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HOW BREATHING COAL ASH IS HAZARDOUS TO YOUR HEALTH

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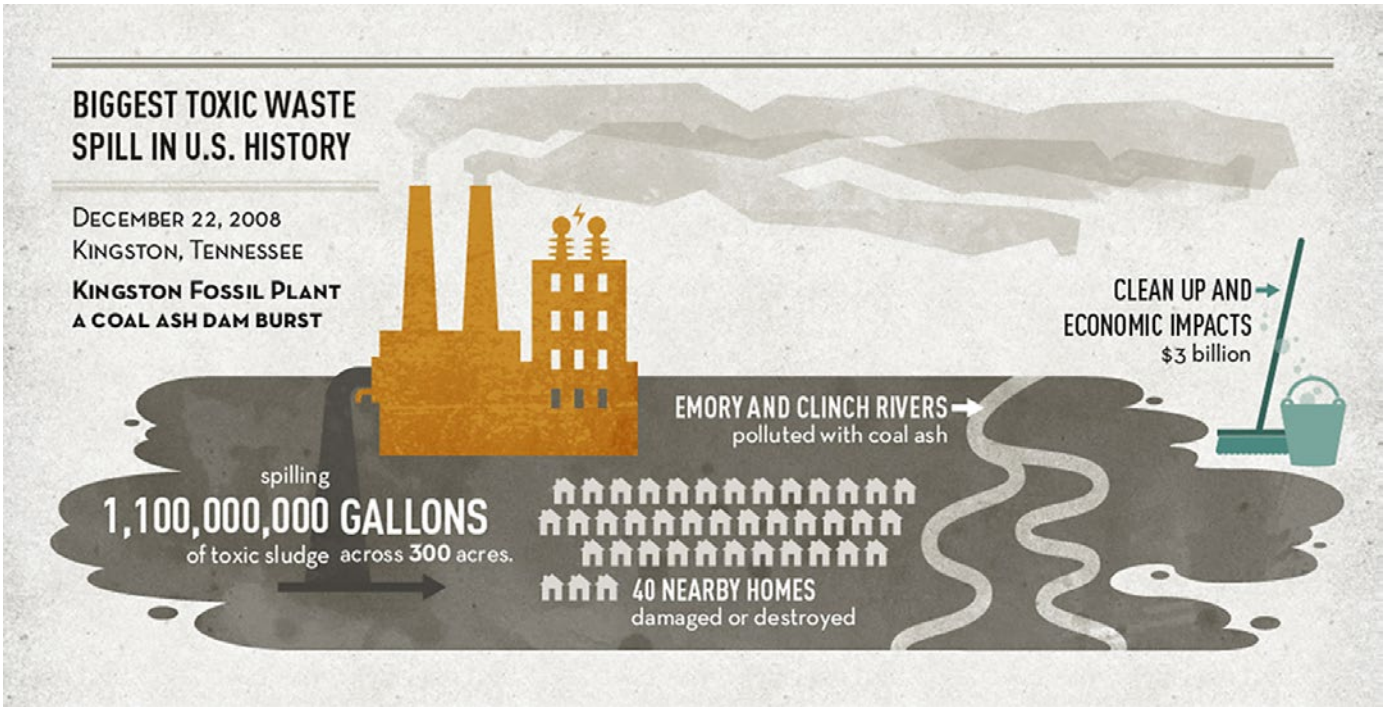
Toxic coal ash dust at the Making Money Having Fun Landfill in Bokoshe, OK.

INTRODUCTION

Take a deep breath. But if you live near a coal-burning power plant that dumps coal ash into a nearby landfill or lagoon, don't inhale too deeply because you're probably breathing fugitive dust made up of airborne coal ash filled with dangerous and toxic pollutants. Whether blown from an uncovered dump site or from the back of an open truck, toxic dust contaminates hundreds of fence line communities across the country. Acrid dust stings residents' eyes and throats, and asthmatics, young and old, are forced to reach for inhalers. Breathing this toxic dust can be deadly, and yet no federal standards exist to protect affected communities. This report describes the health impacts of the pollution found in coal ash dust. It also points to the imminent need for federal controls to limit exposure and protect the health of millions of Americans who live near coal ash dumps.

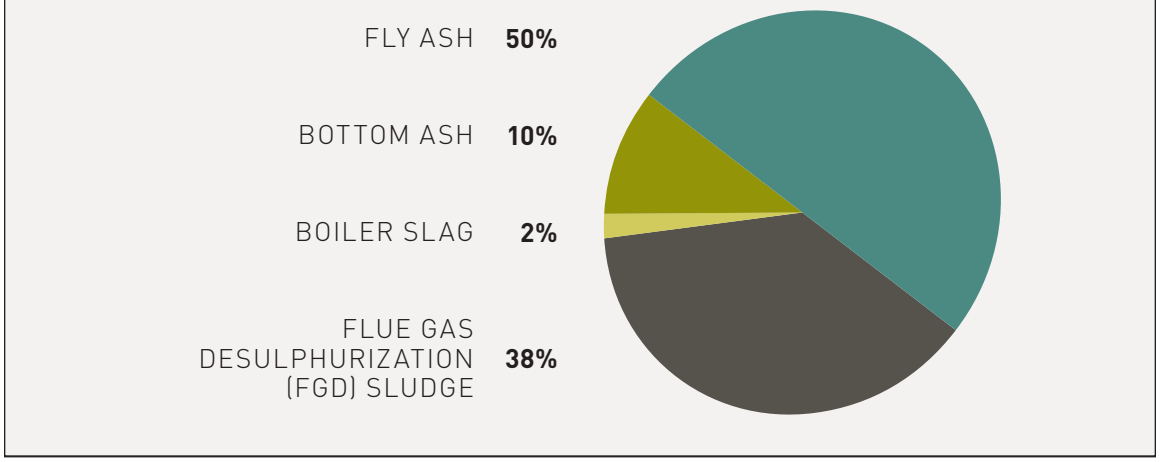
Coal combustion waste (or coal ash[1]), particularly fly ash, a major component of coal ash waste, poses significant health threats because of the toxic metals present in the ash, such as arsenic, mercury, chromium (including the highly toxic and carcinogenic chromium VI), lead, uranium, selenium, molybdenum, antimony, nickel, boron, cadmium, thallium, cobalt, copper, manganese, strontium, thorium, vanadium and others. Ironically, as coal plant pollution controls like electrostatic precipitators and baghouse filters become more effective at trapping fly ash and decreasing coal plant air pollution, the waste being dumped into coal ash waste streams is becoming more toxic.

