

Particulates

the invisible connectedness of things

Smog Plates by Students of Manhattan Middle School



Particulates is part of a multi-faceted project, *the invisible connectedness of things*, created by visual artist Kim Abeles, commissioned by EcoArts Connections (EAC) and co-presented by the University of Colorado Museum of Natural History and EAC.

Particulates

Smog Plates

by Students of Manhattan Middle School

Boulder, Colorado

A project created by Kim Abeles in collaboration with students of Manhattan Middle School and their incredible teachers, Andy Feeney, Brooke Smith, Dan "DT" Tomlin and Ardy Zirakzadeh.

Thank you also to staff members Ermin Agic and Heidi Mitzelfeld who paved the way for our work with the school.

Special thanks to Manhattan Middle School's dedicated principal, Robbyn Fernandez.

This project was commissioned by EcoArts Connections (EAC) and co-presented by the University of Colorado Museum of Natural History and EAC.

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Photo credits

The smog plates were photographed by Ken Marchionno
Additional photography by Kim Abeles

Project website: connectednessofthings.org

EcoArts Connection website: ecoartsonline.org



Particulates and the invisible connectedness of things

Venues

University of Colorado Museum of Natural History, Manhattan Middle School, Spark: UCAR Science Education at the National Center for Atmospheric Research, and the Emissions Testing facility in Boulder for Envirotest - Air Care Colorado

Overview

the invisible connectedness of things is a multi-faceted project created by Los Angeles visual artist Kim Abeles, commissioned by EcoArts Connections (EAC) and co-presented by the University of Colorado Museum of Natural History and EAC. This new project is presented at multiple locations bringing together smog, lichens, kids, adults, and inspiring people to ride the bus, bike or walk.

The diverse locations of the venues express a geographical “invisible connectedness”, with the core exhibition at the Biolounge at UCMNH being the central hub. The project is manifested in an equally varied range of formats (from multi-media installation to puzzles to a celebration of those who use alternative transportation to a lichen hunt near bus route 206 and other local sites), and it is the lichen that pull all the disparate parts together and are the soul of the project.

Lichens, as biomonitors, indicate air quality as they absorb from their environment both the air and moisture. Because of this miracle, they are collected and studied in the lab to compare carbon, lead and other pollutants in specific locations. They can be found on rocks and trees for instance, and mostly we walk or drive past them, overlooking their spectacular structure, colors and longevity.

This book

Selections of the *Smog Collectors* created by 80 students from Manhattan Middle School will be exhibited at each of the exhibition venues.

This project is intended to create dialogue between students and their community, to demonstrate the relationship of art and science, and to inspire people to ride the bus, walk, bike, skateboard, or use other alternative transportation.

What can you do to reduce particulate pollution?

Here are some suggestions compiled by Dr. Richard Wagner, Associate Professor of Meteorology at Metropolitan State College of Denver, to jumpstart our possibilities for cleaner air and a safer future:



Avoid idling your car when not in transit

“For every 10 minutes your engine is off, you’ll prevent one pound of carbon dioxide from being released (carbon dioxide is the primary contributor to global warming).”

- Environmental Defense Fund

Maintain your vehicle

A poorly maintained vehicle can pollute up to 25 times as much as a well-maintained one.

Use mass transit or carpool to reduce vehicle use Walk or bike when possible

Avoid high-emitting gasoline powered yard equipment

Support businesses which prioritize reduced emissions

For example, *Partners for a Clean Environment* includes nearly 300 (20%) businesses and municipal operations across Boulder County.

Encourage others to reduce emissions

Vote for elected officials supporting air pollution control



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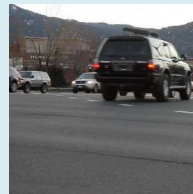
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About Smog Collectors

The *London Globe* printed a new word "Smog," coined in a speech at the 1905 Public Health Congress. They considered it a public service to describe this phenomenon.

The *Smog Collectors* materialize the reality of the air we breathe. I place cut, stencilled images on transparent or opaque plates or fabric, then leave these on rooftops and let the particulate matter in the heavy air fall upon them. After a period of time, for several days or months, the stencil is removed and the image is revealed in smog. To quote a stranger, they are "footprints of the sky".



