

Petcoke-Coal Test Results

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ENVIRONMENTAL HEALTH
& ENGINEERING, INC.

David L. MacIntosh

- All sampling and testing designed by David L. MacIntosh, Sc.D, C.I.H, Chief Science Officer with Environmental Health & Engineering, Inc.
 - Adjunct Associate Professor at the Harvard School of Public Health
 - Technical advisor to government agencies and the World Health Organization
 - 20 years experience as an active member of the environmental health profession
 - Author of numerous publications in the area of exposure assessment, risk analysis, and environmental management
- Test results interpreted and analyzed by Dr. MacIntosh

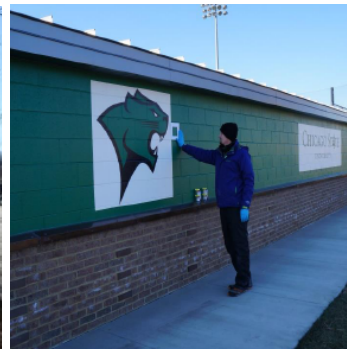
Findings

- No evidence of petcoke or coal on surfaces or in soil of East Side and South Deering neighborhoods based on indicators identified by testing petcoke and coal and by geography*
- Supporting Information
 - Composition of soil in East Side and South Deering neighborhoods similar to control neighborhoods and was not different in any statistically significant way from levels in soil in the City of Chicago as reported by the U.S. Geological Survey or from background levels reported by the State of Illinois Environmental Protection Agency Tiered Approach for Corrective Action (TACO) program
 - Signature trace metals and PAHs for petcoke and coal not found on surfaces sampled

* Indicators include vanadium, V:Ni ratio, distribution of trace element and PAH concentrations, naphthalene, 1-methylnaphthalene, 2-methylnaphthalene, 1-chloronaphthalene, benzo(a)pyrene, benzo(g,h,i)perylene, dibenz(a,h)anthracene; proximity to petcoke/coal terminals; and surrogates of transportation-related impacts (lead, proximity to roads and asphalt)

Study Outline

- Conducted an investigation with the objective of examining surfaces and soil in the East Side and South Deering neighborhoods for the presence of petcoke and coal.
- Examined the soil and surfaces for chemical indicators (signatures) of petcoke and coal, including certain metal (vanadium to nickel) and polynuclear aromatic hydrocarbon (PAHs) ratios.
- Samples were collected and tested in accordance with ASTM and EPA methods by independent environmental professionals and laboratories.
- Collected samples of soil and surface dust in late November-early December 2013 and April 2014 from the East Side and South Deering neighborhoods and control areas.
 - 69 locations in November-December 2013
 - 39 locations in April 2014, collected after an extended period of windy and dry conditions
 - Publicly accessible locations: parks and rights of way
 - Many locations near the petcoke/coal terminals
 - Benches, bleachers, bus stop shelters, sides of storage buildings, and green space
 - Selected to be representative of buildings and yards on private property