Coal ash is best known for polluting our drinking water, lakes, rivers and streams, and the threat it poses when dumped into large earthen dams that can and do break, causing catastrophic spills and leaks. In February 2014, just days after the U.S. Environmental Protection Agency (EPA) announced a deadline for finalizing federal coal ash regulations, an underground pipe beneath a coal ash pond in North Carolina ruptured, sending 82,000 tons of coal ash into the Dan River. In December 2008, a massive coal ash pond at the Tennessee



Coal ash spilled from the TVA Kingston Power Plant covered 300 acres and damaged 40 nearby homes.

CATEGORIES OF COAL COMBUSTION WASTE



Coal ash is comprised of four categories of combustion waste. Fly ash makes up the largest percentage (about half) by weight. Fly ash is the lightest of the four wastes and the most likely to become airborne. It is carried up with hot flue gases and trapped by stack filters.

SOURCE: WWW.EPA.GOV/RADIATION/TENORM/COALANDCOALASH.HTML

Valley Authority's Kingston Fossil Plant in Harriman, Tennessee, burst, sending more than 1 billion gallons of coal ash sludge across 300 acres, destroying and damaging 40 nearby homes and polluting miles of two nearby rivers. These are two examples of more than 200 documented instances of coal ash contaminating nearby waters across the country.[2] Large-scale catastrophes are dangerous, well documented and publicized; but less visible dangers of coal ash pose another threat. When suspended in the air as dust, coal ash is a serious health hazard. The inhalation of toxic dust from disposal, transport and plant operations can cause serious injuries to workers and communities residing near coal ash dumps.

The huge volume of ash produced by the nation's 495 coal-burning power plants amplifies the risk.[3] In 2007, these plants together generated more than 140 million tons of coal ash, enough to fill train cars stretching from the North Pole to the South Pole.[4] This ash was disposed of in approximately 1,070 wet impoundments (or ponds), 435 landfills, hundreds of mines and uncounted numbers of gravel pits, piles and other sites.[5] When disposed, coal ash dust is emitted into the air by loading and unloading, transport and wind. Once in the air, it can migrate off-site as fugitive dust. As a result, workers and nearby residents could be exposed to significant amounts of coarse particulate matter (PM_{10}) and fine particulate matter ($PM_{2.5}$).

Protective practices to control toxic dust, such as moistening dry ash or covering it daily in a landfill, can minimize the dangers to public health. Yet there are currently *no* federal requirements to control fugitive toxic dust. At most coal ash dumps state regulations do not mandate daily cover, and adequate cover may only be required monthly or even yearly. The EPA found that such infrequent dust suppression has "the potential to lead to significant risks."[6]

WHY INHALING COAL ASH IS HARMFUL

EXPOSURE TO SMALL PARTICLE POLLUTION

Coal ash dust is small particles; the smaller the particle, the greater the health risks. The very smallest particles are inhaled into the deepest part of the lungs where they trigger inflammation and immunological reactions. Some particles gain access to the systemic circulation and travel to distant organs where they produce heart or lung disease, while others may enter the brain directly via the nerves in the nose. The disease-causing potential of small particles, particularly those less than 2.5 micrometers in their aerodynamic diameter ($PM_{2.5}$), has led the EPA to include them among the six criteria pollutants under the Clean Air Act, which requires national

When suspended in the air as dust, coal ash is a serious health hazard.

air quality standards for certain pollutants that cause adverse health impacts, including $PM_{2.5}$.[7]

As epidemiological research becomes more sophisticated due to improved techniques for monitoring air quality and advances in statistical and population sampling methods, it seems likely that there is no level at which $PM_{2.5}$ is assuredly free from causing adverse health effects. This principle became clear in a study of 51 metropolitan areas published in the *New England Journal of Medicine*, the world's leading peer-reviewed medical journal. The investigators who wrote this paper retrieved $PM_{2.5}$ and mortality data from the late 1970s and early 1980s and compared it to data obtained about two decades later. Uniformly, these analyses showed important increases in health benefits as the $PM_{2.5}$ concentrations fell. For example, in the Buffalo, New York, metropolitan area, a reduction of 13 micrograms per cubic meter of air was associated with a three- to four-year increase in life expectancy.

Many other studies published in leading peer-reviewed medical journals have shown similar results—higher particulate concentrations are associated with higher mortality rates. These studies link coal-derived particulates, including those from fly ash, to the four leading causes of death in the U.S.: heart disease, cancer, respiratory diseases and stroke. In addition, preliminary data may lead to adding Alzheimer's disease and Type II diabetes mellitus to this list. One study from the Women's Health Initiative is particularly instructive and important for several reasons. For one, it is big: more than 64,000 post-menopausal women participated. It was also done prospectively, i.e., at the time the women entered the study they were judged to be free from cardiovascular disease and were then followed for an average of about seven years. Thus, the occurrence of endpoints, including stroke, heart attack and the need for coronary artery bypass surgery, could be determined with great accuracy. The study showed that for a ten microgram per cubic meter increase in the concentration of $PM_{2.5}$, there was a 24 percent increase in the incidence of the aforementioned diseases.

Whereas initial studies examined long-term exposures to particulates, advances in statistical methods have made it possible to relate even brief increases in the concentration of $PM_{2.5}$ to transient increases in the risk for stroke, fatal heart rhythms and out-of-hospital cardiac arrest. This is made possible because increasing numbers of patients with heart disease have implanted cardiac defibrillators that can detect a potentially fatal heart rhythm and deliver a strong shock to the heart to restore a lifesaving normal rhythm. The painful shock causes patients to go to the hospital emergency room, where technicians are able to "talk" to the defibrillator using radio signals and retrieve the exact heart rhythm and the time at which the device went off. Investigators then compare this time and rhythm data to additional data from air pollution monitoring sites near the patient in order to relate the two seemingly separate data sets, joined by a common time. Times and pollutant levels chosen when the device did not fire off serve as controls.