Kim Abeles, *Engine in One Month of Smog*, 2010, Smog and ash from the Boulder, Colorado fires (August 15-September 15, 2010) on porcelain dinner plate, 10" diameter

Abeles' plate, shown above, was placed on the roof of Manhattan Middle School for one month in late summer 2010. Unexpectedly, the plate was outside during the Colorado fires, exposing the stencil to both ash and smog. On the left, you will see the plate as it was with the stencil, and on the right, the same plate with the stencil removed.

The images on the *Smog Collectors* are composed of particulate matter pollution. "The term "particulate matter" (PM) includes both solid particles and liquid droplets found in air. PM is emitted directly from numerous manmade and natural sources (primary pollutants) or produced in the air through chemical reactions of primary pollutants (secondary pollutants). Particles smaller than ten micrometers in diameter (PM₁₀) are considered "inhalable" and accumulate deep in the respiratory system. Research over the past two decades links "fine" particles, smaller than 2.5 micrometers in diameter (PM_{2.5}), with the greatest health risks." - U.S. Environmental Protection Agency



During October 2010, EcoArts Connections organized three days of programming and workshops where Abeles worked with the science classes at Manhattan Middle School in Boulder, Colorado to create their own images in smog. The plates were then placed on the roof of the school for seven months, collecting particulate matter through rain and shine. This book documents the students' artwork and here are a few notes about this process and project:

Eighty students created smog plates, though a few broke, and "unsigned" refers to student names whisked away by the harsh environment. The students created their images after attending a school-wide talk about environmental art presented by Abeles, followed by classroom-size introductions about the possible topics for the images on the plates. Each student created images, cut stencils and prepared a plate to be placed on the school's roof.





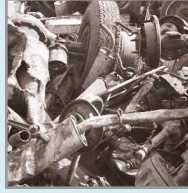
Smog Plate Themes



Animals and Sense of Place speaks of *the effects of pollution on all the species*, and the locations suggested by where animals live on this earth. How do you think our choices as humans effect the entire globe? This thematic section includes a specific reference to the University of Colorado Boulder; three middle schoolers used the CU's emblem as the image for their smog collectors. The buffalo refers to the university's mascot, but it would be impossible not to remember an environmental disaster, the wholesale slaughter of the buffalo by europeans when they arrived.

We live in a contradiction, often thinking that the dangers are somewhere else, beyond, and that we are safe in our homes. Since the worst in our air can't be seen, smog collectors are both literal and metaphoric depictions of the current conditions of our life source. They are reminders of our industrial decisions: the road we took that seemed so modern. **Humans and their Bodies** speaks to the severe effects of particulate pollution. "Because of their small size (less than one-seventh the average width of a human hair), fine particles can lodge deeply into the lungs. Individuals particularly sensitive to fine particle exposure include older adults, people with heart and lung disease, and children." - U.S. Environmental Protection Agency

Polluters include combustion (coal, oil, gasoline, diesel, wood), gas-to-particle conversion (sulfur oxides, nitrogen oxides), high temperature industry (smelter, steel mills) and forest fires. They also include coarser particulates from crushing (construction and demolition), grinding (industrial processes, tire and brake wear), dust (soil, farms, mines, unpaved roads, spread by vehicles on roads) and biological sources (breakdown of vegetation). In this theme, the middle school students were spot-on with many of the primary offenders: vehicles, factories and a brazen use of electricity. *The goal is for each of us to conserve energy, corporations included.*



More trees, more plants and more green spaces will help to heal the earth. **Plants and Life** are always to be admired. Both struggle and survive, providing good lessons for us all. A part of this entire project, *the invisible connectedness of things*, involves lichens as biomonitors, who are able to measure our polluted output and lifestyles. They are used in laboratories to test for levels of pollution in a specific location, (levels of carbon and lead, for example).

The thematic title, **Consumption**, is used here even though many of the images are practical solutions for aspects of the environmental crisis. Why would solutions be regarded as "consumption"? Recycling, alternative forms of transportation and green products are important of course, but consumption itself is our most difficult challenge. In many nations, we want, we buy, and we pitch more products and food than is imaginable in a healthy world. *Consumption is an addiction.*

All the images that the students created are symbolic and metaphoric to represent our world. **Symbols** is a specific theme that shows examples of smog plates that rely on particular images to communicate: hearts, peace signs and the happy face, as examples. Sometimes symbols are not direct translations, but rather, heartfelt expressions of our attitudes about the world. One of my favorites is the happy face by Sterling (see page 53) that transpired in its fullness as a result of the Boulder air and rain. Its smile is made from a puddle of particulate from the soggy air. Like all the students' images, it contains the tender, the critical and the hopeful.



