenic.²¹⁵

The families living near the Coal Mountain mine with whom Human Rights Watch spoke said that they worry constantly about the potential health impacts of contamination in their water. While they all said they stopped drinking or cooking with the water from the contaminated wells, they continue to use it for bathing and brushing teeth (except the family whose well dried up). "What's the difference between consuming it and breathing it?" one person asked rhetorically, referring to the water from steam in a bath or washing dishes.²¹⁶ Many also worried that they may have been drinking contaminated water for years after the mining began but before it turned orange from iron. Indeed, both arsenic and lead are colorless, tasteless, and odorless, and arsenic cannot be eliminated using conventional household filters.

Jason told Human Rights Watch he suspects that bad water may be responsible for his Crohn's disease, a chronic inflammation of the gastrointestinal tract that studies

²¹² Multiple tests of 26 wells conducted between 2012-2014 by WV Department of Environmental Protection; Ohio Valley Environmental Coalition; and/or Dr. D. Scott Simonton on file with Human Rights Watch.

²¹³ Test conducted on July 14, 2014 by the WV Department of Environmental Protection; on file with Human Rights Watch.

²¹⁴ On file with Human Rights Watch.

²¹⁵ On file with Human Rights Watch.

²¹⁶ Human Rights Watch interview with Jane (not real name), Wyoming County, West Virginia, August 30, 2018.

suggest may be influenced by environmental factors, including iron in water.²¹⁷ Lending support to his concern, Jason said his symptoms “started around 10 years ago, I lost 90 pounds in three months.” At that time, he was still drinking water from his well. His health only began to improve, he said, in 2014, when the court ordered the coal company to provide an alternative water source to all the families who had sued while their case remained pending. But the coal company took back the water they had provided after the first group of 16 families lost their case, and he worries his health problems will worsen.²¹⁸

The High Cost of Bad Water

Several metals found in mountaintop removal-impacted streams, such as manganese, iron, aluminum, and sulfate, can severely degrade water’s taste, smell, and color. Elevated levels of all four of these metals were found in wells near Coal Mountain, rendering the water unusable notwithstanding its health risks. Residents describe the costs associated with losing their water source as financially devastating, especially since they were already struggling to make ends meet.

Rose, a woman in her sixties who lives near the Walkers and asked that we don’t use her real name because she is afraid of retaliation against her relative who is a miner, told Human Rights Watch that she worries most about the cost of having to buy drinking water for the rest of her life. She has drinking water delivered in five-gallon jugs that cost \$6 each, and uses one or two jugs a week, she said. She also buys \$6 bags of salt each week to filter her well water for household uses. Even with the filter, she needs to regularly replace her clothes, pipes, faucet, washing machine, and anything else that comes into contact with water, because it stains, corrodes or otherwise ruins her belongings. She lives on a fixed monthly income of less than \$1600 and “every little bit hurts,” she said. Rachel Belcher said that she tries to save money by filling up bottles at a spring around eight

²¹⁷ See e.g. Aamodt et al., “The Association Between Water Supply and Inflammatory Bowel Disease,” <https://academic.oup.com/aje/article/168/9/1065/143180> and Natalie Molodecky and Gilaad Kaplan, “Environmental Risk Factors for Inflammatory Bowel Disease,” *Gastroenterol Hepatol (N Y)* 6(5) (2010), 339–346.

²¹⁸ The court dissolved the order requiring Dynamic Energy provide alternate water on May 21, 2018.

miles away, but she often ends up purchasing water to save time. “It takes away from grocery bills and clothes for my granddaughter, who is still in school,” she said.²¹⁹

Others, like Jason, described saving up to dig deeper wells with they can hit a safer source of groundwater deeper down – a financial risk, since there is no guarantee that the water quality will be better.²²⁰ But perhaps the biggest cost is the steep decline in a property’s value. “If you try and sell it, who is going to buy it?” Jason said, when asked if his family ever considered moving. “I was raised in this hollow. My father, who was a miner, is buried right there,” he said, pointing to a small plot of graves behind his home. Sherry spoke about how much her husband loved mining. “I have nothing against coal mining. It’s my family’s trade; it’s our way of life. But if you damage someone’s property, take responsibility,” she said.²²¹

Private Wells

As the Coal Mountain families suggest, residents who rely on private wells are especially vulnerable to exposure to contaminated water given the lack of any government support for monitoring or treatment of private wells—federal water quality standards do not apply to them. As already noted, the risk of polluted streams contaminating groundwater increases in areas with a long history of underground mining, which is the case in nearly every county where mountaintop removal is prevalent. In fact, scientists who discovered lung cancer clusters in areas of Kentucky where mountaintop removal is prevalent suspected contaminated well water as a possible culprit.²²²

In one of the few studies seeking to measure the contamination of private wells from surface mines, the US Geological Survey tested 58 wells near surface mines in Pennsylvania and West Virginia.²²³ The study, published in 2006, examined the long-term impact of water contamination and identified mines that had ceased to be active between

²¹⁹ Human Rights Watch interview with Rachel Belcher, Wyoming County, West Virginia, August 30, 2018.

²²⁰ Human Rights Watch interviews with Rachel Belcher and Jason Walker, Wyoming County, West Virginia, August 30, 2018.

²²¹ Human Rights Watch interview with Sherry Walker, Wyoming County, West Virginia, August 30, 2018.

²²² W. Jay Christian et al. “Exploring Geographic Variation in Lung Cancer Incidence in Kentucky Using a Spatial Scan Statistic: Elevated Risk in the Appalachian Coal-Mining Region,” *Public Health Reports*, volume 126, December 2011, p. 790.

²²³ US Geological Survey, “Groundwater Quality in Unmined Areas Near Reclaimed Surface Coal Mines in Northern and Central Appalachian Coal Regions, Pennsylvania and West Virginia,” 2006, p. 12.

1985 and 1996; it did not specifically note the types of surface mines, but presumably the ones in southern West Virginia were predominantly mountaintop removal. The tests found levels of metals in the mined area such as manganese, barium, iron, and magnesium that in some cases were staggeringly high and well beyond both drinking water standards (applicable to public water supplies) and levels in a control group of wells in unmined areas.²²⁴

In 2004, scientists at Wheeling Jesuit University in West Virginia conducted tests of 15 wells near a slurry impoundment – where toxic wastewater from processing coal is stored – after citizens complained of “high incidences of Alzheimer’s disease, blood problems, cancers not related to smoking, diseases of the environment, and Attention Deficit Disorder.”²²⁵ Those tests found unsafe levels of lead and arsenic, as well as a mixture of metals similar to the US Geological Survey results that are “indicators of coal related contamination” such as iron and manganese.²²⁶

Despite the risks of well water contamination, there appear to be no public records indicating the number of residents in impacted areas who rely on private wells. In 2005, the Appalachian Regional Council published a report based on data from 1995 that found that one out of every four Appalachians relied on well water – and as many as two in three people did in many of the counties where mountaintop mining is prevalent.²²⁷ Human Rights Watch was unable to find more recent data. Residents reported a marked increase in connection to municipal water supplies over the last decade, but noted that some homes continue to rely on well water, especially those high in the mountains or in more rural counties.²²⁸ Dr. Lafferty, who works as a general practitioner in a mountaintop removal area in West Virginia, said his office asks all children the source of their household water and estimated that 10 percent rely on well water. But West Virginia, like most American states, does not publish data on the number, location, or depth of private

²²⁴ Ibid.

²²⁵ Stout and Papillo, “Well water quality,” 2004.

²²⁶ Ibid.

²²⁷ Appalachian Regional Commission, “Drinking Water and Wastewater Infrastructure: An Analysis of Capital Funding and Funding Gaps – Chapter 2: Water and Wastewater Services in Appalachia,” August 2005, https://www.arc.gov/assets/research_reports/DrinkingWaterandWastewater_Services.pdf (accessed October 19, 2018).

²²⁸ Human Rights Watch interviews with Jack Spadaro; Jason Walker; Junior Walt and Clyde, Raleigh county, April 26, 2018.

wells, nor does it regulate their water quality or advise against using private wells in any particular area.²²⁹ A fact sheet on the website of the state’s Bureau of Public Health notes only that “private wells provide a clean, safe source of water to many citizens of West Virginia,” and that it is the responsibility of the well owner to “make sure that your water is safe to use.”²³⁰

Public Water Supply

Unlike private wells, the federal and state government regulates the quality of water available in public water systems, yet they nonetheless may be impacted by pollutants from mountaintop removal because their source water is often the same groundwater supply as private wells or surface water that is susceptible to MTR contamination. Many communities in central Appalachia rely on smaller municipal water systems, which tend to have higher levels of violations than systems that serve larger numbers of people—in part because these systems often fail to engage in proper monitoring.²³¹ Hendryx conducted a survey of all West Virginia water station’s violations of the Safe Drinking Water Act between 2001 and 2009 and found that counties with mountaintop removal had over five times the number of violations as counties with only underground mining even though they serve a similar number of residents.²³² The vast majority of these violations were for water systems’ failure to monitor water quality – a gap that suggests poor oversight by the

²²⁹ Human Rights Watch correspondence with West Virginia Department of Health and Human Resources (WVDHH), May 23, 2018; Human Rights Watch phone interview with WVDHH, May 22, 2018.

²³⁰ West Virginia Department of Health and Human Resources: Bureau for Public Health, Office of Environmental Health Services, “Fact Sheet: Private Well Owners – Four Steps to Water Well Safety,” March 2008, <https://www.wvdhhr.org/phs/water/Fact%20Sheets/PrivateWellOwners-FourStepstoWaterWellSafety.pdf> (accessed October 19, 2018).

²³¹ Daniel Ervin, “Trends in EPA Violations in Water Systems,” post to “The Environmental Finance Blog,” University of North Carolina School of Government Environmental Finance Center, February 8, 2017, <http://efc.web.unc.edu/2017/02/08/trends-epa-violations-water-systems/> (accessed October 19, 2018) and Appalachian Regional Commission, “Drinking Water and Wastewater Infrastructure: An Analysis of Capital Funding and Funding Gaps – Chapter 2: Water and Wastewater Services in Appalachia,” August 2005, https://www.arc.gov/assets/research_reports/DrinkingWaterandWastewater_Services.pdf (accessed October 19, 2018).

²³² Michael Hendryx, “Public Drinking Water Violations in Mountaintop Coal Mining Areas of West Virginia, USA,” *Springer Science* (2012). Human Rights Watch was unable to find a more recent comprehensive analysis of drinking water violations in West Virginia. A review of the EPA’s Safe Drinking Water Information System for Raleigh county, where Edwight is located and mountaintop mining is prevalent, suggests that small systems continue to be plagued by monitoring problems. Of 18 water systems in the county, six had multiple monitoring and reporting violations since 2015 – all of which serve under 750 people. See Environmental Protection Agency, “List of Water Systems in SDWIS,” July 8, 2018, https://ofmpub.epa.gov/enviro/sdw_query_v3.get_list?wsys_name=&fac_search=fac_beginning&fac_county=RALEIGH&fac_city=&pop_serv=500&pop_serv=3300&pop_serv=10000&pop_serv=100000&pop_serv=100001&sys_status=active&pop_serv=&wsys_id=&fac_state=WV&last_fac_name=&page=1&query_results=&total_rows_found=

state’s environmental agency. The study authors estimated that while it was not possible to know the extent to which they comply with safe drinking water standards, based on information they were able to analyze, there would likely be five times more health-based violations than in counties without mountaintop removal if properly monitored.²³³

In addition, the EPA does not regulate some of the metals commonly found in streams contaminated by mountaintop mining, such as aluminum and manganese, because it does not consider them to pose a risk to healthy adults.²³⁴ But these metals can nonetheless be dangerous for children, pregnant women, older people and people experiencing other health problems. As discussed above, federal and state laws do not have standards for all possible chemicals used in coal operations.²³⁵

²³³ Ibid.