Although burning coal is not the biggest source of $PM_{2.5}$, improvements in analytical techniques have made it possible to point the finger at coal with increasing confidence. Initially it was only possible to measure and identify the source of relatively large particulates. Subsequent improvements then made it possible to segregate particles in terms of size. Recently, investigators have applied statistical techniques coupled with advances in analytical chemistry to clearly identify the source of particles. Those with large amounts of silicon dioxide, the principle component of sand, arise from the earth's crust; particles with lead come from motor vehicles; and particles marked with selenium result from burning coal. Source-specific analytical techniques then showed that the selenium-containing particles were the most damaging to health—that is, the particles that arose from coal.

While inhalation of coal ash fine particle pollution poses the greatest threat to human health from fugitive coal ash dust, the composition of the coal ash dust poses additional inhalation effects as well.

HARMFUL EFFECTS OF SILICA EXPOSURE VIA INHALATION OF COAL ASH

The composition of fly ash dust can vary considerably depending on the coal that was burned, but all fly ash contains significant amounts of silica, in both crystalline and amorphous form.[8] Respirable crystalline silica in coal ash can lodge in the lungs and cause silicosis, or scarring of the lung tissue, which can result in a disabling and sometimes fatal lung disease. Chronic silicosis can occur after many years of mild overexposure to silica. While the damage may at first go undetected, irreversible damage can occur to the lungs from chronic exposure. Such exposure can result in fever, shortness of breath, loss of appetite and cyanosis (blue skin). In addition, the International Agency for Research on Cancer (IARC) has determined that silica causes lung cancer in humans, and the National Toxicology Program (NTP) and National Institute for Occupational Safety and Health (NIOSH) have also classified silica as a human carcinogen.

HARMFUL EXPOSURE TO EXCESSIVE RADIOACTIVITY

Fugitive coal ash dust also contains radioactive metals.[9] While each coal seam will have different levels of radioactive metals attached to the carbon, all coals have at least some level of naturally occurring radioactive materials, including uranium, thorium, potassium and their radioactive decay products including radium.[10] Burning coal concentrates the radionuclides approximately three to ten times the levels found in the initial coal seams. The radioactive metals stay with the coal ash when the carbon is burned off.[11]

If these dusts are inhaled, they can transport radioactive metals into a person's lungs. The

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radioactive metals will undergo radioactive decay and the resulting water-soluble radium can be transported to a person's bones where it will replace calcium. It will also undergo further decay to radon gas, the second leading cause of lung cancer after tobacco smoke in the United States. Radon gas is generated from the decay of radium. Being heavier than air, it tends to lay in pockets in low-lying areas unless mixed with air and carried away by wind. In addition, the dust does not have to be inhaled to be dangerous. Dust can contaminate surface water supplies

While inhalation of coal ash fine particle pollution poses the greatest threat to human health from fugitive coal ash dust, the composition of the coal ash dust poses additional inhalation effects as well.

where the soluble radium can contaminate drinking water and be ingested by humans or other species.

HARMFUL EXPOSURE TO MERCURY VIA COAL ASH

Mercury is of particular concern due to its high toxicity and its accumulation in fly ash and eventually into the coal ash waste stream. Implementation of the federal Clean Air Mercury Rule will significantly increase the mercury content in fly ash because the mercury capture required by the rule will result in more mercury ending up in the solid waste created by coal burning. According to EPA testing of fly ash at plants that had mercury controls, the mercury in ash increased by a median factor of 8.5, and in one case, by a factor of 70.[12] At the same time, other contaminants in fly ash such as arsenic and selenium also increased, concurrently elevating the risk to human health via inhalation of fugitive dust.

HARMFUL EXPOSURE TO HYDROGEN SULFIDE VIA COAL ASH

Hydrogen sulfide is a flammable, colorless gas with the characteristic odor of rotten eggs. Hydrogen sulfide is released primarily as a gas and spreads in the air. Because of the high sulfur level in coal ash, hydrogen sulfide is often released at coal ash landfills and impoundments. Communities near dumps or coal plants and workers at these facilities may be exposed to hydrogen sulfide by breathing contaminated air.

Exposure to low concentrations of hydrogen sulfide may cause nausea and irritation to the eyes, nose or throat.[13] It may also cause difficulty in breathing for some asthmatics. Children are sometimes exposed to more hydrogen sulfide than adults because hydrogen sulfide is heavier than air and children are shorter than adults. The sulfurous stench from coal ash dumps can also significantly degrade the quality of life of communities near disposal sites.

DANGERS TO WORKERS FROM INHALATION OF COAL ASH

The primary workplace health risks are associated with inhaling airborne fly ash. Depending on conditions in the plant, regulations may require employees to use respirators, wear disposable clothing or both when performing specific tasks. These employees may be the safest while performing those tasks since they are wearing protective gear. However, it is likely that many employees are exposed to and inhale substantial concentrations of fly ash in power plants while they are not wearing respirators or other protections. In a published study, the Electric Power Research Institute found that silica exposure in U.S. coal-fired power plants frequently exceeded NIOSH health standards in areas where fly ash was handled, particularly during activities involving the maintenance of air pollution devices (e.g., maintenance of baghouses or electrostatic precipitators).[14]

Landfill employees and workers handling coal ash in "beneficial use" operations (e.g., at structural fills and minefills) may also experience harmful exposure to airborne ash. Workers at the Arrowhead Landfill in Uniontown, Alabama,[15] which received 4 million tons of coal ash from the cleanup of the TVA Kingston spill in 2009–2010, reported significant injuries to health.[16] A construction manager overseeing the use of coal ash in the construction of a golf course has also claimed serious injury due to inhalation of fly ash.[17]

The primary workplace health risks are associated with inhaling airborne fly ash.

CHRIS JORDAN-BLOCH / EARTHJUSTICE

Much like other residents of Uniontown, AL, William Gibbs started seeing the paint peeling off his truck a few months after coal ash from the spill in Tennessee arrived at a nearby landfill. "If that's what it's doing to my truck, imagine what it's doing to me," said Gibbs.

DANGER TO COMMUNITIES NEAR COAL-BURNING PLANTS

Utility companies have three ways to dispose of toxic coal ash. An estimated 36 percent of coal ash is disposed of in dry landfills, usually at the power plant site where it was generated. Approximately twenty-one percent of coal ash is stored in wet impoundments or "ponds"—some as large as 1,000 acres.[18] The remaining 43–46 percent is reused in industrial applications, including many that involve large-scale disposal, such as large structural fill projects and filling mines with coal ash. More than 60 percent of all coal-burning plants have some type of onsite coal ash disposal, frequently consisting of at least one landfill, pond or silo.[19] Most have multiple disposal areas. Thus communities near power plants are frequently at risk of exposure to toxic dust.