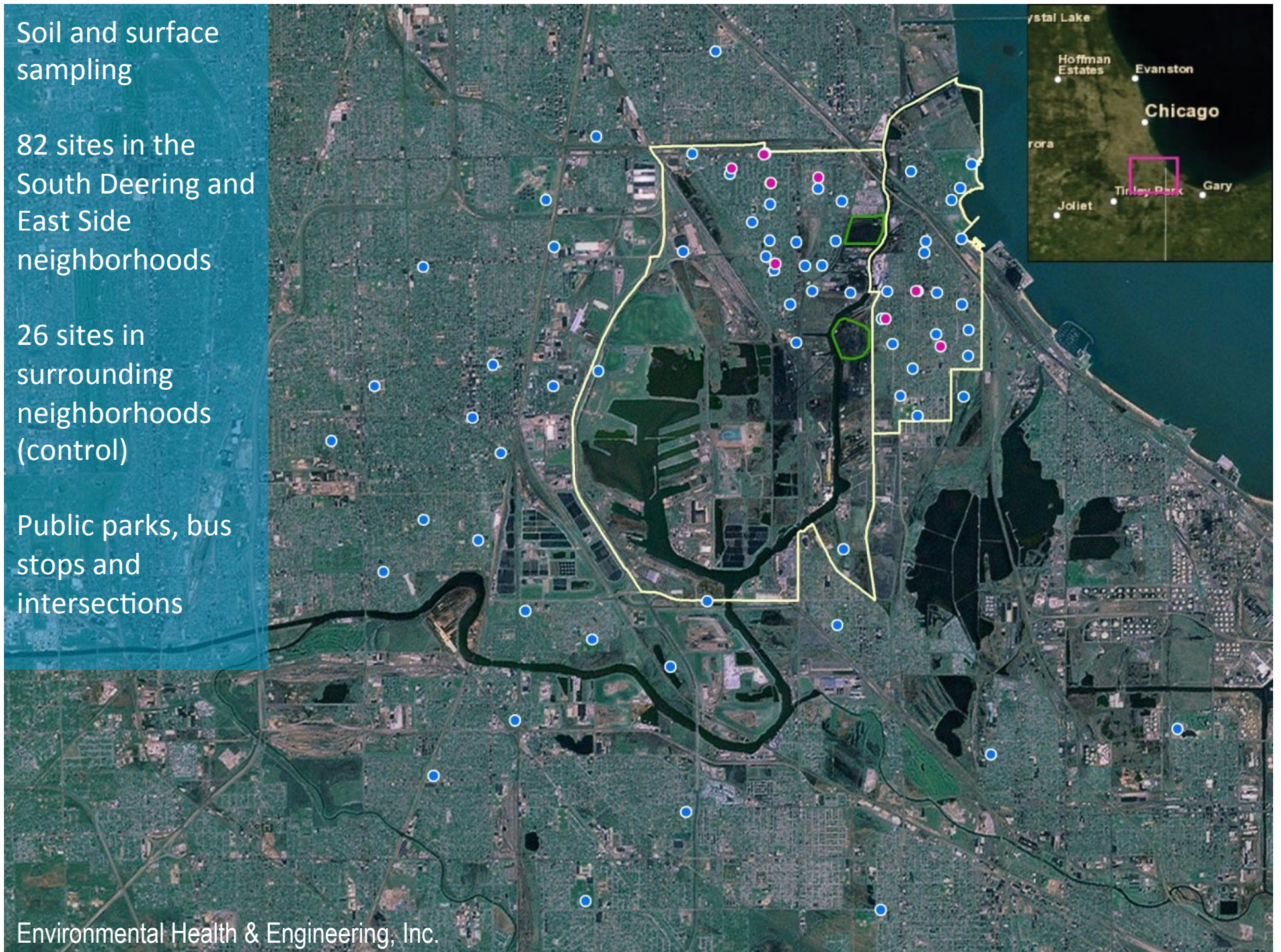
Soil and surface
sampling

82 sites in the
South Deering and
East Side
neighborhoods

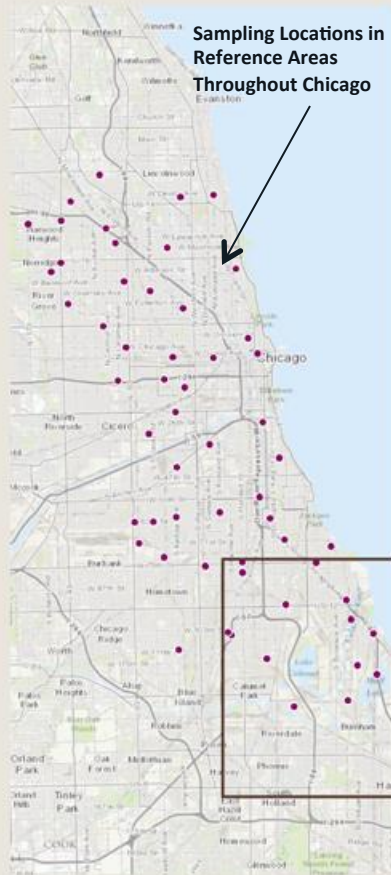
26 sites in
surrounding
neighborhoods
(control)

Public parks, bus
stops and
intersections

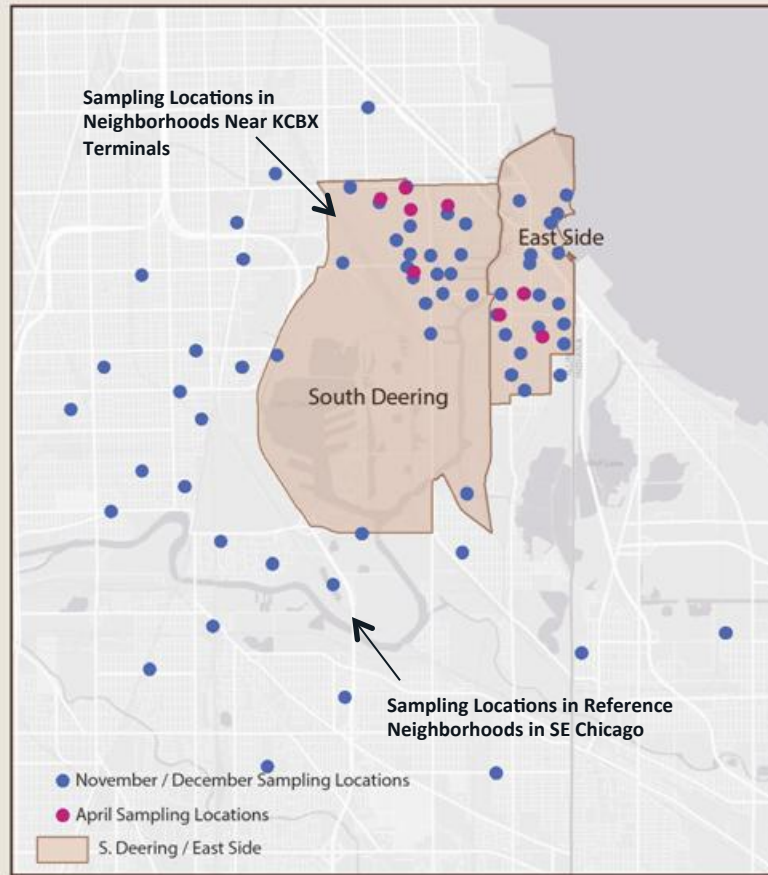
Environmental Health & Engineering, Inc.