²³⁴ The EPA regulates these as “secondary drinking water standards,” which are non-mandatory guidelines to manage “aesthetic considerations,” such as taste, color, and odor. Environmental Protection Agency, “Secondary Drinking Water Standards: Guidance for Nuisance Chemicals,” March 8, 2017, <https://www.epa.gov/dwstandardsregulations/secondary-drinking-water-standards-guidance-nuisance-chemicals> (accessed October 19, 2018).

²³⁵ The Safe Drinking Water Act mandates the regulation of around 85 contaminants; for a list, see Environmental Protection Agency, “National Primary Drinking Water Regulations,” March 22, 2018, <https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations> (accessed October 19, 2018).

III. The Coal Industry's Response

Coal mining companies and trade associations have consistently worked to cast doubt on the existence of any health risks created by mountaintop removal, despite the mounting evidence to the contrary.²³⁶ As with black lung disease in the past, industry leaders have responded to the research with aggressive lobbying and research efforts aimed at discrediting the science and opposing regulatory oversight. These efforts aim not only at fending off new regulation, but also at challenging existing rules and at blocking new scientific research that could help establish those regulations' necessity.

Such campaigns are not unusual. The Union of Concerned Scientists, an organization founded in 1969 by Massachusetts Institute of Technology scientists to ensure scientific research is used for the public good, compiled a list of tools they said corporate interests commonly employ to “corrupt science” and influence government officials, such as intimidating scientists and exploiting the “revolving door” between industry and government.²³⁷

After two decades of advocacy and litigation challenging mountaintop removal, bolstered by a growing body of scientific research, proponents of better regulation achieved two small victories. The Interior Department, at West Virginia's request, funded the National Academy of Sciences to study the health impact of surface coal mining activities in central Appalachia and enacted the Stream Protection Rule, which required mining companies to monitor pollutants in streams near their activities and restore them at the end of the project. Both were promptly canceled under the Trump administration.

²³⁶ Stephen Lee, “Evidence Thin That Mountaintop Mining Harms Health: Coal Groups,” Bloomberg BNA, July 19, 2017, <https://www.bna.com/evidence-thin-mountaintop-n73014461987/> (accessed October 19, 2018).

²³⁷ Union of Concerned Scientists, “Heads We Lose, Tails They Win: How Corporations Corrupt Science at the Public's Expense,” 2012, <https://www.ucsusa.org/center-science-and-democracy/promoting-scientific-integrity/how-corporations-corrupt-science.html#.WyPgRadKiUk> (accessed October 19, 2018).

Influencing Science

Halted National Academy of Science study

By 2015, West Virginian government officials were sufficiently alarmed by the mounting evidence of the health risks of mountaintop removal that they had to act. Governor Earl Ray Tomblin ordered the state's Department of Environmental Protection to conduct a review and requested that the Obama administration support further research. In response, the Interior Department awarded a \$1 million grant to the National Academy of Science (NAS) in 2016 to conduct a two-year study on the potential human health effects of surface coal mining operations in central Appalachia.²³⁸ The findings of the NAS, an independent research agency founded by Abraham Lincoln to provide "independent, objective advice" to the government, are often a crucial step to enacting regulations. The NAS appointed an 11-member committee of volunteer experts, none of whom were "active members of the coal industry or any governmental agency that regulates coal mining."²³⁹

Halfway through the committee's work, on August 18, 2017, the Interior Department, at this point under the Trump administration, ordered the NAS to halt its work on the study. In a letter the agency sent, it explained the decision "as part of an agency-wide review of its grants" over \$100,000.²⁴⁰ The NAS has yet to hear the result of the agency's review, and in early 2018 it formally disbanded the study's committee, much to the committee's bewilderment.²⁴¹ The committee had already held the four public hearings planned for the study and had spent nearly half of the grant funds. It is extremely rare for the government to cancel a study so close to completion and, contrary to the letter's claim, the Interior Department did not stop any of its other ongoing NAS studies at the time.²⁴²

²³⁸ "OSMRE Funds National Academy of Sciences Study of Potential Health Risks Related to Surface Coal Mining in Central Appalachia," Office of Surface Mining Reclamation and Enforcement press release, Washington, August 3, 2016.

²³⁹ *Ibid.*

²⁴⁰ Letter from Glenda H. Owens to Elizabeth A. Eide, August 18, 2017, <http://i2.cdn.turner.com/cnn/2017/images/08/22/nas.letter.pdf>.

²⁴¹ Kate Mishkin, "Without federal funding, study on health effects of mountaintop removal ends," *Charleston Gazette-Mail*, March 21, 2018, https://www.wvgazette.com/news/health/without-federal-funding-study-on-health-effects-of-mountaintop-removal/article_24a6d16a-faee-59c9-a44b-e1be9494c0ad.html (accessed October 19, 2018).

²⁴² Letter from House Natural Resources Committee Ranking Member Raúl M. Grijalva to U.S. Interior Department Deputy Inspector General Mary L. Kendall, January 10, 2018, <http://democrats-naturalresources.house.gov/imo/media/doc/Grijalva%20Letter%20to%20DOI%20Deputy%20IG%20Kendall%20on%20Can%20celebrated%20NAS%20Studies%20Jan.%2010%202018.pdf>. Riya told HRW that the NAS had additional ongoing DOI grants above \$100,000 at the time but was unable to specify how many or on what topics; HRW did not receive responses to further requests for information.

An agency report approving the study expenses already incurred, offered a different reason for the cancellation: “Departmental officials decided to halt the study because they did not believe it would produce any new information and felt costs would exceed the benefits.”²⁴³ Riya Anadwala, a NAS spokesperson, told the *Charleston Gazette* that she couldn’t think of any other example of a study being halted like this.²⁴⁴ The chairman of the study, Paul Locke, who had served on seven other committees, said the same thing. “I know leadership changes, but the facts and the science don’t change, so we’re now in a position where we don’t know what we could have known,” he told the *Gazette*.

The unusual circumstances of the study’s cancellation raise serious concerns about inappropriate political interference and industry influence. Human Rights Watch viewed emails exchanged between Interior Department officials prior to making the decision that the agency sent to a journalist in response to a request made under the Freedom of Information Act (FOIA).²⁴⁵ The emails are heavily redacted, but they seem to indicate quite clearly that the review was specific to “this study,” rather than an agency-wide reconsideration of all large contracts, as the letter to the NAS claimed.²⁴⁶ They also suggest the decision to halt the study may have been made almost immediately after initiating the review.

The first email in the thread was sent by Joshua Campbell, a political appointee in the Interior Department’s legal office, on August 17, 2017 at 6:16 p.m.²⁴⁷ In it, he tells Glenda Owens, the acting director of the Office of Surface Mining, that Kate MacGregor, a senior political appointee, has asked that he “follow up with you as DOI begins this review.” Less than two hours later, Owens wrote to MacGregor that she would call the NAS the next day to inform it of the agency’s decision – suggesting that they arrived at a decision almost immediately after the review began. On August 18, at 3:42 p.m., Owens sent the NAS the letter ordering it to halt the study. The Office of Inspector General investigated this

²⁴³ US Department of the Interior, Office of Inspector General, 2018, s.v., “Audit of Costs Claimed Under NAS Cooperative Agreement with OSMRE Found No Issues,” https://www.doiioig.gov/sites/doiioig.gov/files/FinalAudit_NASCooperativeAgreement_091818.pdf.

²⁴⁴ Kate Mishkin, “Without federal funding, study on health effects of mountaintop removal ends,” *Charleston Gazette-Mail*, March 21, 2018, https://www.wvgazette.com/news/health/without-federal-funding-study-on-health-effects-of-mountaintop-removal/article_24a6d16a-faee-59c9-a44b-e1be9494coad.html

²⁴⁵ Human Rights Watch obtained the emails from Jimmy Tobias.

²⁴⁶ See e.g. email from Joshua Campbell to Jim Weiner and Glenda Owens, August 17, 2017, on file with Human Rights Watch.

²⁴⁷ Email from Joshua Campbell to Glenda Owens, August 17, 2017, 4:16 p.m.

decision at the request of Rep. Raúl Grijalva, the ranking member of the US House of Representatives Natural Resources Committee, who was concerned about political interference. The investigation concluded that “departmental officials were unable to provide specific criteria used for their determination” to allow or cease specific studies.²⁴⁸

Locke told Human Rights Watch that he was not informed of any political or industry interference, “but if you look at the studies [the DOI] canceled, they’re all in controversial areas.”²⁴⁹ (A study on offshore oil and gas drilling was canceled in December 2017.²⁵⁰) In a letter to Human Rights Watch, the National Mining Association said that it “publicly opposed” the study since “this re-review of existing flawed research would have been a very expensive waste of taxpayer dollars.”²⁵¹

Staff calendars show that in the months prior to halting the study, MacGregor and other senior agency staff met the National Mining Association and individual coal companies including Arch Coal, which operates mountaintop mines.²⁵² But the apparent speed of the Interior Department’s review process puts an event closer in timing to the decision in the spotlight: On August 3, West Virginia Governor Jim Justice switched from the Democratic to the Republican party at a rally hosted by Trump. A few days prior to the rally, Justice, who inherited a coal fortune and owns companies that operated mountaintop mines, said he had recently met privately with Trump “over and over and over” and discussed “boosting

²⁴⁸ Kate Mishkin, “Interior official: no ‘specific’ reason mountaintop removal study halted,” *Charleston Gazette-Mail*, June 13, 2018. https://www.wvgazette.com/news/politics/interior-official-no-specific-reason-mountaintop-removal-study-halted/article_d96c5b5a-872d-5a15-8399-60a9416fa982.html (October 19, 2018).

²⁴⁹ Human Rights Watch phone interview with Paul Locke, May 22, 2018.

²⁵⁰ “Statement on Stop-Work Order for National Academies Study on the Interior Department’s Offshore Oil and Gas Operations Inspections Program,” The National Academies of Sciences, Engineering, and Medicine press release, Washington, December 21, 2007, http://www8.nationalacademies.org/onpinews/newsitem.aspx?recordid=12212017&_ga=2.243537984.477993711.1537908835-2090279826.1537908835.

²⁵¹ Letter from Hal Quinn, President and CEO of National Mining Association, to Human Rights Watch, September 27, 2018. Attached as appendix.

²⁵² For example, MacGregor met with Arch Coal on March 21 and June 7 and with the National Mining Association on April 4. US Interior Department, 2017, s.v. “Deputy Assistant Secretary for Lands and Minerals Management Katharine MacGregor,” <https://www.doi.gov/foia/os/secretarial-calendars> (October 19, 2018). See also Jim Tobias, “A top DOI Official had at least six meetings with the mining industry. She then helped cancel a study on the public health effects of mining,” *Pacific Standard*, June 11, 2018, <https://psmag.com/environment/a-top-doi-official-had-at-least-six-meetings-with-the-mining-industry-she-then-helped-cancel-a-study-on-the-public-health-effects-of-mining> (October 19, 2018).

the coal industry,” according to media reports.²⁵³ There is no record of that meeting and no way of knowing whether Justice raised the NAS study with Trump. At the time, 10 families who live near Coal Mountain had already filed a suit against his company alleging its mountaintop removal activities had contaminated their well water.²⁵⁴ On August 1, two days before the rally, Trump had lunch with Interior Department Secretary Ryan Zinke and Deputy Chief of Staff for Policy Downey Magallenes, but there is no record of what they discussed.²⁵⁵

In other situations, the Trump administration does appear to have buried scientific reports for political reasons: leaked emails from then EPA Director Scott Pruitt revealed that he sought to prevent Health and Human Services, a federal agency, from publishing a report on dangerously high levels of water contamination near military bases across the United States, citing a potential “public relations nightmare.”²⁵⁶ In another foreboding development, according to a report published by the *Washington Post* in June 2018, the Interior Department promulgated new guidelines requiring US Geological Survey scientists to request permission before presenting research at academic conferences, and must show how the topic aligns with the department’s “priorities.”²⁵⁷

Putting Pressure

Several of the West Virginia University scientists whose research helped trigger the NAS study said the coal industry sought to undermine their work. The acting dean of the university’s School of Public Health at the time the research was ongoing told Human

²⁵³ Brad McElhinny, “Governor Justice says tight relationship with Trump will pay off,” *West Virginia Metro News*, July 27, 2017, <http://wvmetronews.com/2017/07/27/governor-justice-says-tight-relationship-with-trump-will-pay-off/> (October 19, 2018).