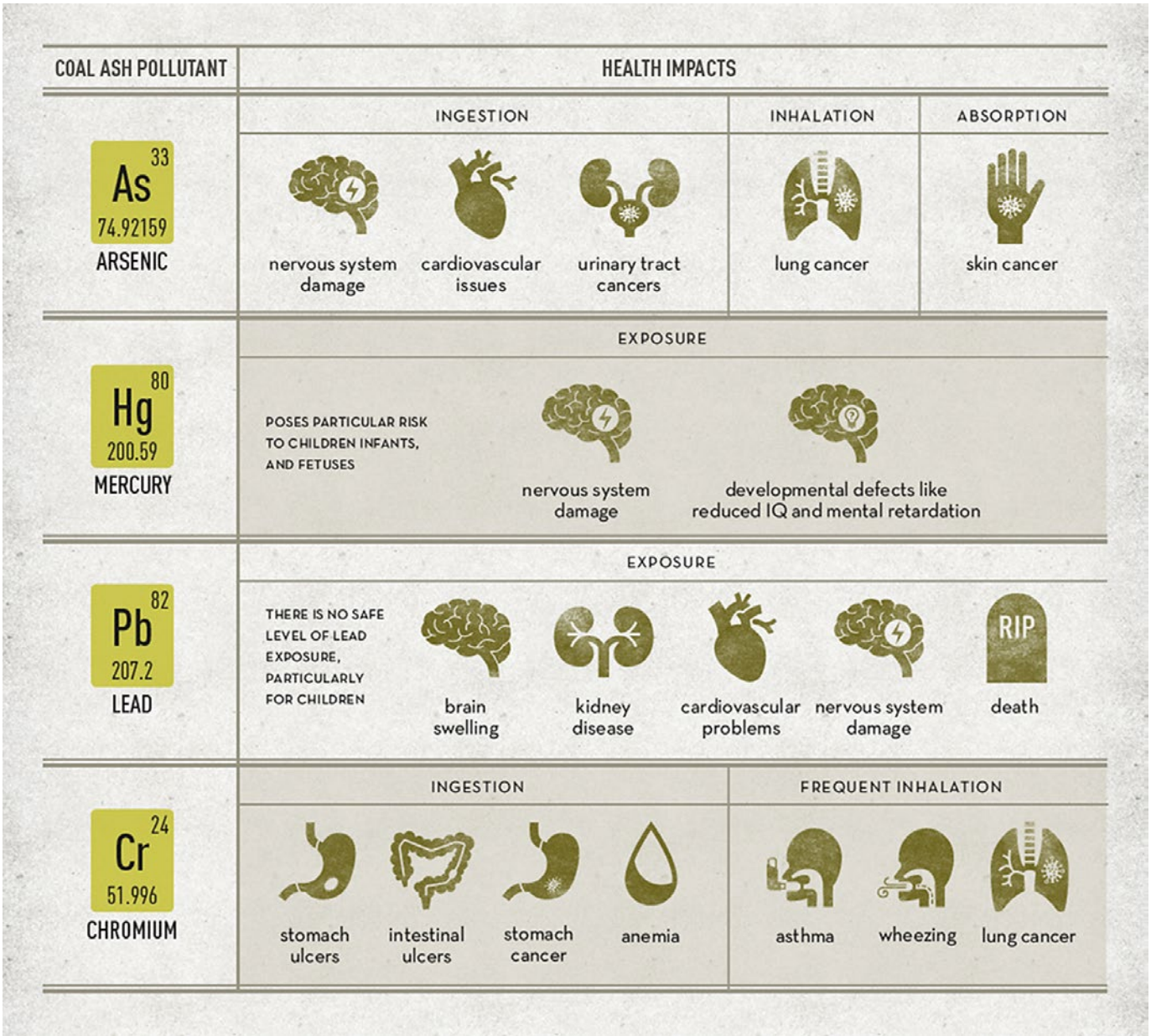
All forms of coal ash disposal can generate dangerous quantities of airborne ash due to mismanagement of ponds, landfills and reuse projects. Ponds in arid environments may be allowed to dry, resulting in wind dispersion of dried ash. Landfills may not be covered daily or capped, also resulting in unsafe levels of ash blowing from dumps. Also, where coal ash is used for fill in construction or on agricultural fields as a "soil amendment," the ash can readily blow or erode. Windblown particulates called "fugitive dust" also arise when ash is loaded, unloaded and transported.

REUSE OF ASH

NOT ALWAYS BENEFICIAL

Reuse can cause harmful levels of toxic dust and water pollution

SOURCE: AMERICAN COAL ASH ASSOCIATION, 2012 COAL COMBUSTION PRODUCT (CCP) PRODUCTION & USE SURVEY REPORT.



In 2009, the EPA documented the health threat from toxic dust near coal ash landfills in its draft screening risk assessment, *Inhalation of Fugitive Dust: A Screening Assessment of the Risks Posed by Coal Combustion Waste Landfills*.[20] The purpose of this screening assessment was to determine whether the National Ambient Air Quality Standards (NAAQS) could be violated through dry handling of coal ash, and if so, what management options might be needed to reduce the health risk. Indeed, the EPA found that "there is not only a possibility, but a strong likelihood that dry-handling would lead to the NAAQS being exceeded absent fugitive dust controls."[21] The EPA concluded that only daily controls (daily cover) can definitively prevent unhealthy releases of particulates.

However, a critique of the EPA's screening assessment found that it considerably underestimated the risk to human health from toxic dust. The EPA considered only one source of fugitive dust emissions from coal ash—wind erosion—and failed to assess the substantial emissions that occur during unloading and grading of the ash, as well as from trucks traveling on the deposited waste at the landfill.[22] In addition to toxic dust from coal ash, communities near waste disposal operations are exposed to carcinogenic diesel particulate emissions from trucks, on-site landfill equipment and diesel-powered

pumps and generators. To compound the problem, high background levels of particulate matter from nearby equipment may increase the potential for fugitive dust from coal ash to cause significant human health problems. If the EPA had taken all of these factors into account, it would have found even greater risks to communities living near coal ash dumps.