Animals and Sense of Place



smog plate by Amanda London





smog plate by E.J.





unsigned smog plate





smog plate by Kiara Louy



Humans and their Bodies



unsigned smog plate









unsigned smog plate



Polluters



smog plate by Riley Fink











Plants and Life



smog plate by Anna Murphy





smog plate by Adriana O.











Consumption



smog plate by Merlin









smog plate by Taylor











Symbols















unsigned smog plate

- 1. Care for your car.** Regular maintenance and tune-ups, changing the oil, and keeping tires properly inflated can improve gas mileage, extend your car's life, and increase its resale value. It can also reduce traffic congestion due to preventable breakdowns and reduce your car's emissions by more than half.
- 2. Get fuel when it's cool.** Refueling on cool days or during cooler periods of the day, such as mornings and evenings, can prevent gas fumes from heating up and creating ozone. And that can help reduce ozone alert days.
- 3. Don't top off the tank.** Topping off releases gas fumes into the air, which cancels the benefits of the pump's anti-pollution devices. So, stop at the click and prevent gas spillage—it's safer and reduces pollution.
- 4. Know before you go.** If your area has a travel and transit information network, access it by calling, visiting the website, or tuning in to the cable station. Get travel and transit updates before you leave home so you're less likely to get stuck in a jam.
- 5. Spread the word.** If everyone took just a few of these simple steps, it could make a big difference in air quality and traffic congestion
- 6. Trip chain more often.** It's easy! Just combine your errands into one trip. It helps you get things done efficiently while reducing traffic congestion and air pollution. Starting a car after it has been sitting for more than an hour causes up to five times more pollution than starting up when the engine is warm.
- 7. Take mass transit, share a ride, or carpool.** Even if you do it just once or twice a week, you'll reduce traffic congestion and pollution and save money. The average driver spends more than 50 cents per mile, including the cost of car ownership and maintenance.
- 8. Have fun! Ride your bike.** It's a great way to travel and it can help you and the air get into better condition. Vehicles on the road create more than 25% of all air pollution nationwide.
- 9. Use your feet.** Walk or in-line skate instead of driving. Using your feet is a great way to get exercise and it's easy on the air.

Soaring gas prices are another good reason to make our vehicles more fuel-efficient. **Remember, small changes in behavior can have a big effect on gas mileage.**

Here are some suggestions that will help you clean the air and save money this summer:

- 1. Aggressive driving** (rapid acceleration, speeding, and quick braking) **can lower your gas mileage** by 33% at highway speeds and 5% around town. Go easy on the gas and brake pedals and you can save 15 to 96 cents per gallon!
- 2. Driving a typical passenger vehicle at 75 miles per hour uses 18% more gasoline** than driving at 65 miles per hour, and 31% more gasoline than driving at 55 miles per hour. That means, at today's prices, you're paying an additional 20 cents per gallon of gasoline for every 5 mph over 60 mph you're driving.
- 3. When refueling your vehicle, stop at the “click.”** Spilling one ounce of gasoline that evaporates produces the same ozone-producing VOC emissions as a car driving 56 miles.
- 4. Ozone, a pollutant that's hazardous** to your health, forms when evaporative emissions “bake” in the heat. Refueling your car at night can help prevent formation of ozone, which will keep your lungs healthier.
- 5. Don't throw your money on the ground!** Spilled gasoline from topping off your tank means less money in the bank.

These tips are courtesy Air Care Colorado







The *Smog Collector* is a process invented by Kim Abeles in 1987 to make images from the polluted air. A stencil is placed on plates and then exposed to the air. After a period of time, from a few days to several months, the stencil is removed and the image is revealed in smog. During October 2010, EcoArts Connections organized three days of programming and workshops where Abeles worked with the science classes at Manhattan Middle School in Boulder, Colorado to create their own images in smog. The plates were then placed on the roof of the school for seven months collecting particulate pollution through rain and shine.

Left to right: smog plates by Manhattan Middle School students Riley Fink, Aria Klein and Amanda London