²⁵⁴ The first group of sixteen complainants in *Belcher v. Dynamic Energy* had already lost their case, but their appeal was pending at that time before the West Virginia Supreme Court.

²⁵⁵ US Interior Department, 2017, s.v. “Secretary Ryan Zinke’s Calendar” <https://www.doi.gov/foia/os/secretarial-calendars> (October 19, 2018).

²⁵⁶ Annie Snider, “White House, EPA headed off chemical pollution study,” *Politico*, June 14, 2018, <https://www.politico.com/story/2018/05/14/emails-white-house-interfered-with-science-study-536950> (October 19, 2018). The report was ultimately published a month after the emails were leaked to the media. US Department of Health and Human Services, “Toxicological Profile for Perfluoroalkyls,” June 2018, <https://www.atsdr.cdc.gov/toxprofiles/tp200.pdf>.

²⁵⁷ The new guidelines were published on the agency’s website and are not publicly available. Sarah Kaplan, “Scientists at USGS face new scrutiny on research presentations,” *The Washington Post*, June 14, 2018, https://www.washingtonpost.com/news/speaking-of-science/wp/2018/06/14/scientists-at-usgs-face-new-scrutiny-on-research-presentations/?noredirect=on&utm_term=.4c23d6e18781 (October 19, 2018).

Rights Watch, “It was very clear that the WVU administration was getting feedback from industry which is a major funder.” In a separate interview, Hendryx said that although he was never directly pressured by West Virginia University to end his research, “I knew there was tension and that they were super concerned and nervous about it. Toward the end, if I had a meeting with journalists, someone from their media office sat in on it to keep an eye on me,” he said.²⁵⁸

In October 2011, the university wrote to the *Charleston Gazette* environmental journalist requesting that he refrain from calling studies by university faculty “WVU studies” since it “could be interpreted as the institution taking a position.”²⁵⁹ The acting dean said he “thought WVU would be grateful” when he rushed to defend academic freedom at a public event following the incident, effectively quieting a storm criticism. But that was not his impression, he said, and his discomfort grew deeper when people connected with the university warned him that “my leadership position was in jeopardy” due to the research, he said.

According to Hendryx and other West Virginia University scientists involved in the studies, a coal mining company twice invoked the Freedom of Information Act (FOIA) to demand Hendryx and other researchers produce all their emails, notes, drafts, data sets, and interview questions relating to several studies they published.²⁶⁰ “FOIA has its place,” Hendryx told Human Rights Watch, “but this was excessive. It was obvious to me it was a way to harass me, make me waste my time.” The university’s attorneys defended Hendryx and the circuit court agreed the requests were unduly burdensome, although the West Virginia Supreme Court later ordered it to consider the mining company’s proposal to limit the FOIA request by applying an analysis under which “WVU’s document production obligations are dramatically reduced.”²⁶¹ The university has stopped researching the topic since Hendryx left the university in 2013, a decision he said was for personal reasons.

²⁵⁸ Interview with acting dean of West Virginia University School of Public Health, Morgantown, June 14, 2018.

²⁵⁹ Ken Ward Jr., “New WVU forecast outlines continued decline of coal,” post to “Charleston Gazette-Mail,” blog, May 27, 2017, <http://blogs.wvgazette.com/coalattoo/?s=wvu> (October 19, 2018).

²⁶⁰ Human Rights Watch interview with Michael Hendryx, phone, June 14, 2018; Keith Zullig, Morgantown, West Virginia, March 14, 2018.

²⁶¹ *Highland Mining Company v. West Virginia University, School of Medicine*, Supreme Court of W.V., Civil Action No. 12-C-275, March 21, 2015, p. 39.

Industry representatives also criticized the research in the media. Following the publication of the study showing higher rates of birth defects in mountaintop removal counties, a law firm representing the National Mining Association suggested that inbreeding may be to blame.²⁶² In an op-ed published in the *Charleston Gazette*, a representative of the West Virginia Coal Association described the studies as “a classic example of prostitution of science in the service of a political agenda,” even though none of the research was funded by environmental groups or those opposing mountaintop removal.²⁶³ He went on, oddly, to argue both that we cannot know what causes the health disparities because science “is never ‘settled’” and that individual choices such as tobacco use, diet, and lack of exercise are clearly to blame, without providing any evidence. This line of argument has been repeated by other industry representatives, including the National Mining Association.²⁶⁴

Funding Research

In March 2011, just after WVU and other research on mountaintop removal began to receive media attention, Virginia Tech unveiled a new program called the Appalachian Research Initiative for Environmental Studies (ARIES). The initiative would fund researchers from eight universities, including West Virginia University, to study the human and ecological impact of coal. The catch: it was initially funded entirely by a \$15 million grant from coal companies (it now also receives state funding).²⁶⁵ ARIES’ website states that its research is “independent of the interests of its affiliates” and expect researchers to follow their

²⁶² The firm removed the letter from its website after one week, but an excerpt is available on the blog of Ken Ward, an environmental journalist for the *Charleston Gazette*, <http://blogs.wvgazette.com/coaltattoo/2011/07/11/mountaintop-removal-and-birth-defects-just-what-are-the-coal-industrys-lawyers-talking-about/> (accessed October 19, 2018).

²⁶³ T.L. Headley, “Applying Some Common Sense to the Issue of Coal Mining and the Health of West Virginians (Part 1),” post to “Coalfields 2030” project site, August 11, 2013, <https://coalfields2030.wordpress.com/2013/08/11/applying-some-common-sense-to-the-issue-of-coal-mining-and-the-health-of-west-virginians-part-1/> (accessed October 19, 2018).

²⁶⁴ Alice Su, “Study finds toxins from mountaintop coal mining sites,” *Center for Public Integrity*, May 19, 2014, <https://www.publicintegrity.org/2012/07/20/9947/study-finds-toxins-mountaintop-coal-mining-sites> (accessed October 19, 2018); Ken Ward Jr., “Industry attack hardly lays a glove on WVU coal cost study,” post to “Charleston Gazette-Mail” blog, July 13, 2009, <http://blogs.wvgazette.com/coaltattoo/2009/07/13/industry-attack-hardly-lays-a-glove-on-wvu-coal-cost-study/> (accessed October 19, 2018).

²⁶⁵ The initial funders were Alpha Natural Resources, International Coal Group, Massey Energy, Natural Resource Partners, TECO Coal Corporation, Patriot Coal Corporation, Cliffs Natural Resources, Mepco, CSX Corporation, and Norfolk Southern. <https://aries.energy.vt.edu/abouto.html> Some of these companies were the principal mountaintop mine operators at the time.

respective universities' research integrity policies.²⁶⁶ In response to a letter from Human Rights Watch, published in full in an annex to this report, ARIES' project director, Dr. Edmund Jong, clarified that industrial affiliates “would not have a role in selecting specific projects” for funding and they may not “dictate research methodology.” However, Jong did not respond to a query about whether the program’s corporate funders may communicate with researchers, a practice that is not only permitted but encouraged by the integrity policy at least one of the universities affiliated with ARIES.²⁶⁷ Jong also noted that not all ARIES-funded research has been published, but did not specify whether funders had any influence over publication decisions.

Paul Locke, who chaired the ill-fated NAS study, cautioned that some industry-funded studies can “serve a scientific need,” but others employ shoddy methodologies to “torture the data until it confesses.”²⁶⁸ He said the committee had not yet drawn conclusions about the quality of the industry-funded studies on mountaintop removal.

In 2015, ARIES hired Steven Lamm, then the president of a Washington-based consulting firm specializing in environmental and occupational health issues, to scrutinize the study by Ahern and Hendryx showing elevated rates of birth defects in mountaintop removal counties.²⁶⁹ Lamm reviewed the birth certificates on which Ahern relied and argued that one of the largest hospitals included in the study was overinclusive in how its doctors recorded birth defects.²⁷⁰ On this basis, Lamm adjusted for hospital of birth, which all but erased the difference in birth defect rates between mining and non-mining communities. However, Lamm changed several parameters of the original analysis, including limiting it to West Virginia data, whereas Ahern had included all Appalachian counties, and removing 275 birth sites with less than a thousand births, leaving only 44 hospitals.²⁷¹

²⁶⁶ ARIES, “Statements of Research Integrity,” https://aries.energy.vt.edu/research/research_integrity.html (October 19, 2018).

²⁶⁷ University of Kentucky, “Industry Sponsored Agreements,” <https://www.research.uky.edu/office-sponsored-projects-administration/industry-sponsored-agreements> (accessed October 15, 2018).

²⁶⁸ Human Rights Watch phone interview with Dr. Paul Locke, April 22, 2018.

²⁶⁹ Buzzfile, s.v. “Consultants in Epidemiology and Occupational Health Inc.,” <http://www.buzzfile.com/business/Ceoh-202-333-2364>

²⁷⁰ Steven H. Lamm et al., “Are Residents of Mountaintop-Mining Counties More Likely to Have Infants with Birth Defects? The West Virginia Experience,” *Clinical and Molecular Teratology*, vol. 103:2, February 2015, pp. 76-84.

²⁷¹ *Ibid.*

Lamm explained his reasons in a letter to Human Rights Watch, reproduced in full as an appendix to this report, and maintains that the changes did not affect his conclusions. Hendryx, however, pointed to these differences to argue Lamm had “monkeyed with the data” to please his funders. “It was nonsense. They cherrypicked this and manipulated that until they got the answer their paymaster requires.”²⁷² Lamm’s article states that “ARIES had no involvement” in the design or writing of the study, and his letter to Human Rights Watch he wrote that his “only contacts were with the staff of Virginia Polytechnical Institute.” He also noted that ARIES later contracted with his consulting firm to research additional studies, although he declined to provide the contract value. Both arrived at conclusions favored by the coal industry: One, published in 2016, concluded that the EPA “overpredicted” the lung cancer risk from low levels of arsenic in drinking water, and the second, published in 2018, found that the increased prevalence of fetuses small for their gestational age in mountaintop mining counties could be “primarily explained” by maternal tobacco use.²⁷³

Some ARIES-funded studies did support findings that surface mining has potential negative health impacts, but the coal industry has emphasized the few that are inconclusive or show no adverse impact, as well as other favorable studies it had funded. These studies have generally served to erode the appearance of scientific consensus. The narrative that no such consensus exists is then used by industry leaders as a powerful argument against regulation. A 2017 National Institute of Health review of scientific literature examining the health impact of mountaintop mining found “[t]he only papers to report no adverse effects . . . had energy sector funding.”²⁷⁴ Because they were not assessing the quality of individual studies, the conflicting research meant the review “could not reach conclusions on community health effects of” mountaintop removal, a point the National Mining Association highlighted in a letter to Human Rights Watch. However, the Association’s letter omitted that the review called for further study, and that

²⁷² Human Rights Watch interview with Michael Hendryx, phone, June 14, 2018.