CHALLENGES TO CONTROLLING HUMAN EXPOSURE

Controlling respirable fugitive ash particles is a daunting task, principally because of two physical properties of coal ash. First, fly ash is inherently water repellant and tends to shed water droplets rather than absorb them. Thus simply wetting the material may not be effective in controlling the ash. Second, the small size of the particles (similar to talcum powder) adds to the difficulty of suppressing airborne dust. Unfortunately the most hazardous dust particles are the ones too small to see.[23]

STATE AND FEDERAL REGULATIONS ARE INADEQUATE TO PROTECT COMMUNITIES

No federal standards exist for reducing toxic dust

There are currently no federal regulations addressing the threat of toxic dust from coal ash disposal or placement operations. In addition, most state laws do not protect communities from fugitive dust.

While coal ash is regulated as a solid waste under the Resource Conservation and Recovery Act (RCRA), the general standards applying to fugitive dust at industrial waste landfills do not address the risks to human health posed by coal ash.[24] Further, while coal ash is classified as a hazardous substance under the federal Superfund law, no regulations address its safe disposal.[25] In 2010, the EPA proposed regulations under RCRA to address the threat from toxic coal ash dust, but these regulations have not yet been finalized.[26]

Protective practices to control toxic dust, such as moistening dry ash and covering it daily in a landfill, can minimize the dangers to public health. Yet at most coal ash dumps, state regulations do not mandate daily cover, and adequate cover may be required only monthly or annually. The EPA found such infrequent dust suppression has "the potential to lead to significant risks," adding that "yearly management leads to a PM_{10} concentration almost an order of magnitude above the [National Ambient Air Quality Standard]." The EPA concluded that most states do not require daily cover to control fugitive dust from landfills, and most states do not require caps on coal ash ponds to control dust.[27]

In fact, our survey of 37 of the top coal ash generating states in the U.S. found that less than half of the states mandate dust (e.g. moistening) controls at coal ash landfills, and only a single state requires dust controls at coal ash ponds.[28] In addition, only seven of the 37 states require daily cover at coal ash landfills.[29] Of the states that require dust controls, none require specific measures for the control of dust on a daily basis; significant discretion is left in the hands of state permitting authorities and facility operators. No state currently requires the specific limit on toxic dust from landfills and ponds proposed by the EPA in its 2010 proposed coal ash rule (a level not to exceed 35 micrograms per cubic meter).

Table 1 indicates the controls currently applicable in 37 of the top coal ash-generating states.

Our survey of 37 of the top coal ash generating states in the U.S. found that less than half of the states mandate dust controls at coal ash landfills, and only a single state requires dust controls at coal ash ponds.

TABLE 1: STATE COAL ASH FUGITIVE DUST CONTROLS

STATES	MANDATORY DUST CONTROLS AT COAL ASH LANDFILLS	MANDATORY DUST CONTROLS AT COAL ASH PONDS	MANDATORY DAILY COVER AT COAL ASH LANDFILLS
AL	NO	NO	NO
AZ	NO	NO	NO
CO	NO	NO	NO[30]
FL	NO	NO	NO
GA	NO	NO	NO[31]
IL	YES	NO	YES
IN	YES	NO	NO
IA	YES	NO	NO
KS	NO	NO	NO
KY	NO	NO	NO
LA	NO	NO	YES
MD	NO	NO	NO
MI	YES	NO	NO
MN	NO[32]	NO	NO[33]
MS	NO	NO	NO[34]
MO	YES	NO	NO[35]
MT	NO	NO	NO
NV	YES	NO	YES
NH	NO	NO	NO
NJ	YES	NO	YES
NM	NO	NO	NO
NY	NO[36]	NO	NO[37]
NC	YES	NO	YES
ND	NO[38]	NO	NO[39]
OH	NO	NO	NO
OK	NO[40]	NO	NO[41]
PA	YES	YES	YES
SC	YES	NO	NO
SD	NO[42]	NO	NO[43]
TN	NO[44]	NO	NO[45]
TX	NO	NO	NO
UT	NO	NO	NO
VA	NO[46]	NO	NO
WA	NO[47]	NO	NO
WI	YES	NO	NO[48]
WV	YES	NO	YES
WY	NO[49]	NO	NO[50]

HOW COMMUNITIES ARE IMPACTED BY TOXIC DUST FROM COAL ASH

The following six communities are among hundreds of American communities that are injured by toxic air emissions from coal ash.

1. Arrowhead Landfill: Toxic Dust and Odors Plague an Alabama Town

After the catastrophic collapse of the coal ash dam at TVA's Kingston plant in Harriman, Tennessee, in 2008, the nation's worst coal ash spill was dumped across state lines into the lives of residents in Uniontown, Alabama (population 1,775).[51]

With the approval of the Alabama Department of Environmental Management, the TVA chose to move the 4 million cubic yards of poisonous ash to the town's Arrowhead Landfill. But instead of using protective management techniques, the coal ash was dumped in uncovered mounds stacked six stories high, just 100 feet from nearby residents. Dust and odors from the landfill caused residents of Uniontown to experience health problems, including respiratory illness, headaches, dizziness, nausea and vomiting. Dust blanketed their homes, cars and gardens, and choking wafts of the "rotten egg" stench of hydrogen sulfide permeated their houses making life nearly unbearable.

The dumping was a blatant act of environmental injustice.[52] While the Harriman, Tennessee, community where the Kingston spill occurred is almost entirely white (91 percent) and middle class (median income $36,031), Uniontown is 90 percent African American, and 45.2 percent of its citizens live below the poverty line (median income $17,473). The transfer of the TVA coal ash to a community where the negative effects were disproportionately borne by African-Americans sparked residents to file a lawsuit in 2012 under Title VI of the Civil Rights Act of 1964.[53] Under Title VI, government agencies that receive federal funds must assess whether their permitting decisions result, even unintentionally, in racial inequality. In fall 2013, Earthjustice assumed representation of those impacted by the dumping.

The railcars loaded with toxic waste from Tennessee have ceased. But since the Arrowhead Landfill's permit allows the dump to continue to accept coal ash from more than two dozen states, there is no guarantee that the danger to the Uniontown residents has passed.

CHRIS JORDAN-BLOCH / EARTHJUSTICE

"I wanted to move away from the noise and the hardness of the city. So I came here for some peace and quiet in the country. I wanted to hunt and fish and enjoy the weather in this beautiful place and now they've pushed this thing right on top of us. Now, I'm too old to move and no one would want to buy this place anyways," said William Gibbs.

