



SOMETHING IN THE AIR

Impacts of Coal Ash Dust
on Communities and
Workers



WHAT COULD BE IN THE AIR?

Heavy metals

- Arsenic, lead, selenium, cadmium, chromium, manganese, thallium

Particulate Matter

- When inhaled, in addition to the particulate matter itself, coal ash can carry dangerous constituents such as heavy metals, dioxins, radioactive particles, and poly aromatic hydrocarbons (PAH's) deep into the lungs

Hydrogen Sulfide

Silica

Ammonia

Radioactive particles and Radon gas

- Burning coal increases the radioactivity in the ash

HEALTH EFFECTS OF TOXIC CONSTITUENTS IN COAL ASH

Lead: The exposure of lead in coal ash can cause major damage to the nervous system.^[5] Lead exposure can lead to kidney disease, hearing impairment, high blood pressure, delays in development, swelling of the brain, hemoglobin damage, and male reproductive problems.^{[7][8]} Both low levels and high levels of lead exposure can cause harm to the human body.^[7]

Cadmium: When coal ash dust is inhaled, high levels of cadmium is absorbed into the body.^[5] More specifically, the lungs directly absorb cadmium into the bloodstream.^[7] When humans are exposed to cadmium over a long period of time, kidney disease and lung disease can occur.^{[5][7]} In addition, cadmium exposure can be associated with hypertension.^[5] Lastly, chronic exposure of cadmium can cause bone weakness which increases the risk of bone fractures and osteoporosis.^[5]

Chromium: The exposure of chromium (IV) in coal ash can cause lung cancer and asthma when inhaled.^[5] When coal ash waste pollutes drinking water, chromium (IV) can cause ulcers in the small intestine and stomach when ingested.^[5] Lastly, skin ulcers can also occur when the exposure chromium (IV) in coal ash comes in contact with the skin.^[5]

Arsenic: When high amounts of arsenic is inhaled or ingested through coal ash waste, diseases such as bladder cancer, skin cancer, kidney cancer and lung cancer can develop.^{[5][9]} Ultimately, exposure of arsenic over a long period of time can cause mortality.^[5] Furthermore, low levels of arsenic exposure can cause irregular heartbeats, nausea, diarrhea, vomiting, peripheral neuropathy and vision impairment.^{[7][5]}

Mercury: Chronic exposure of mercury from coal ash can cause harm to the nervous system.^[5] When mercury is inhaled or ingested various health effects can occur such as vision impairment, seizures, numbness, memory loss and sleeplessness.^{[10][11]}

HEALTH EFFECTS OF TOXIC CONSTITUENTS IN COAL ASH CONT..

Boron: When coal ash dust is inhaled, the exposure of boron can cause discomfort in the throat, nose and eye.^[5] Moreover, when coal ash waste is ingested, boron exposure can be associated with kidney, liver, brain, and intestine impairment.^[5]

Molybdenum: When molybdenum is inhaled from coal ash dust, discomfort of the nose, throat, skin and eye can occur.^[12] As a result, short-term molybdenum exposure can cause an increase of wheezing and coughing.^[12] Furthermore, chronic exposure of molybdenum can cause loss of appetite, tiredness, headaches and muscle soreness.^{[5][12]}

Thallium: The exposure of thallium in coal ash dust can cause peripheral neuropathy when inhaled.^[5] Furthermore, when coal ash is ingested, thallium exposure can cause diarrhea and vomiting.^[5] In addition, thallium exposure is also associated with heart, liver, lung and kidney complications.^[5]

Silica: When silica is inhaled from coal ash dust, fetal lung disease or silicosis can develop.^[4] Furthermore, chronic exposure of silica can cause lung cancer.^[4] In addition, exposure to silica over a period of time can cause loss of appetite, poor oxygen circulation, breathing complications and fever.^[4]

Health Effects of Coal Ash

WAYS COMMUNITIES AND WORKERS CAN BE EXPOSED

- Living near a coal ash impoundment, landfill (or structural fill), power plant, or other location that coal ash may be used/disposed of
- Working at any of the above or driving a truck transporting coal ash
- Living along the route where ash is being transported

Coal ash being transported to Brickhaven coal ash landfill in Chatham County





From Southeast Energy News

AIR MONITORING

WHAT DO WE KNOW?