²⁷³ Hamid Ferdosi et al., “Arsenic in Drinking Water and Lung Cancer Mortality in the United States: An Analysis Based on US Counties and 30 Years of Observation (1950–1979),” *Journal of Environmental and Public Health* (2016) and Hamid Ferdosi et al., “Small-For-Gestational Age Prevalence Risk Factors in Central Appalachian States with Mountain-Top Mining,” *International Journal of Occupational Medicine and Environmental Health*, 2018.

²⁷⁴ Abee L. Boyles et al., “Systematic Review of Community Health Impacts of Mountaintop Removal Mining,” *Environment International* 107 (2017), p. 167. The coal industry’s response to the studies published by West Virginia University researchers, and its funding research to challenge it, is further discussed in the following section.

the NAS study, which it opposed, would have assessed the quality of studies, enabling it to draw further conclusions.²⁷⁵ But even the call for further study can be seen as a success from the industry’s perspective since that takes time – during which the status quo can continue.

Influencing government

Regulatory Battles

From the outset, mining companies understood that environmental regulations enacted under the Surface Mining Control and Reclamation Act and the Clean Water Act could pose an existential threat to mountaintop removal. Rules under both laws include provisions protecting streams, a goal inherently at odds with a form of mining that depends on burying them. The regulatory history, described below, is a tug of war between the coal industry and people concerned by mountaintop removal’s health and environmental impacts fighting to exert influence over the government’s exercise of regulatory power.

Successive administrations have been pushed and pulled in different directions, but every administration has permitted mountaintop removal to continue without any new requirements to address the staggering environmental and health impacts that have become increasingly clear over the last decade. This was supposed to change when the Obama administration enacted the Stream Protection Rule in its waning days, on December 19, 2016.

Stream Protection Rule

It took nearly 20 years from the first lawsuit challenging mountaintop removal until the Interior Department enacted the Stream Protection Rule, and it was a shadow of what environmentalists had advocated. Not only did it allow the practice of mountaintop removal to continue, but it eliminated language in the preexisting rule, called the Stream Buffer Rule, that prohibited mining within 100 feet of a stream. But, as detailed in the following section, that rule had never been fully enforced and its replacement offered a compromise: in exchange for eliminating the buffer zone, it required mining companies to

²⁷⁵ Abee L. Boyles et al., “Systematic Review of Community Health Impacts of Mountaintop Removal Mining,” *Environment International* 107 (2017), p. 163.

monitor and restore the water quality of streams impacted by their activities; established a more rigorous permitting process; and better protected ephemeral streams.²⁷⁶

The coal industry spent millions of dollars lobbying legislators to oppose this rule and contributed generously to campaigns of several of the lawmakers who would ultimately vote to cancel it. It is not possible to isolate the exact amount companies spent opposing this rule in particular from companies' broader lobbying efforts, but it was clearly an important item on their advocacy agenda. For example, Arch Coal, a coal company that owns a 46,000-acre surface coal mine in West Virginia, included "OSM Stream Protection Rule" in every disclosure form for its in-house lobbying between the second quarter of 2010 and the second quarter of 2018, during which time it declared spending \$10.7 million on lobbying, according to a database of lobbying disclosure forms managed by ProPublica.²⁷⁷

Arch Coal also donated \$311,000 to support Republican candidates and \$16,000 to support Democratic candidates in the 2016 election cycle, according to Open Secrets, a website that tracks political spending.²⁷⁸ Arch Coal's heavy spending in favor of Republicans is in line with the coal mining industry in general: Open Secrets calculated that 97 percent of the \$4.5 million the industry donated to candidates during the 2016 election cycle went to Republicans, including \$265,000 to Donald Trump's campaign.²⁷⁹ (The industry spent an additional \$9 million during the 2016 election cycle in so-called "soft money," that goes to fundraising committees that can then transfer the money to political parties.)

²⁷⁶ Congressional Research Service, "The Office of Surface Mining's Stream Protection Rule: An Overview," January 11, 2017, https://www.everycrsreport.com/files/20170111_R44150_aeb8ad15c32441ec3bdb678840obda94f4aa8d86.pdf (October 19, 2018).

²⁷⁷ ProPublica, 2018, s.v. "Arch Coal, Inc.," <https://projects.propublica.org/represent/lobbying/300979457> (October 19, 2018).

²⁷⁸ Center for Responsive Politics, 2016, s.v. "ARCH Coal," <https://www.opensecrets.org/orgs/totals.php?id=D000019258&cycle=2016> (October 19, 2018).

²⁷⁹ Center for Responsive Politics, 2016, s.v. "Coal Mining: Top Contributors to Federal Candidates, Parties, and Outside Groups," <https://www.opensecrets.org/industries/contrib.php?ind=E1210&Bkdn=DemRep&cycle=2016> (October 19, 2018). The only democrat in the top 20 recipients of elected members of either the Senate or House of Representatives is Senator Heidi Heitkamp, who received \$8,000.

In a lucky break for the industry, Trump, who made the promise to deregulate coal central to his campaign, won the election and Republicans won control of the Senate and maintained control over the House of Representatives. On Feb 3, 2017, just two weeks after being sworn in, the new Congress canceled the Stream Protection Rule under the Congressional Review Act, a law that permits it to review rules issued by federal agencies within 60 legislative days after their enactment.²⁸⁰ Congress had only used the law to overturn one rule before Trump came in to office, but has since used it to cancel sixteen rules.²⁸¹ The law prohibits agencies from reissuing the same or substantially similar rules to those that were annulled, meaning the Interior Department now has limited options to protect streams from mining pollution. It can, however, enact a rule that specifically addresses the environmental and health impacts of mountaintop removal, such as one that regulates air pollution or bans the practice entirely.

Despite the far-reaching implications, Congress conducted only a short debate before it voted to annul the Stream Protection Rule, which the Interior Department enacted after eight years of reviewing dozens of scientific studies indicating serious risks to public health and the environment, as well as 94,000 public comments and testimonies from six public hearings. During the debates in the Senate and House of Representatives, not a single lawmaker who spoke in favor raised the health concerns related to mountaintop removal.²⁸² Rather, in yet another example of how industry-funded research can shape policy, they cited a claim from a study commissioned by the National Mining Association that the rule risked 77,000 jobs – almost as many jobs as existed across the entire industry in 2016 and a far cry from the several hundred jobs that the Office of Surface Mining’s regulatory impact assessment estimated the rule would cost. When Trump signed the elimination of the rule into law, a miner who attended the ceremony thanked him for saving around “70,000 jobs across the country.”²⁸³

²⁸⁰ 5 US Code § 801-08, *Congressional Review of Agency Rule Making*. For a description of the rule, see <https://www.gao.gov/legal/other-legal-work/congressional-review-act>.

²⁸¹ *Ibid.*, under “Frequently Asked Questions.” See also 5 US Code § 801(b)(2).

²⁸² Congressional Record, *Disapproving a Rule Submitted by the Department of the Interior--Motion to Proceed*, Senate: S561-74 and House of Representatives: H840-48, February 1, 2017.

²⁸³ *White House Briefings & Statements Archive*, 2017, s.v. “Remarks by President Trump at the Signing of H.J. Resolution 38,” <https://www.whitehouse.gov/briefings-statements/remarks-president-trump-signing-h-j-resolution-38/> (accessed October 19, 2018).

The National Mining Association study used a deeply flawed methodology to conclude that the rule would eliminate between 40,000 and 77,000 jobs.²⁸⁴ Ramboll Environ, the firm that conducted the study, simply asked mining operators how they believed they would be impacted.²⁸⁵ With every incentive to exaggerate the impacts, nearly half said they would shut down, halting 90 percent of underground production and 75 percent of surface production.²⁸⁶ Those assertions diverged wildly from the federally-funded regulatory impact analysis, which based its estimates on 13 representative “model” mines and found that the Stream Protection Rule would initially cost up to 590 coal production jobs, many of which would be offset by new jobs to ensure compliance with the rule.²⁸⁷ That analysis also anticipated it would cost the industry \$52 million to implement and decrease surface mining nationwide by one million tons annually.²⁸⁸

It is impossible to know what the actual impact of the rule would have been because it was canceled before going into force. In a letter to Human Rights Watch, the National Mining Association said it opposed the rule and stated – incorrectly – that the rule was ultimately canceled because it unlawfully duplicated existing rules and “would have provided no additional protections.” But many of the lawmakers in favor of eliminating the rule justified their decision based on the study it funded that improbably estimated that the rule’s implementation would end the vast majority of US coal production, a position that is at odds with the Association’s current claim that the rule largely duplicated other, existing protections. Regardless, not a single lawmaker who voted to repeal the rule even acknowledged the overwhelming scientific evidence indicating mountaintop removal’s threat to health.

²⁸⁴ Ramboll Environ, “Economic Analysis of Proposed Stream Protection Rule,” prepared for National Mining Association, October 2015, https://www.eenews.net/assets/2015/10/26/document_gw_01.pdf, p. ii. ii

²⁸⁵ *Ibid.*, p. 12.

²⁸⁶ *Ibid.*, p. 20. A Washington Post fact-checking report called the claim “simply not credible.” See Glenn Kessler, “Did President Trump save 77,000 coal mining jobs?” *Washington Post*, February 27, 2017, https://www.washingtonpost.com/news/fact-checker/wp/2017/02/27/did-president-trump-save-77000-coal-mining-jobs/?utm_term=.ac8893d4ffod (accessed October 19, 2018).

²⁸⁷ Industrial Economics, “Regulatory Impact Analysis of the Stream Protection Rule,” July 2015, p. ES-27.

²⁸⁸ *Ibid.*

Regulatory History

The cancellation of the Stream Protection Rule was a major victory for the coal industry, which had been fighting regulatory threats to mountaintop removal under both the Surface Mining Act Control and Reclamation Act and Clean Water Act for decades.

Surface Mining Control and Reclamation Act

In 1983, as mountaintop removal was becoming more prevalent, the Office of Surface Mining under the Reagan administration enacted a rule that appeared to ban it. The Stream Buffer Rule prohibits mining activity within 100 feet of a stream; no exception can be made for activities that adversely affect the water quantity and quality or other environmental resources of the stream.²⁸⁹ The rule was specifically designed to prevent mountaintop-removal valley fills, according to one of the rule's authors, Jack Spadaro, who was a supervisor and field engineer in the Office of Surface Mining at the time. Spadaro later headed the Mining Safety and Health Academy from 1996 to 2004, a federal program that trains inspectors to enforce surface mining laws, and has since appeared as an expert witness in over 200 coal-related court cases. In his view, the rule categorically prohibits valley fills. "There are no surface mines that are in compliance with the law," he said.²⁹⁰

While the Office of Surface Mining makes the rules, state environmental agencies implement them, and they continued to issue permits to mining companies for mountaintop removal mines. In 1998, several West Virginians sued their state, and the federal government, claiming that these permits violated federal rules.²⁹¹ The government settled the claim by agreeing to conduct a comprehensive assessment of mountaintop removal's environmental impact as a basis for a new regulatory approach.²⁹² But that study would fall prey to the same political pressures that had rendered existing rules meaningless.

²⁸⁹ Ibid.

²⁹⁰ Human Rights Watch interview with Jack Spadaro, Charleston, West Virginia, March 16, 2018.

²⁹¹ U.S. District Court for the Southern District of West Virginia, *Bragg v. Robertson*, 72 F. Supp. 2d 642 (S.D.W. Va. 1999), October 20, 1999.. See also Congressional Research Service, "Mountaintop Mining: Background on Current Controversies," April 20, 2015.

²⁹² Ibid.