2. An Ill Wind Blows Across a Native American Community

It starts with a warning. Next it is only a matter of which way the wind blows. In the evening, someone will go from house to house and tell the neighborhood that tomorrow will be a windy day and, perhaps, a bad air day. The next afternoon if the conditions are just wrong, coal ash dust blows from the nearby dump sites of Nevada Energy's Reid Gardner Power Station and moves like a sandstorm across the dry desert of the Moapa River Indian Reservation. The reservation is the ancestral home to a band of Paiute Indians whose homes sit only 300 yards from the plant.[54] Living in the shadow of Reid Gardner, the tribe has paid dearly with its health, and reaped little economic benefit.

The Reid Gardner "sandstorm" is made up of coal ash, and members of the tribe tell of health

Toxic coal ash blows like a sandstorm straight at the homes on the Moapa River Reservation.

MOAPA BAND OF PAIUTES

problems resulting from the blowing ash, including burning skin, sore throats, hyperthyroidism, heart problems and asthma. On bad days, residents stay inside. The toxic dust prevents use of the tribal lands for traditional activities, and members are concerned that their soil and water are poisoned with toxic pollutants from the ash.

3. Louisville Gas & Electric's Cane Run Generating Station: Years of Blowing Ash

The LG&E Cane Run Generating Station near Louisville, Kentucky, stores huge mountains of coal ash on site. For years, toxic dust clouds and odors have blown from the power plant's waste dumps onto the nearby community. Every day a continuous line of trucks haul ash from the power plant to the disposal site near a community of nearly 400 residents, many of whom live in rented trailers and mobile homes. A screen was erected between the ash pile and an adjacent cemetery in order to minimize the amount of wind-blown dust that escapes from the property. However, it seems to be purely cosmetic. In fact, videos of ash blowing over the top of the screen are regularly posted online.[55]

The Louisville Metro Air Pollution Control District has repeatedly responded to the toxic dust with notices of violations and fines.[56] In 2013, LG&E agreed to pay $113,250 and comply with a pollution control plan after ash and odors blowing from the plant's landfill affected residents living near the plant.[57] Two years earlier, LG&E paid $22,500 for repeatedly disregarding city regulations and allowing coal ash to blow into residential neighborhoods.[58] Environmental samples obtained from three homes near the plant all showed clear evidence of deposits of fly ash and bottom ash, as confirmed by scanning electron microscopy and spectral analysis.[59]

4. Battlefield Golf Course: "Beneficial Use" Gone Terribly Wrong

Between 2002 and 2007, Dominion Virginia Power opted for a cheap way to dispose of 1.5 million tons of coal ash. They built an 18-hole golf course with the toxic ash in Chesapeake, Virginia. Ever since, Battlefield Golf Course has been ground zero in the fight over harmful "beneficial uses" of coal ash.

SOUTHEASTCOALASH.ORG

The "mountain" rising behind the fence is coal ash generated by the power plant. The screen at the Cane Run Generating Station cannot stop the toxic dust from reaching neighbors.

During construction of the golf course, neighbors and workers reported clouds of black dust migrating from the construction site to the adjacent residential neighborhoods. Homeowners abutting the course reported that their homes, yards, cars, picnic tables and play equipment were covered with ash. They were told it was harmless.

According to a former construction manager of the golf course, Dominion directed the building of the course with fly ash to disguise the project's true purpose—a coal ash dump. In a sworn statement, Derrick Howell, a former employee of the builder of the golf course, said, "It was clear that a golf course wasn't being built," stated Howell. "It was a coal ash dump. All Dominion ever cared about was tonnage and how much more they could dump."[60]

As a result of the toxic dust and water contamination, the golf course has been the subject of several lawsuits, including a $2 billion lawsuit brought by nearby residents for damages. In addition, in 2012, a contractor filed a $10 million lawsuit against Dominion alleging that his inhalation of fly ash while building the course over five years contributed to his kidney cancer.[61]

5. Dust and Disease from Mine Dumping in La Belle, PA

In the small rural community of La Belle, Pennsylvania, an immense mine dump covers 500 acres and contains a mountain of 40 million tons of waste. Because of its conical shape and a pond at the top, resembling a crater, local residents refer to the dump as a "volcano" of mine waste and coal ash. First Energy—the operator of a power plant 75 miles north—plans to dump more than 3 million tons of additional coal ash here every year starting in 2016, when its 1,300-acre Little Blue Run coal ash impoundment in Beaver County closes.

This is very bad news for the residents of La Belle. In addition to water contamination, toxic dust blows from the dump and from uncovered trucks hauling coal ash. The waste blankets nearby homes, offices, yards and cars. Residents have documented large clouds of dust drifting from the dump. Analyses of the particles on residential properties reveal the presence of coal ash, including toxic metals such as antimony, arsenic, chromium, lead and fine particles.[62]

The residents of La Belle have turned to the court for relief. Represented by attorneys from Public Justice and the Environmental Integrity Project, a complaint alleging violations of numerous federal and state environmental statutes was filed against the dump operator in 2013.[63]

6. Toxic Ash from Coal Ash Ponds Threatens the Navajo Nation

In the Four Corners region, the Navajo Nation hosts one of the biggest coal-fired power plants in the West—the Arizona Public Service (APS) Four Corners Power Plant in Fruitland, New Mexico. Despite the plant's size, 25 percent of the reservation—an estimated 16,000 Navajo families—are without access to electricity.[64] The Navajo population is instead burdened by the enormous pollution created by the coal plant, including clouds of toxic dust from its half-dozen coal ash ponds and a landfill that rises 110 feet above the floor of the high desert.

Since 1962, APS has dumped approximately 30 million tons of coal ash in six immense wet dumpsites near the power plant. Fugitive dust from the coal ash ponds is a severe problem. Ash dries rapidly in the arid climate and is largely uncontained. Coal ash blown from the waste impoundments covers hundreds of acres

Coal ash ponds from APS' Four Corner's Power Plant rise more than 100 feet above the arid Navajo Reservation.

of the surrounding desert. On windy days, the air is literally filled with ash. Health problems, including asthma, are common among members of the Navajo Nation.

Additionally, Navajo people use their local environment to gather medicines for ceremony and wellness. According to the group Dine' Citizens Against Ruining the Environment, contamination from coal ash jeopardizes the Navajo people's ability to practice traditional healings, which is embedded in their culture.