Monitoring Results Brickhaven Coal Ash Landfill Chatham County

SMITH+GARDNER

Ash Analytical Results
Charah Brickhaven Facility

	5/26/2016	6/28/2016	7/29/2016
Antimony	0.61	0.57	0.27 J
Arsenic	53	47	46
Barium	360	390	440
Beryllium	3.8	4.1	4.4
Boron	22 J	23 J	26 J
Cadmium	0.22 J	0.22 J	0.33 J
Chromium	17	24	25
Cobalt	11	12	11
Copper	70	65	52
Lead	17	18	20
Lithium	20	20	21
Mercury	0.035	0.097	0.29
Molybdenum	2.7	2.9	1.7
Nickel	22	24	23
Selenium	2	3.7	9.9
Thallium	0.61	0.8	1.5
Vanadium	69	73	78
Zinc	30	33	35

Units are mg/kg dry.

J = Reported by the laboratory as detected but below their
Reporting Limit; therefore the result is an estimated

Split Sample of Coal Ash

BASELINE AND DURING TRUCK TRANSPORT

Consituent	10/21/2015 Results	Concentration	12/21/2015 Results	Concentration	% Change
Particulate Weight	135 mg	221.853 $\mu\text{g}/\text{m}^3$	328 mg	548.495 $\mu\text{g}/\text{m}^3$	147%
Aluminum (Al)	1340 μg	2.202 $\mu\text{g}/\text{m}^3$	4580 μg	7.659 $\mu\text{g}/\text{m}^3$	248%
Barium (Ba)	40.5 μg	0.067 $\mu\text{g}/\text{m}^3$	64 μg	0.107 $\mu\text{g}/\text{m}^3$	61%
Calcium (Ca)	1010 μg	1.660 $\mu\text{g}/\text{m}^3$	4580 μg	7.659 $\mu\text{g}/\text{m}^3$	361%
Chromium (Cr)	<6.7 μg	below RDL	16 μg	0.027 $\mu\text{g}/\text{m}^3$	>145%
Cobalt (Co)	<2.7 μg	below RDL	4.6 μg	0.008 $\mu\text{g}/\text{m}^3$	>80%
Copper (Cu)	49.2 μg	0.081 $\mu\text{g}/\text{m}^3$	74.2 μg	0.124 $\mu\text{g}/\text{m}^3$	53%
Iron (Fe)	2630 μg	4.322 $\mu\text{g}/\text{m}^3$	9510 μg	15.903 $\mu\text{g}/\text{m}^3$	268%
Lead (Pb)	17.2 μg	0.028 $\mu\text{g}/\text{m}^3$	32.1 μg	0.054 $\mu\text{g}/\text{m}^3$	90%
Magnesium (Mg)	697 μg	1.145 $\mu\text{g}/\text{m}^3$	3300 μg	5.518 $\mu\text{g}/\text{m}^3$	382%
Manganese (Mn)	114 μg	0.187 $\mu\text{g}/\text{m}^3$	311 μg	0.520 $\mu\text{g}/\text{m}^3$	178%
Nickel (Ni)	5.3 μg	0.009 $\mu\text{g}/\text{m}^3$	13.6 μg	0.023 $\mu\text{g}/\text{m}^3$	161%
Phosphorus (P)	77 μg	0.127 $\mu\text{g}/\text{m}^3$	239 μg	0.400 $\mu\text{g}/\text{m}^3$	216%
Potassium (K)	269 μg	0.442 $\mu\text{g}/\text{m}^3$	1360 μg	2.274 $\mu\text{g}/\text{m}^3$	414%
Silicon (Si)	173 μg	0.284 $\mu\text{g}/\text{m}^3$	692 μg	1.157 $\mu\text{g}/\text{m}^3$	307%
Sodium (Na)	176 μg	0.289 $\mu\text{g}/\text{m}^3$	959 μg	1.604 $\mu\text{g}/\text{m}^3$	454%
Strontium (Sr)	4.5 μg	0.007 $\mu\text{g}/\text{m}^3$	16.1 μg	0.027 $\mu\text{g}/\text{m}^3$	264%
Sulphur (S)	401 μg	0.659 $\mu\text{g}/\text{m}^3$	839 μg	1.403 $\mu\text{g}/\text{m}^3$	113%
Titanium (Ti)	73 μg	0.120 $\mu\text{g}/\text{m}^3$	295 μg	0.493 $\mu\text{g}/\text{m}^3$	311%
Vanadium (V)	<6.7 μg	below RDL	14.6 μg	0.024 $\mu\text{g}/\text{m}^3$	>118%
Zinc (Zn)	88.4 μg	0.145 $\mu\text{g}/\text{m}^3$	118 μg	0.197 $\mu\text{g}/\text{m}^3$	36%