Soon after the Interior Department, which oversees the Office of Surface Mining, completed a draft of the study recommending restricting valley fills to 250 acres, George W. Bush, a candidate whom the coal industry backed, won the presidency.²⁹³ In 2001, Bush appointed former coal industry executive and lobbyist Steven Griles as the deputy secretary of the Interior Department. Soon after, Griles, who had represented the National Mining Association as a lobbyist, made a speech to the West Virginia Coal Association promising to “fix the federal rules very soon on water and spoil placement.”²⁹⁴ According to *The Washington Post*, he then ordered the draft report to be restructured to focus on “streamlining the permitting process,” leading to a final report, published in 2007, that made no recommendation to limit the size of valley fills. It proposed such superficial changes to the permitting process that one government scientist working on the project complained in an email to colleagues: “All we have proposed is alternative locations to house the rubber stamp that issues the permits.”²⁹⁵ The agency went a step further to protect mountaintop removal and, in 2008, changed the Stream Buffer Rule to allow waste near or within streams when there is no alternative.²⁹⁶

A federal court eventually forced the agency to withdraw the Stream Buffer Rule amendment after it ruled it was enacted without following the proper procedure.²⁹⁷ By then, Barack Obama had become president, making environmental protection central to his administration, and the Interior Department was already well on its way to replacing the embattled rule with the Stream Protection Rule.

²⁹³ Joby Warrick, “Appalachia is Paying Price for White House Rule Change,” *The Washington Post*, August 17, 2004, http://www.washingtonpost.com/wp-dyn/articles/A6462-2004Aug16_4.html?noredirect=on, p.4 (accessed October 19, 2018).

²⁹⁴ Interior Department, Office of the Inspector General, “Report of Investigation: J. Steven Griles,” p. 105.

²⁹⁵ Environmental Protection Agency, “Mountaintop Mining/Valley Fills in Appalachia Final Programmatic Environmental Impact Statement,” October 2005, <https://nepis.epa.gov/Exe/ZyPDF.cgi/20005XA6.PDF?Dockey=20005XA6.PDF> (accessed October 19, 2018). Joby Warrick, “Appalachia is Paying Price for White House Rule Change,” *The Washington Post*, August 17, 2004, http://www.washingtonpost.com/wp-dyn/articles/A6462-2004Aug16_4.html?noredirect=on, p.4 (accessed October 19, 2018).

²⁹⁶ Interior Department, Office of Surface Mining Reclamation and Enforcement, “Excess Spoil, Coal Mine Waste, and Buffers for Perennial and Intermittent Streams; Final Rule,” 73 *Federal Register* 75814-75885, December 12, 2008, p. 75875.

²⁹⁷ *Nat'l Parks Conservation Ass'n v. Jewell*, D.D.C., No. 1:09-cv-00115, February 20, 2014.

Clean Water Act

The coal industry also fought challenges to mountaintop removal under the Clean Water Act, which requires a permit in order to discharge any pollutant into the waters of the United States. The process of obtaining such a permit varies widely based on the kind of pollutant and its environmental impact. Despite mountaintop removal's significant environmental impacts, including severely degrading the quality of streams, the EPA and the Army Corps of Engineers issues permits for valley fills under a scheme reserved for activities with minimal adverse impacts.

Typically, disposing waste in water requires a permit under the National Pollutant Discharge Elimination System (NPDES) Program, a scheme that places limits on discharge and includes monitoring and reporting requirements, among other provisions to protect water quality and people's health.²⁹⁸ But the Corps of Engineers and EPA allow mining companies to avoid these requirements by categorizing mining overburden as "fill," which falls under a much laxer permitting scheme than "discharge."²⁹⁹ The 1998 lawsuit arguing that mountaintop removal violated the Stream Buffer Rule also challenged this designation. At the time, the Army Corps' guidelines defined "fill" as a material intended to replace "an aquatic area with dry land" – such as a dam or bridge – and explicitly excluded waste.³⁰⁰ The court agreed with the plaintiffs and order the agency to require a NPDES permit for mining waste. However, that decision was overturned by an appeals court decision on the grounds that the case should have been brought in federal court.

In 2002, before the plaintiffs could refile the case in federal court, the Corps of Engineers, in consultation with Griles, formally redefined "fill" to include mining waste as well as plastic and other goods.³⁰¹ However, even under this permitting scheme mountaintop removal should be more rigorously regulated, if not outright prohibited. Under its own guidelines, the Corps may not issue a permit for discharge that would "significantly

²⁹⁸ Environmental Protection Agency, "National Pollutant Discharge Elimination System (NPDES) Permit Basics," <https://www.epa.gov/npdes/npdes-permit-basics> (accessed October 19, 2018).

²⁹⁹ Environmental Protection Agency, "Clean Water Act (CWA) and Federal Facilities," <https://www.epa.gov/enforcement/clean-water-act-cwa-and-federal-facilities> (accessed October 19, 2018).

³⁰⁰ US District Court for the Southern District of West Virginia, *Bragg v. Robertson*, 72 F. Supp. 2d 642 (S.D.W. Va. 1999), October 20, 1999, <https://law.justia.com/cases/federal/district-courts/FSupp2/72/642/2336213/>.

³⁰¹ Interior Department, Office of the Inspector General, "Report of Investigation: J. Steven Griles," p. 121-23.

degrade” water quality.³⁰² This description would appear to apply to mountaintop removal valley fills, which the EPA concluded in 2011 “lead directly” to “degraded water quality [that] reaches levels that are acutely lethal to standard laboratory test organisms.”³⁰³

Human Rights Watch sent a letter to the EPA and Corps asking the agencies how they justified issuing valley fill permits, since the risk of environmental harm appears to exceed what their guidelines will tolerate. Both responded that in 2012, the Corps began requiring a more rigorous process for issuing valley fill permits. Until that year, the Corps issued permits for valley fills under a national scheme, its most permissive standard that is supposed to be reserved only for activities with “minimal adverse impacts.” However, it now requires companies to apply for individual permits to construct surface mining-related valley fills, a process that includes evaluating each application as well as public notice and comments.³⁰⁴ The letters are reproduced in full as an annex to this report. While this change is a positive step, neither the Corps nor the EPA explained the standard used for determining whether to grant the permit and how it meets the guidelines’ prohibition on discharge that would “significantly degrade” water quality.

Campaign Donations, Lobbying and the Revolving Door

Federal and state regulators’ persistent failure to adequately regulate mountaintop removal, and the swift upending of every legal or regulatory victory for better protection, is particularly troubling when considered against the vast sums spent by the industry on lobbying and campaign contributions. Since 1998, the industry spent nearly \$200 million on lobbying and around \$68 million supporting political campaigns, according to Open Secrets.³⁰⁵ Like many other industries, its political spending skyrocketed in 2010 after the US Supreme Court held that limits on corporations’ contributions violate their free speech

³⁰² Environmental Protection Agency, “Section 404 of the Clean Water Act: Section 404 Permit Program,” 2017, <https://www.epa.gov/cwa-404/section-404-permit-program> (accessed October 19, 2018).

³⁰³ Environmental Protection Agency, “The Effects of Mountaintop Mines and Valley Fills on Aquatic Ecosystems of the Central Appalachian Coalfields,” 2011, p. 1, <https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=225743>.

³⁰⁴ Environmental Protection Agency, “Managing Your Environmental Responsibilities, Section IV: Dredge and Fill/Wetlands Permit Requirements (Section 404) for Construction Projects,” https://archive.epa.gov/compliance/resources/publications/assistance/sectors/web/pdf/myer1c_dredgeandfill.pdf (accessed October 19, 2018).

³⁰⁵ *Center for Responsive Politics*, 2018, s.v. “Coal Mining: Long-Term Contribution Trends,” <https://www.opensecrets.org/industries/totals.php?cycle=2018&ind=E1210> (accessed October 19, 2018).

rights; the increase also skewed even more heavily in favor of the Republican party.³⁰⁶ Open Secrets calculated that between 2010 and 2016, the coal industry spent \$22.5 million backing Republican candidates compared to \$2.5 million on Democrats.³⁰⁷

Many of the congresspeople who voted to cancel the Stream Protection Rule benefited from the coal industry's largesse. All but one senator had received coal-industry donations – with 12 of 54 taking more than \$100,000 – since 2012 (the earliest possible year they began their term); in contrast, only 12 of 45 senators who voted to keep the rule had received such donations, and all but one were below \$4,500.³⁰⁸ The House of Representatives vote followed a similar pattern. Of the 228 representatives who favored canceling the rule, 85 had received money from the coal industry during the 2016 elections (the entire chamber is elected every two years) – including 12 who received more than \$10,000. In contrast, only five of the 194 representatives who favored keeping it had received such donations, and none more than \$2,500.³⁰⁹

Political contributors generally support candidates whose interests are already aligned with their own, so it is entirely possible that lawmakers made their decisions based on their ideological position alone. But it is hard not to see the coal industry's substantial financial support of the lawmakers who oversee their activities as obviously relevant and deeply troubling.

³⁰⁶ *Citizens United v. Federal Election Commission*, 558 U.S. 310 (2010).

³⁰⁷ *Center for Responsive Politics*, 2016, s.v. "Coal Mining: Long-Term Contribution Trends," <https://www.opensecrets.org/industries/totals.php?cycle=2016&ind=E1210> (accessed October 19, 2018).. Joe Manchin, a West Virginia senator, is the Democrat who received by far the most coal industry support. See *Center for Responsive Politics*, 2012, s.v. "Coal Mining: Money to Congress," <https://www.opensecrets.org/industries/summary.php?ind=E1210&recipdetail=S&sortorder=A&mem=Y&cycle=2012> (accessed October 19, 2018).

³⁰⁸ Political campaign contributions for all senators are available at *Center for Responsive Politics*, 2016, s.v. "Coal Mining: Money to Congress," <https://www.opensecrets.org/industries/summary.php?ind=E1210&cycle=2016&recipdetail=S&mem=N> (accessed October 19, 2018). For the voting roll call, see Congressional Record, *Disapproving A Rule Submitted By The Interior Department-- Motion To Proceed*, Senate: S632, February 2, 2017.

³⁰⁹ Political campaign contributions for all representatives are available at *Center for Responsive Politics*, 2016, s.v. "Coal Mining: Money to Congress," <https://www.opensecrets.org/industries/summary.php?ind=E1210&cycle=2016&recipdetail=H&mem=Y> (accessed October 19, 2018). For the voting roll call, see Congressional Record, *Disapproving A Rule Submitted By The Interior Department-- Motion To Proceed*, House of Representatives: H858, February 1, 2017.

As earlier noted, President George W. Bush, whom the coal industry supported, appointed Steven Griles, a former coal executive and lobbyist, as deputy secretary of the Interior Department. Once appointed, he ordered changes to a report that was crucial in allowing large-scale valley fills to continue. Prior to his appointment, Griles had ownership interest in a lobbying firm that represented at least ten mining companies, including the National Mining Association and Arch Coal, which operates mountaintop mines.³¹⁰ In December 2004, Griles was forced to resign from his position after the inspector general found he had continued to meet with his former clients while in that position.³¹¹

The investigation found that Griles had attended at least nine meetings that he said “pertained only to the court-ordered [study] of mountaintop mining,” although he said none of his previous clients attended those meetings.³¹² Moreover, the Office of Surface Mining’s director and deputy director both testified that Griles “was involved in numerous meetings and discussions regarding th[e] critical definition” of valley fills that would determine under which regime it would require permits.³¹³ In an unrelated incident in 2007 that exemplifies the potential corrupting influence of lobbyists, Griles pleaded guilty to lying to the Senate about using his position to assist the lobbyist Jack Abramoff in exchange for a \$500,000 donation to an organization with which he was associated, and was sentenced to 10 months in prison.³¹⁴

President Trump, who also received support from the coal industry, has appointed coal industry insiders to key positions.³¹⁵ In October 2017, Trump nominated Steven Gardner, a long-time consultant to the coal industry and a vocal proponent of mountaintop removal,

³¹⁰ Interior Department, Office of the Inspector General, “Report of Investigation: J. Steven Griles,” p. 119.