CONCLUSION

Despite the obvious health risks to communities living near coal ash dump sites, no federal regulation regarding the storage and disposal of this toxic waste exists. The EPA proposed coal ash regulations in 2010, but has not finalized the rules. Earthjustice, on behalf of Physicians for Social Responsibility, Appalachian Voices, Chesapeake Climate Action Network, Environmental Integrity Project, Kentuckians For The Commonwealth, Moapa Band of Paiutes, Montana Environmental Information Center, Prairie Rivers Network, Sierra Club, Southern Alliance for Clean Energy and Western North Carolina Alliance, sued the EPA in federal court for its failure to follow the law and propose coal ash regulations in a timely manner. As a result of that lawsuit, the EPA will finalize the nation's first federal coal ash regulation by December 19, 2014.

But federal regulations for coal ash cannot come soon enough. An increasingly large number of studies show clear links between inhaled coal ash and adverse health outcomes. The huge volume of coal ash generated in the United States and the many dangerous ways it is dumped create a variety of pathways for harmful levels of human exposure. Communities across the nation are hurt by toxic dust because adequate controls are not in place to protect public health. Often those harmed are communities of color or low-income communities living along the fence lines of these coal ash dumps whose economic hardships make them even more vulnerable to injury. Requiring control of toxic dust through federally enforceable standards that protect all Americans nationwide, and switching from coal to cleaner, renewable energy sources, are well-documented and essential paths to better health.

Communities across the nation are hurt by toxic dust because adequate controls are not in place to protect public health. Often those harmed are communities of color or low-income communities living along the fence lines of these coal ash dumps.

NOTES

1. Coal ash is comprised of four categories of combustion waste. Fly ash makes up the largest percentage (about half) by weight. Fly ash is the lightest of the four wastes and the most likely to become airborne. It is carried up with hot flue gases and trapped by stack filters.

2. http://earthjustice.org/features/coal-ash-contaminated-sites

3. U.S. Energy Information Administration (EIA), *Form EIA-923, Power Plant Operations Report, Schedule 8. Part A. Annual Byproduct Disposition* (2012 Final Release).

4. U.S. Environmental Protection Agency. Hazardous and Solid Waste Management System Identification and Listing of Special Wastes; Disposal of Coal Combustion Residuals from Electric Utilities. Proposed rule. Page 344. http://www.epa.gov/wastes/nonhaz/industrial/special/fossil/ccr-rule/ccr-rule-prop.pdf.

5. *See* data submitted pursuant to U.S. Envtl. Prot. Agency. Environmental Protection Agency: 2010 Questionnaire for the Steam Electric Power Generating Effluent Guidelines. OMB Control No. 2040–0281. Approved May 20, 2010. *See also* U.S. Environmental Protection Agency, Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category; Proposed Rule, 78 Fed. Reg. 34,432, 34,516 (June 7, 2013).

6. U.S. Environmental Protection Agency. *Inhalation of Fugitive Dust: A Screening Assessment of the Risks Posed by Coal Combustion Waste Landfills* (*draft*), September 2009.

7. The Clean Air Act established six criteria pollutants and required the EPA to develop and periodically review National Ambient Air Quality Standards (NAAQS) for each of them. These standards are designed to help the Agency achieve its mission "to protect human health and the environment." As time has passed, the NAAQS have become more stringent, as the extent of their health impacts has become more and more evident.

8. Valencic, Aaron. "Dust Suppression in Coal Ash Applications," 2013 World of Coal Ash (WOCA) Conference, Lexington, KY, *available at* http://www.flyash.info/2013/098-Valencic-2013.pdf.

9. According to EPA, fly ash has a typical radiation level between a low of 2 pCi/g and a high of 9.7 pCi/g. *See* http://www.epa.gov/radiation/tenorm/coalandcoalash.html

10. *Id.*

11. *See* Figure 1. Graph from Radioactive Elements in Coal and Fly Ash: Abundance, Forms, and Environmental Significance. U.S. Geological Survey Fact Sheet FS-163-97. October, 1997.

12. U.S. Environmental Protection Agency, National Emission Standards for Hazardous Air Pollutants from the Portland Cement Manufacturing Industry, Federal Register, Vol 71, No. 244, December 20, 2006.

13. Agency for Toxic Substances and Disease Registry, Division of Toxicology and Environmental Medicine ToxFAQs, Hydrogen Sulfide, CAS #7783-06-4, July 2006.

14. Edison Electric Institute, Silica Exposure at Electric Utilities, EEI Safety and Health Webinar, July 22, 2009, 8, *available at* http://www3.eei.org/meetings/Meeting%20Documents/2009-07-22-IHIssuesWeb-Silica_Hatcher.pdf.

15. *See* http://earthjustice.org/slideshow/photo-essay-a-toxic-inheritance.

16. Holly Haworth, Oxford American, Something Inside of Us, Issue 82, Nov. 11, 2013, *available at* http://www.oxfordamerican.org/articles/2013/nov/11/something-inside-us/.

17. *See* Marjon Rostami, Norfolk Virginian-Pilot, "Chesapeake fly ash suit against Dominion refiled," February 22, 2012, *available at* http://hamptonroads.com/2012/02/chesapeake-fly-ash-suit-against-dominion-refiled, describing lawsuit by construction manager at the Battlefield Golf Course who alleges his cancer is attributable to arsenic exposure.

18. Barry Breen, Acting Assistant Administrator, Office of Solid Waste and Emergency Response, US EPA. Testimony delivered to Committee on Transportation and Infrastructure, Subcommittee on Water Resources and the Environment, U.S. House of Representatives, April 30, 2009.

19. U.S. Environmental Protection Agency, Regulatory Impact Analysis For EPA's Proposed RCRA Regulation Of Coal Combustion Residues (CCR) Generated by the Electric Utility Industry, April 30, 2010 at 33.

20. U.S. Environmental Protection Agency. *Inhalation of Fugitive Dust: A Screening Assessment of the Risks Posed by Coal Combustion Waste Landfills* (*draft*), September 2009.

21. *Id.*

22. Comments of Environmental Integrity Project, Sierra Club, Earthjustice et al., Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category; Proposed Rule, Docket ID No. EPA-HQ-OW-2009-0819, Appendix G, Petra Pless, "Refinement of EPA's 2009 Screening Assessment of Risks Posed by Inhalation of Fugitive Dust from Coal Combustion Waste Landfills Based on New Data for Landfill Size," September 20, 2013.