BASELINE AND DURING RAIL TRANSPORT

Constituent	1/25/16 Results	Concentration	3/31/16 Results	Concentration	% Change
Particulate Weight	20.6 mg	37 $\mu\text{g}/\text{m}^3$	37.3 mg	62 $\mu\text{g}/\text{m}^3$	67%
Aluminum (Al)	111 μg	0.199 $\mu\text{g}/\text{m}^3$	111 μg	0.183 $\mu\text{g}/\text{m}^3$	-8%
Barium (Ba)	7.1 μg	0.013 $\mu\text{g}/\text{m}^3$	5.7 μg	0.009 $\mu\text{g}/\text{m}^3$	-26%
Calcium (Ca)	443 μg	0.792 $\mu\text{g}/\text{m}^3$	339 μg	0.560 $\mu\text{g}/\text{m}^3$	-29%
Chromium (Cr)	<6.7 μg	Below RDL	<6.7 μg	Below RDL	----
Copper (Cu)	51.5 μg	0.092 $\mu\text{g}/\text{m}^3$	41.7 μg	0.069 $\mu\text{g}/\text{m}^3$	-25%
Iron (Fe)	319 μg	0.571 $\mu\text{g}/\text{m}^3$	457 μg	0.755 $\mu\text{g}/\text{m}^3$	32%
Lead (Pb)	5.6 μg	0.010 $\mu\text{g}/\text{m}^3$	<4.0 μg	Below RDL	> -33%
Magnesium (Mg)	98 μg	0.175 $\mu\text{g}/\text{m}^3$	250 μg	0.413 $\mu\text{g}/\text{m}^3$	136%
Manganese (Mn)	61.1 μg	0.109 $\mu\text{g}/\text{m}^3$	395 μg	0.653 $\mu\text{g}/\text{m}^3$	497%
Phosphorus (P)	<33 μg	Below RDL	68 μg	0.112 $\mu\text{g}/\text{m}^3$	> 106%
Potassium (K)	398 μg	0.712 $\mu\text{g}/\text{m}^3$	203 μg	0.336 $\mu\text{g}/\text{m}^3$	-53%
Silicon (Si)	409 μg	0.732 $\mu\text{g}/\text{m}^3$	472 μg	0.780 $\mu\text{g}/\text{m}^3$	7%
Sodium (Na)	285 μg	0.510 $\mu\text{g}/\text{m}^3$	1560 μg	2.579 $\mu\text{g}/\text{m}^3$	406%
Strontium (Sr)	1.5 μg	0.003 $\mu\text{g}/\text{m}^3$	1.9 μg	0.003 $\mu\text{g}/\text{m}^3$	17%
Sulphur (S)	472 μg	0.844 $\mu\text{g}/\text{m}^3$	461 μg	0.762 $\mu\text{g}/\text{m}^3$	-10%
Zinc (Zn)	40.8 μg	0.073 $\mu\text{g}/\text{m}^3$	23 μg	0.038 $\mu\text{g}/\text{m}^3$	-48%

Results Comparison to Standards in $\mu\text{g}/\text{m}^3$ including EPA National Ambient Air Quality Standards (NAAQS), NIOSH Recommended Exposure Limit (REL) over a 10-hour time weighted average (TWA), and OSHA Permissible Exposure Limit (PEL) over an 8-hour TWA.



DEVELOPING A COMMUNITY AIR MONITORING PROJECT

MONITORING FUGITIVE COAL ASH DUST

- Coal ash is extremely light and can travel long distances– sometimes described as “dry water”
- Coal ash dust is very difficult to control
- It can be a challenge to monitor– cannot always be seen when present
- Very little information in the literature about monitoring projects



DO'S AND DON'TS

It is important to understand that any grassroots monitoring project requires at least as much preparation prior to a monitoring event as actual time spent monitoring. Location for monitoring, weather conditions, limitations of the equipment, and researching what is possibly being emitted are all part of preparing for monitoring in your community. Documentation is essential, pictures, video, and written logs augment the data that is being recorded by the equipment.

Some dos and don'ts:

Do understand the limitations of your equipment

Do be flexible

Do your research

DO have fun

Do protect yourself– from the emissions, from traffic, from harassment and from critters

DEVELOPING A COMMUNITY AIR MONITORING PROJECT CONT..

Don't lose patience

Don't shortcut your preparation

Don't forget to have all the batteries you could possibly need

Our BREDL air monitoring project is continually evolving and improving. We hope to provide training and additional testing capabilities soon.



THANK YOU!

For More Information Contact:

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The Blue Ridge Environmental Defense League is a 32-year old community-based, nonprofit environmental organization with chapters in seven states. Our founding principles are earth stewardship, environmental democracy, social justice, and community empowerment.

www.BREDL.org