³¹¹ “Secretary Norton Praises Leadership of Deputy Secretary J. Steven Griles,” U.S. Interior Department press release, Washington, December 7, 2004, https://www.doi.gov/sites/doi.gov/files/archive/news/archive/04_News_Releases/041207a.htm; Juliet Eilperin, “Interior Department’s No.2 Resigns After Controversial Tenure,” *Washington Post*, December 8, 2004, <http://www.washingtonpost.com/wp-dyn/articles/A45180-2004Dec7.html> (accessed October 19, 2018).

³¹² Interior Department, Office of the Inspector General, “Report of Investigation: J. Steven Griles,” p. 119.

³¹³ *Ibid.*, 120.

³¹⁴ “Former Interior Deputy Secretary Steven Griles Sentenced to 10 Months in Prison for Obstructing U.S. Senate Investigation into Abramoff Corruption Scandal,” US Department of Justice press release, Washington, June 26, 2007, https://www.justice.gov/archive/opa/pr/2007/June/07_crm_455.html.

³¹⁵ The industry made \$265,501 in direct contributions to his campaign, according to Open Secrets, compared to \$4,302 to Hillary Clinton’s campaign. Center for Responsive Politics, 2016, s.v. “Coal Mining: Top Recipients,” <https://www.opensecrets.org/industries/recips.php?ind=E1210&recipdetail=P&sortorder=U&mem=N&cycle=2016> (accessed October 19, 2018).

to head the Office of Surface Mining, a nomination that remains pending.³¹⁶ Four years earlier, the agency had terminated its contract with Gardner’s firm to prepare an environmental impact assessment for an early draft of the Stream Protection Rule based on feedback it received from state regulators and its own staff. Joe Pizarchik, who headed the Office of Surface Mining at the time, testified before a US House of Representatives committee meeting that agency experts in states where coal mining is prevalent described the draft report as “inaccurate,” “incomplete,” “erroneous,” “incorrect,” and “insufficient.”³¹⁷ Gardner maintains that he was terminated for refusing to reduce the draft report’s finding that the rule risked cutting 7,000 jobs.³¹⁸

Although not directly related to mountaintop removal, Andrew Wheeler, the acting director of the EPA, is also a former lobbyist who represented coal and other energy companies.³¹⁹ Trump had originally appointed Wheeler as Deputy Administrator of the EPA, but he rose to his current position in July 2018 when Scott Pruitt was forced to resign from the post following a string of ethics scandals.³²⁰

The coal industry has close relationships with the state government in West Virginia, where politics has long been intertwined with the coal industry. Labor historian David Corbin has noted that for a period of fifty years, until the reforms of the New Deal, US senators and representatives from West Virginia “were generally either coal operators or men directly affiliated with the coal establishment.”³²¹ That close relationship remains true even today. West Virginia’s governor, Jim Justice, is a billionaire who inherited his family’s coal

³¹⁶ *White House Presidential Actions Archive*, October 26, 2017, s.v. “President Donald J. Trump Announces Key Additions to his Administration,” <https://www.whitehouse.gov/presidential-actions/president-donald-j-trump-announces-key-additions-administration-18/> (accessed October 19, 2018).

³¹⁷ US House of Representatives, Committee on Natural Resources, “Statement Of The Hon. Joseph Pizarchik, Director, Office Of Surface Mining Reclamation And Enforcement, U.S. Interior Department,” *Jobs At Risk: Waste And Mismanagement By The Obama Administration In Rewriting The Stream Buffer Zone Rule*, November 4, 2011, p. 9.

³¹⁸ Steve Gardner, ESCI LLC, “OSM’s Stream Protection Rule: Potential Impacts to Coal Operations,” August 26, 2016, http://pem.engineering.uky.edu/files/2016/09/Gardner.Steve_.pdf (accessed October 19, 2018).

³¹⁹ *ProPublica*, 2018, s.v. “Andrew Wheeler, Environmental Protection Agency Deputy Administrator: Bio, via Faegre Baker Daniels LLP,” <https://projects.propublica.org/trump-town/staffers/andrew-wheeler> (accessed October 19, 2018).

³²⁰ Coral Davenport, Lisa Friedman, and Maggie Haberman, “EPA Chief Scott Pruitt Resigns Under a Cloud of Ethics Scandals,” *New York Times*, July 5, 2018, <https://www.nytimes.com/2018/07/05/climate/scott-pruitt-epa-trump.html> (accessed October 19, 2018).

³²¹ David A. Corbin, *The Last Great Senator: Robert C. Byrd’s Encounters with Eleven U.S. Presidents* (Morgantown: West Virginia University Press, 2015), p. 4.

fortune.³²² He briefly sold the business, which operated mountaintop removal mines, to a Russian company but bought it back in 2015 and turned its operations over to his son.³²³

Justice appointed a former coal executive, Austin Caperton, to head the state's Department of Environmental Protection. Caperton previously worked for Massey Energy, a firm notorious for violating mining regulations; in 2016, its former CEO, Don Blankenship, was sentenced to one year in federal prison for willfully violating mining standards. The charges were tied to an explosion in the Upper Big Branch mine that killed 29 miners.³²⁴ Ironically, a government-commissioned report incident cited "the cozy relationship . . . between the enforcement agency and the industry it regulates" for creating an environment where violations went ignored or were dismissed with a slap on the wrist. As the report wryly notes, even the state's lead investigator into the disaster left before its conclusion to take a job with Alpha Energy.³²⁵

³²² *Forbes*, 2018, s.v. "Jim Justice, II," <https://www.forbes.com/profile/jim-justice-ii/#5f2a90477fe6> (accessed October 18, 2018).

³²³ Paul J. Nyden. "Justice buys back coal company from Russians," *Charleston Gazette-Mail*, February 17, 2015, https://www.wvgazette.com/business/justice-buys-back-coal-company-from-russians/article_f4c55841-57c4-58eb-8a46-493ed7eb866e.html (accessed October 18, 2018); Phil Kabler, "Some of Justice's companies put in blind trust," *Charleston Gazette-Mail*, March 2, 2017, https://www.wvgazette.com/news/politics/some-of-justice-s-companies-put-in-blind-trust/article_f6193a4f-b470-5606-a9d6-cb41f98ba409.html (accessed October 18, 2018).

³²⁴ Ryan Koronowski, "Huge Coal Company To Pay Largest-Ever Fine After 6000 Clean Water Violations in 7 Years," *ThinkProgress*, March 5, 2014, <https://thinkprogress.org/huge-coal-company-to-pay-largest-ever-fine-after-6-000-clean-water-violations-in-7-years-94f7b82d45f4/> accessed October 19, 2018); *US Department of Justice Office of Public Affairs*, April 6, 2016, s.v. "Former Massey Energy CEO Sentenced to a Year in Federal Prison," <https://www.justice.gov/opa/pr/former-massey-energy-ceo-sentenced-year-federal-prison> accessed October 19, 2018).

³²⁵ West Virginia Governor's Independent Investigation Panel, "Upper Big Branch: The April 5, 2010 Explosion: A Failure of Basic Coal Mine Safety Practices: Report to the Governor," May 2011, p. 89, <https://www.afsc.org/sites/default/files/documents/Upper%20Big%20Branch%20Report.pdf>.

IV. International Human Rights Law

International human rights law recognizes the right of all people to the highest attainable standard of health and to safe drinking water. It also recognizes people's right to information affecting these rights. States have a duty, in accordance with their international obligations, to prevent and protect against human rights abuse committed by business and other non-state actors, including through robust and effective regulation.

Congress' decision to eliminate a regulation that protected streams from mining pollution, without adequately addressing the risks to health and water of communities living near mountaintop removal mines, is inconsistent with this duty. Similarly, the Trump administration's decision to cancel a study assessing the potential health effects of surface mining operations in central Appalachia has denied residents information on risks to their health and created an obstacle for the government to better protect them from those risks.

Rights to Health and a Healthy Environment

The right to health is elaborated by the International Covenant on Economic, Social, and Cultural Rights (ICESCR), as well as other international human rights treaties.³²⁶ Its substantive content has been further elaborated through the work of treaty bodies including the Committee on Economic, Social and Cultural Rights (ESC Rights Committee), the expert body charged with interpreting and monitoring state compliance with the Covenant. The US government has signed, but not yet ratified, the ICESCR, and as such is not legally bound by its provisions.³²⁷ The Covenant and the work of the Committee do, however, constitute a useful and authoritative guide to the content of the right to health and the steps the US government should take to protect and realize it.

³²⁶ International Covenant on Economic, Social and Cultural Rights (ICESCR), December 19, 1966, art. 12.

³²⁷ As a signatory to the ICESCR, the United States is obliged to refrain from take any action that would "defeat the object and purpose" of the treaty. Vienna Convention on the Law of Treaties, adopted May 23, 1969, 1155 U.N.T.S. 331, entered into force January 27, 1980, art. 31. It is considered to articulate a norm of customary international law. Article 25 of the Universal Declaration of Human Rights, which is widely considered to be broadly reflective of international law, guarantees a standard of living "adequate for the health and well-being of himself and his family."

Under the ICESCR, the right to health encompasses the right to a healthy natural environment.³²⁸ The Covenant obliges states parties to improve "all aspects of environmental and industrial hygiene" in order to prevent, treat, and control "epidemic, endemic, occupational and other diseases."

Increasingly, there is a recognition that a safe, clean, healthy and sustainable environment is integral to the full enjoyment of a wide range of human rights, including the rights to life, health, food, water and sanitation. In March 2012, the United Nations Human Rights Council established a mandate on human rights and the environment and appointed John Knox first as an independent expert and later as a special rapporteur. During his mandate, Knox sought to clarify what international human rights law requires of governments vis-à-vis environmental issues.

After five years of intensive work, Knox set out a framework of 16 principles to guide states on their human rights obligations related to a healthy environment. Knox emphasized that states should establish and maintain substantive environmental standards that are non-discriminatory, non-retrogressive and otherwise respect, protect and fulfill human rights. Of particular relevance to the concerns laid out in this report, he argued that while these standards should take into account the best available science, the lack of full scientific certainty should not be used to justify postponing effective and proportionate measures to prevent environmental harm, especially when there are threats of serious or irreversible damage.³²⁹

International law obliges states to prevent private actors from abusing human rights, and this includes a duty to regulate business activities to ensure that they do not cause human rights abuse or otherwise threaten the enjoyment of fundamental human rights.³³⁰ The ESC Rights Committee has clarified that the right to health includes a duty for state parties to

³²⁸ ICESCR, art. 12; ESC Committee, General Comment No. 14, The Right to the Highest Attainable Standard of Health, para 15.

³²⁹ United Nations Human Rights Council, "Report of the Special Rapporteur on the issue of human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment," A/HRC/37/59, March 23, 2018, http://srenvironment.org/wp-content/uploads/2018/02/A_HRC_37_59_AdvanceEditedVersion.pdf.