23. Peterson, Edwin. "An Aid to Fugitive Material Control in Coal Ash Application," 2011 World of Coal Ash, Denver, Co. *available at* http://www.flyash.info/2011/001-felde2011.pdf

24. See Comments, Earthjustice et al., Hazardous and Solid Waste Management System; Identification and Listing of Special Wastes; Disposal of Coal Combustion

Residuals From Electric Utilities; Proposed Rule, Docket ID No. EPA-HQ-RCRA-2009-0640, June 21, 2010, 34–35.

25. *See Eagle-Picher Industries v U.S. EPA*, 759 F.2d 922 (D.C. Cir. 1985).

26. EPA, Hazardous and Solid Waste Management System; Identification and Listing of Special Wastes; Disposal of Coal Combustion Residuals From Electric Utilities; Proposed Rule, 75 Fed. Reg. 35,128, 35,182 (proposed June 21, 2010).

27. U.S. EPA. "Estimation of Costs for Regulating Fossil Fuel Combustion Ash Management at Large Electric Utilities Under Part 258." Prepared by DPRA Incorporated. November 30, 2005.

28. See note 24, supra.

29. *Id*.

30. Allows variance for daily cover requirement.

31. Allows variance for daily cover requirement.

32. Dust controls can be waived by variance.

33. Allows variance for daily cover requirement.

34. Cover requirement is not daily.

35. Cover requirement is not daily.

36. Dust controls can be waived by variance.

37. Allows variance for daily cover requirement.

38. Dust controls can be waived by variance.

39. Cover requirement is not daily.

40. Dust controls can be waived by variance.

41. Cover requirement is not daily.

42. Dust controls can be waived by variance.

43. Allows variance for daily cover requirement.

44. Dust controls can be waived by variance.

45. Cover requirement is not daily.

46. Dust controls can be waived by variance.

47. Dust controls can be waived by variance.

48. Cover requirement is not daily.

49. Dust controls can be waived by variance.

50. Cover requirement is not daily.

51. Shaila Dewain, New York Times, "Clash in Alabama Over Tennessee Coal Ash," August 29, 2009, *available at* http://www.nytimes.com/2009/08/30/us/30ash.html?_r=0.

52. Emily Enderle, Earthjustice, "Tr-ash Talk: Dumping is a Civil Rights Issue," February 12, 2012, *available at* http://earthjustice.org/blog/2012-february/tr-ash-talk-dumping-a-civil-rights-issue.

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59. *See* RJ Lee Group, Surface Dust Study, July 8, 2011, *available at* http://archives.wfpl.org/wp-content/uploads/2011/07/TLH104154-Nuisance-dust-report-7-8-11-FINAL.pdf and RJ Lee Group, Update on Passive Deposition Sampling Study, July 13, 2011, *available at* http://archives.wfpl.org/wp-content/uploads/2011/07/TLH104154-Passive-Sampling-Report_FINAL_July-13.pdf.

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61. Marjon Rostami, TheVirginian-Pilot, "Chesapeake fly ash suit against Dominion refilled," February 22, 2012, *available at* http://hamptonroads.com/2012/02/chesapeake-fly-ash-suit-against-dominion-refiled.

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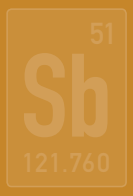
64. http://www.ntua.com/.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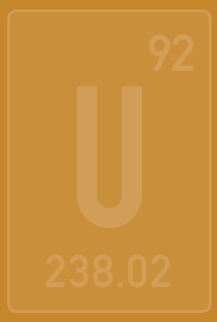
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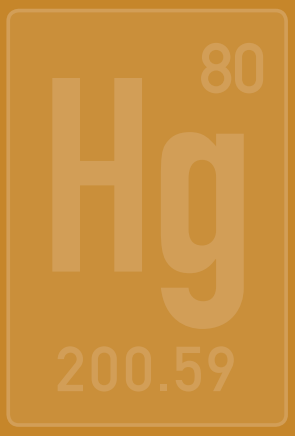
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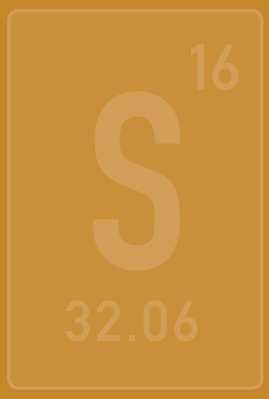
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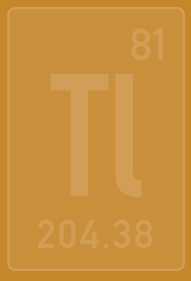
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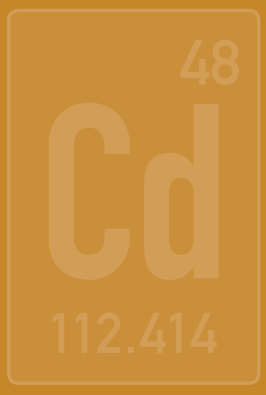
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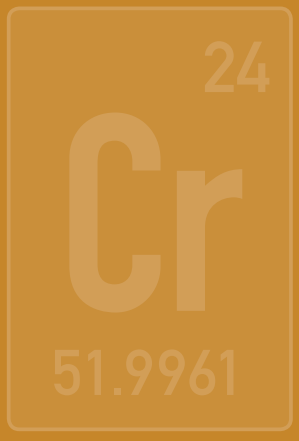
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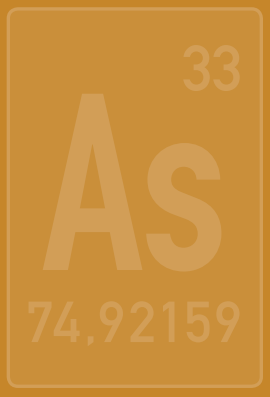
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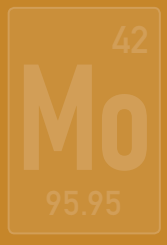
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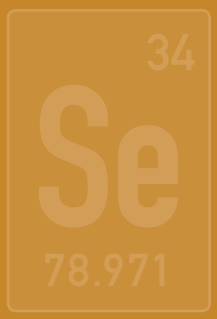
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