³³⁰ UN Human Rights Committee, General Comment No. 31, The Nature of the General Legal Obligation Imposed on States Parties to the Covenant, para. 8; CESCR, General Comment No. 14, The Right to the Highest Attainable Standard of Health, U.N. Doc. E/C.12/2000/4 (2000), para. 51; OHCHR, "UN Guiding Principles on Business and Human Rights, Implementing the United Nations 'Protect, Respect, and Remedy' Framework," 2011, http://www.ohchr.org/Documents/Publications/GuidingPrinciplesBusinessHR_EN.pdf (accessed September 14, 2017)

“regulate the activities of individuals, groups or corporations so as to prevent them from violating the right to health of others.”³³¹ It also prohibits state parties from taking retrogressive measures that may negatively affect public health, including “the formal repeal or suspension of legislation necessary for the continued enjoyment of the right to health.”³³²

Right to Water

Under the ICESCR, the right to water entitles everyone, without discrimination, “to have access to sufficient, safe, acceptable, physically accessible and affordable water for personal and domestic use.”³³³ Under that framework, the right to water is rooted in the guarantee of an adequate standard of living, but it is also intrinsically connected to the rights to health and life, among others.³³⁴

The ESC Rights Committee, in its General Comment No. 15 on the right to water, described the minimum water quality encompassed by this right:

The water required for each personal or domestic use must be safe, therefore free from micro-organisms, chemical substances and radiological hazards that constitute a threat to a person’s health. Furthermore, water should be of an acceptable colour, odour and taste for each personal or domestic use.³³⁵

The Committee also noted that the right includes access to “information concerning water issues.” The Stream Protection Rule’s monitoring requirement and the National Academy of Sciences study would have both been important sources of such information to potentially impacted people.

³³¹ ESC Rights Committee, General Comment No. 14, The Right to the Highest Attainable Standard of Health, U.N. Doc. E/C.12/2000/4 (2000), para. 51.

³³² *Ibid.*, para. 48.

³³³ United Nations General Assembly, “The human rights to safe drinking water and sanitation,” Resolution 70/169, UN Doc. A/RES/70/169, December 17, 2015.

³³⁴ *Ibid.* See also, UN Human Rights Council resolution 15/9 of September 2010, resolution 16/2 of March 2011, resolution 18/1 of September 2011 and resolution 21/2 of September 2012.

³³⁵ UN Committee on Economic, Social and Cultural Rights, General Comment No. 15, The Right to Water, U.N. Doc. E/C.12/2002/11, adopted January 20, 2003, para. 12(b).

Because the Covenant requires states to progressively realize economic and social rights, the ESC Rights Committee infers a “strong presumption that retrogressive measures” are prohibited, a principle that the first UN Special Rapporteur on the Human Right to Safe Drinking Water and Sanitation specifically applied to the context of her mandate.³³⁶ Since it is not a party to the Covenant, the US is not legally bound by that prohibition, but should nonetheless embrace it as a necessary component of any policy framework that aims to adequately protect the right to water.

Corporate Human Rights Responsibilities

As articulated under the UN Guiding Principles on Business and Human Rights, all businesses including coal companies have a responsibility to respect human rights, and ensure that they do not cause or contribute to human rights abuses.³³⁷ The central pillar of these Principles is a requirement that companies carry out due diligence to identify the possible and actual human rights risks in their operations and lay out steps to prevent or mitigate those risks. In the context of mining operations that impact nearby communities or water supplies, that process should include good faith review of scientific evidence of the health impacts of their activities — and support for new, independent research where evidence is inconclusive. If a rights abuse did occur, then a coal company should endeavor to ensure that effective remedy is available to victims and participate in remediation.

³³⁶ *Ibid.*, p. 42 and United Nations General Assembly, “Report of the Special Rapporteur on the human right to safe drinking water and sanitation, Catarina de Albuquerque,” July 11, 2013, https://reliefweb.int/sites/reliefweb.int/files/resources/A-HRC-24-44_en.pdf.

³³⁷ Office of the High Commissioner for Human Rights, “UN Guiding Principles on Business and Human Rights, Implementing the United Nations ‘Protect, Respect, and Remedy’ Framework,” 2011, http://www.ohchr.org/Documents/Publications/GuidingPrinciplesBusinessHR_EN.pdf (accessed September 14, 2017).

Acknowledgments

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It was reviewed and edited by Arvind Ganesan, business and human rights director; Alison Leal Parker, US program director; Megan McLemore, senior research in the Health and Human Rights division; Amanda Klasing, senior researcher in the Women’s Rights division and specialist on the right to water; Katharina Rall, researcher in the Environment and Human Rights division; Chris Albin-Lackey, senior legal advisor; and Babatunde Olugboji, deputy program director. Additional editorial and production assistance were provided by Namratha Somayajula, business and human rights associate. The report was prepared for publication by Jose Martinez, senior coordinator; and Fitzroy Hepkins, administrative manager.

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Appendix: Responses to Human Rights Watch Letters

September 21, 2018

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Greetings,

It is my pleasure to answer the technical questions you have asked in your comparison of the Ahern et al. (2011) and Lamm et al. (2015) papers on mountaintop-mining (MTM) counties and birth defects.

1. Why did our study look only at the West Virginia data and not the four-state data that Ahern looked at?

This was answered in our paper (page 77) in the last three paragraphs of the introduction. Because of the lack of balance of MTM mining counties across the four states, the Ahern comparison was of MTM-mining counties in WV and KY and the non-mining counties of TN and VA. Only WV had a significant proportion of its live births occurring to residents of MTM counties – 34% compared to 9%, 2%, and 1%. WV had a balanced distribution of counties with about 1/3 having MTM-mining activity ($18/55 = 33\%$), 1/3 non-MTM mining activity ($14/55 = 25\%$), and 1/3 no mining activity ($23/55 = 42\%$).

2. Why did you exclude hospitals with fewer than 1,000 live births in your more detailed analyses?

The answer to this question is demonstrated in Table 1. The last paragraph of the introduction states the purpose of this paper: We hypothesize that hospital of birth may bias the estimation and comparison of prevalence rates for birth defects by mining groups. We shall assess whether the prevalence rates for birth defects are explained by county of maternal residency (MTM or non-mining) or by hospital of birth. This gives us an opportunity to demonstrate how data quality issues, such as unbalanced distributions of live births

among hospitals and observer bias, may be handled to bring clarity to findings and conclusions.

Table 1 demonstrates that the crude prevalence rate ratio [PRR] (birth defect rate for residents of MTM-mining counties versus for residents on non-mining counties) was 1.43 (95% CI, 1.36-1.52) when all 319 birth sites were included. However, the analysis for the hospital-adjusted PRR could not converge. The model did converge when the analysis was restricted to the 44 hospitals that had greater than 1,000 resident live births in MTM-mining and non-mining counties during the 20-year study period.

This reduced data set still contained 98% of the live births to residents of the MTM-mining counties ($152,540/155,382 = 98\%$) and 95% of the live births to residents of the non-mining counties ($132,732/139,603 = 95\%$). Further, there was no loss of information as the crude prevalence rate ratio was still 1.43 (95% CI, 1.35-1.51). With this data set, the analytic model for the hospital-adjusted prevalence rate ratio converged with Hospital-adjust PRR = 1.08 (95% CI, 0.97-1.20; $p = 0.16$).

3. Why did you not adjust for maternal age, education, or smoking status, as Ahern et al. (2011) did?

Table 3 in Ahern (2011) report both “unadjusted” and “adjusted” prevalence rate ratios (with 95% confidence limits) for birth defect rates for residents of MTM-mining counties and of non-mining counties.

The “unadjusted” PRR was 1.63 (95% CI, 1.54-1.72), which is statistically significantly elevated [the lower confidence limit is greater than 1.0]. The “adjusted” PRR was 1.26 (95% CI, 1.21-1.32), also statistically significantly elevated, but much less so than the “unadjusted” PRR. The purpose of performing the “adjusted” PRR calculation was determine whether the statistically significant elevated “unadjusted” PRR could be entirely explained by known co-variates. This procedure showed that the co-variates could explain most of the increased risk. The “unadjusted” PRR showed an excess PRR of 0.63, and the “adjusted” PRR showed an excess PRR of 0.26. Therefore, the examined co-variates explained 59% of the statistically significant excess PRR in the “unadjusted” PRR $[(0.63-0.26)/0.63 = 0.37/0.63 = 59\%]$. There still remained a statistically significant residual excess PRR of 0.26 that was not explained by the examined co-variates.

In contrast, our unadjusted PRR showed an excess PRR of 0.43, and our hospital-adjusted PRR showed an excess ERR of 0.08. Therefore, the one examined co-variate (hospital of birth) explained 81% of the statistically significant excess PRR in the unadjusted

PRR $[(0.43-0.08)/(0.43) = 0.35/0.43 = 81\%]$. As there was no statistically significant residual excess PRR after adjusting for hospital of birth, there was no need to seek other explanatory co-variates, such as maternal age, education, or smoking.

In addition to the technical questions, you asked about the role of ARIES and its member companies in the development of this paper. The statement of the non-role of ARIES applies also to the member companies of ARIES. Our only contacts were with the staff of Virginia Polytechnical Institute. CEOH closed its offices in 2016, and I do not recall the financial value of this contract.

You also asked what other work we have done for ARIES – that would have been the work on small for gestational age infants in Appalachia and analyses related to epidemiologic studies on arsenic.

Cordially,

Steve

Steven H. Lamm, MD, DTPH
Center for Epidemiology and Environmental Health
Washington, DC



HAL QUINN
President & CEO

September 27, 2018

Mr. Arvind Ganesan
Director
Business and Human Rights
350 Fifth Avenue, 34th Floor
New York, NY 10118-3299

Dear Mr. Ganesan:

Thank you for reaching out and providing the opportunity for the National Mining Association (NMA) to offer its perspective on the many topics raised in your letter.

Research. Your letter mentions Human Rights Watch's examination of mining-related research. NMA and its members also rely on independent, peer-reviewed research and, in the case of research on mountaintop mining, I would direct you to the research of the National Institute of Environmental and Health Sciences at the National Institutes for Health (NIH), which concluded in July 2017, after examining more than 3,000 available studies, that it is not possible to "reach conclusions on community health effects of MTR mining because of the strong potential for bias in the current body of human literature." Researchers noted specifically that studies often failed to account for "individual-level contributors to mortality such as poor socioeconomic status or smoking." (Source: Systematic Review of Community Health Impacts of Mountaintop Removal Mining, Abee L. Boyles*, Robyn B. Blain, Johanna R. Rochester, Raghavendhran Avanasi, Susan B. Goldhaber, Sofie McComb, Stephanie D. Holmgren, Scott A. Masten, Kristina A. Thayer)

Regulatory and Policy Protections. Regarding your question on "regulatory and policy response," there are extensive environmental protections currently administered by the Environmental Protection Agency, the Army Corps of Engineers, the Fish and Wildlife Service and the states' regulatory authorities to ensure environmental protections are in place wherever mining occurs – indeed, the United States has some of the strictest environmental protections in the world.

Even before mining begins, detailed plans are made, and funding is secured to support the restoration of land after mining operations have concluded. Today's mining

Mr. Arvind Ganesan
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projects begin with extensive environmental and engineering studies, public involvement in major decision-making, and compliance with scores of state and federal laws and regulations governing every facet of the environment, from wildlife habitat protection to water quality monitoring. Projects end with land reclamation that often includes making reclaimed mining sites useful to the community for wildlife enhancement, developed recreation areas and other local community needs.

You specifically asked about the Stream Rule, which was ultimately unsuccessful because it would have duplicated, contradicted and created confusion around established state and federal regulations. As you may know, the Surface Mining Control and Reclamation Act of 1977 expressly prohibits rulemaking that creates regulatory overlap resulting in uncertainty through inconsistent requirements. We were public about our opposition to the Stream Rule for these very reasons – it was unlawful and would have provided no additional protections that weren't already covered by existing state and federal authorities.

The National Academies of Sciences (NAS) Study. Finally, your letter also asks about the NAS study that was cancelled in 2017. We publicly opposed the NAS study, whose committee was charged with a review of existing research to "identify(ing) gaps in the research and consider(ing) options for additional examination." Our position was and is that, for \$1 million, taxpayers should expect more than research to identify new areas to research. Legitimate efforts to improve health and safety in and around mines should be supported and applauded, but this re-review of existing flawed research would have been a very expensive waste of taxpayer dollars.

Nevertheless, we continue to believe that efforts made in good faith and without an agenda to advance health and safety in and around mines deserve support.

Sincerely,



Hal Quinn



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

October 19, 2018

OFFICE OF WATER

Arvind Ganesan
Director, Business and Human Rights
Human Rights Watch
350 Fifth Avenue, 34th Floor
New York, NY 10118-3299

Dear Mr. Ganesan,

Thank you for your September 17, 2018 correspondence to the U.S. Environmental Protection Agency (EPA) Acting Administrator Andrew Wheeler regarding your interim findings concerning the environmental impacts of mountaintop removal mining in central Appalachia. I want to thank you for your commitment, information, and input in support of efforts to reduce these impacts. Your letter has been referred to me in EPA's Oceans, Wetlands and Communities Division within the Office of Water. I would like to take this opportunity to respond to the specific questions raised in your letter.

1) In light of studies indicating the health risk posed by mountaintop mining, as well as severe degradation of streams near these mines, has the EPA taken or considered taking any actions to change its process for issuing permits for valley fills or for monitoring, preventing, mitigating or remediating possible Clean Water Act violations due to mountaintop removal mining?

The EPA works with our regulatory partners to help ensure that Clean Water Act (CWA) Section 404 permit decisions for surface coal mining projects are environmentally protective and legally defensible. Although the EPA does not render a decision as to whether or not to issue the required permits, the U.S. Army Corps of Engineers (Corps) makes that determination, we have an important role in this process. The EPA developed, in coordination with the Corps, the environmental criteria used in evaluating CWA Section 404 permit applications for the proposed discharge of dredged or fill material into the nation's waters. These criteria are known as the CWA Section 404(b)(1) Guidelines (Guidelines). Importantly, the Guidelines require a demonstration that the proposed discharge will not result in significant degradation of the aquatic environment, that there are no less environmentally damaging alternatives to the discharge, and that all appropriate and practicable steps have been taken to avoid and minimize impacts and to compensate for any unavoidable impacts to the aquatic environment. The EPA continues to affirm these key tenets of the Guidelines in our coordination with the Corps and in our careful review of surface coal mining proposals under CWA Section 404. Through this review, the EPA has recommended the incorporation of cost-effective best management practices (BMP) for

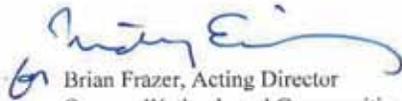
associated with surface coal mining and reclamation operations that have been authorized or are being processed by States with approved programs under the Surface Mining Control and Reclamation Act. The Corps' reissuance of NWP 21 in 2012 included significant revisions to NWP 21 to provide greater assurance that this general permit will authorize only those discharges of dredged or fill material into waters that have minimal individual and cumulative adverse effects on the aquatic environment. Environmental thresholds limiting stream loss were added to NWP 21 for consistency with many of the other NWPs. The revised NWP 21 also included a new condition prohibiting its use to authorize valley fills. These provisions were retained in the current version of NWP 21 that was reissued by the Corps in 2017.

4) *Several peer-reviewed studies conducted by West Virginia University scientists measured concentrations of toxic particulate matter in residential areas near mountaintop removal sites that dramatically exceeded legal limits under the Clean Air Act. What steps, if any, has the EPA taken to ensure that areas near surface mining sites comply with particulate matter limits?*

The Clean Air Act requires the EPA to set national air quality standards for particulate matter, as one of the six criteria pollutants considered harmful to public health and the environment. The law also requires the EPA to periodically review the standards to ensure that they provide adequate health and environmental protection, and to update those standards as necessary. The EPA is committed to helping state and local governments meet the Agency's national air quality standards for particulate matter.

Thank you again for your letter and raising these important concerns. I hope this information is helpful. If you have any further questions or concerns, please contact me at Frazer.Brian@epa.gov.

Sincerely,



Brian Frazer, Acting Director
Oceans, Wetlands and Communities Division



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October 29, 2018

Arvind Ganesan
Director Business and Human Rights
Human Rights Watch
350 Fifth Avenue, 34th Floor
New York, NY 10118-3299

Dear Mr. Ganesan:

Thank you for contacting us regarding the Appalachian Research Initiative for Environmental Science (ARIES) program and policies. I am happy to share the following information with you.

The Virginia Center for Coal and Energy Research (VCCER) administers the ARIES program. The VCCER was created by an Act of the Virginia General Assembly on March 30, 1977, as an interdisciplinary study, research, information and resource facility for the Commonwealth of Virginia, located at Virginia Tech. Derived from its legislative mandate and years of experience, the mission of the VCCER involves five primary functions:

- Research in interdisciplinary energy and coal-related issues of interest to the Commonwealth
- Coordination of coal and energy research at Virginia Tech and in the Commonwealth of Virginia
- Dissemination of coal and energy research information and data to users in the Commonwealth
- Examination of socio-economic implications related to energy and coal development and associated environmental impacts
- Assistance to the Commonwealth of Virginia in implementing the Commonwealth's energy plan

The Virginia Center for Coal and Energy Research and Appalachian Research Initiative for Environmental Science has no affiliation with the U.S. Department of Interior.

ARIES is an Industrial Affiliates Program and functions under Virginia Tech's policies for such programs, information about which can be found here: <https://osp.vt.edu/industry/industrial-affiliates-program.html>. Simply stated, Virginia Tech's industrial affiliates program allow companies to become members, to pay membership fees, and for the fees to be expended in support of the specific purpose(s) of the individual industrial affiliates program. As with all Industrial Affiliates Programs at Virginia Tech, ARIES members would not have a role in selecting specific projects to receive contracts for sponsored research.

Furthermore, it has been ARIES policy since its inception that the focus of individual research projects is not dictated by ARIES IAP members and that researchers must adhere to the integrity policies of their respective organizations. Virginia Tech policy, precludes members from dictating research methodology. Per the Industrial Affiliates Program FAQs (at <https://osp.vt.edu/resources/faqs/industrial-affiliates-faqs.html>), "An industrial affiliate is not entitled to specify the protocol to be used in the conduct of a specific research effort."

ARIES was a 5-year program, with membership beginning in 2011 and ending in 2015. Research funded by ARIES continued beyond 2015 and all contracted research projects were completed by 2017. As stated in the ARIES membership agreements,

The purpose of this membership program is to conduct research on potential upstream (mining, drilling and processing) and downstream (water, land, air) environmental impacts of the mining, gas and energy sectors in Appalachia. To accomplish its mission, ARIES will conduct scientific inquiry and research, foster publication and contribute to the relevant literature, and engage in outreach efforts to share and disseminate research results.

At this time a portion, but not all, of the research results have been published.

Thank you for your interest in our research.

Sincerely,

A handwritten signature in black ink that reads "Edmund Jong". The signature is written in a cursive, flowing style.

Edmund Jong, Ph.D.
Research Assistant Professor and
ARIES Project Director



DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
441 G STREET, NW
WASHINGTON, DC 20314-1000

OCT 22 2018

Mr. Arvind Ganesan
Director, Business and Human Rights
Human Rights Watch
350 Fifth Avenue, 34th Floor
New York, New York 10118-3299

Dear Mr. Ganesan:

Thank you for your September 17, 2018, letter regarding concerns about the health risks of mountaintop removal mining in central Appalachia. I am responding to your letter on behalf of Lieutenant General Todd Semonite.

A complex statutory framework governs the regulation of coal mining activities such as the construction of valley fills and associated sediment ponds. Congress passed the Surface Mining Control and Reclamation Act of 1977 (SMCRA) to establish a nationwide program to protect society and the environment from the adverse effects of surface coal mining operations. While the federal Office of Surface Mining (OSM) has the responsibility for SMCRA implementation, all states in the Appalachian Region (with the exception of Tennessee) have been granted primacy by OSM and those states currently regulate and permit surface coal mining and reclamation operations in their states. The U.S. Army Corps of Engineers (Corps) regulatory authority under Section 404 of the Clean Water Act (CWA) applies to the discharge of dredged or fill material into waters of the United States. The Section 404(b)(1) Guidelines developed by the Environmental Protection Agency (EPA) in conjunction with the Corps are the substantive environmental criteria used by the Corps in evaluating activities regulated under Section 404. The Corps' review is limited to effects caused by the discharge of fill material into jurisdictional waters, while broader effects from the overall mining operations are appropriately regulated under SMCRA. See *Ohio Valley Environmental Coalition v. Aracoma Coal Company*, 556 F.3d 177 (4th Cir. 2009).

In your letter, you raised three specific questions about the Corps of Engineers permitting of valley fills associated with surface coal mining. I will respond to them in the order in which they were presented.

1. In the May 9, 2002, "Definition of Fill" Rule, EPA and the Corps clarified that overburden from mining is appropriately classified as fill material (33 CFR Part 323.2(e)(2)). In this regard, the discharge of this overburden material into waters of the United States must be authorized by a permit issued by the Corps pursuant to Section 404 of the CWA.

2. As noted above, the Corps evaluates a proposed discharge to determine compliance with the Section 404(b)(1) Guidelines. If a proposal would cause or contribute to significant degradation of waters of the United States, it would not comply with the Guidelines and a Section 404 permit would not be issued. Conversely, if a Section 404 permit is issued for a proposed discharge of fill material, a determination has been made by the Corps that the proposal will not cause significant degradation. Additionally, before the Corps can issue a Section 404 permit, the state must issue a water quality certification pursuant to Section 401 of the CWA that the proposal will not violate state water quality standards.

3. For many years, Nationwide Permit (NWP) 21 was the primary type of general permit that was used to authorize surface coal mining activities. When the NWPs were reissued in 2012 (effective date March 19, 2012), a restriction was added to NWP21 to prevent it from being used to authorize the construction of valley fills. While a similar restriction was not added to NWP49 (Coal Remining Activities) or NWP50 (Underground Coal Mining Activities), historically those NWPs have not routinely been used to authorize construction of valley fills. In the event that a Corps district proposes to use either NWP49 or NWP50 to authorize a project that involves construction of a valley fill, that NWP verification could only be issued if the district determines that the discharge will result in no more than minimal adverse effects.

If you have any additional questions or wish to further discuss these issues, please feel free to contact Mr. William L. James, the Corps National Mining Expert at (615) 369-7508 or by email at william.l.james@usace.army.mil.

Sincerely,

A handwritten signature in blue ink, appearing to read 'J. Dalton', is positioned above the printed name.

James C. Dalton, P.E.
Director of Civil Works



THE COAL MINE NEXT DOOR

How the US Government's Deregulation of Mountaintop Removal Threatens Public Health

The Trump administration and current Congress have championed deregulation, especially of the coal industry, as an economic boon. The process' speed, limited public consultations, devaluation of science, and close relationship with industries standing to benefit from deregulation threaten workers, public health, and the environment. This report documents the health risks of mountaintop removal, a form of surface coal mining which involves blasting off up to 400 vertical feet of a mountain to reach buried coal seams and dumping the remaining land into a nearby valley, generating toxic air pollution and burying or contaminating thousands of miles of streams. Under the Trump administration, Congress canceled the Stream Protection Rule and the Interior Department subsequently halted a half-completed study assessing the health risks of surface mining operations in central Appalachia. Over a dozen peer-reviewed scientific studies have found elevated rates of cardiovascular disease, cancer, and other health problems in areas with mountaintop removal. The Interior Department should immediately reinstate the canceled study and enact a new rule that adequately protects people from health risks of living near mountaintop removal or ban the practice entirely. Congress should enact a law setting out specific criteria federal agencies must meet when deciding to halt or alter the terms of reference for scientific research they have agreed to fund.

(above) A row of homes that abut a valley fill from a mountaintop removal mine on Coal Mountain, Wyoming County, West Virginia

*© 2018 Mariam Dwedat
for Human Rights Watch*

(front cover) Aerial view of a mountaintop mine in West Virginia

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