Polynuclear Aromatic Hydrocarbon Profiles



GREATER CHICAGO AREA



SAMPLED NEIGHBORHOODS
ABUTTING COAL SITES AND CONTROLS

WHAT ARE POLYNUCLEAR AROMATIC HYDROCARBONS?

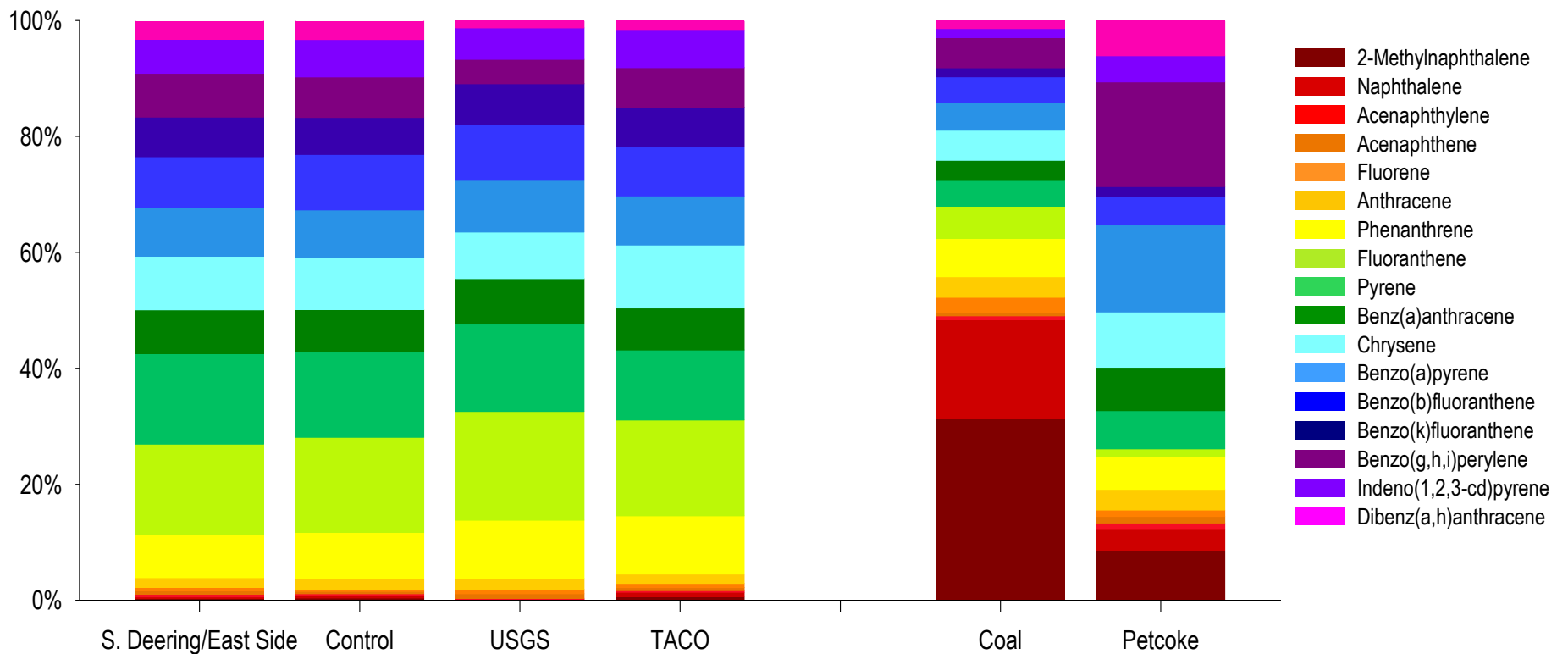
Polynuclear aromatic hydrocarbons (PAHs) are a group of chemicals that occur naturally in coal and crude oil. Forest fires and volcanoes produce PAHs naturally as well. PAHs also are present in products made from fossil fuels, such as home heating oil, kerosene, gasoline, diesel fuel, and asphalt. PAHs are released into the air whenever fossil fuels, petroleum products, wood, garbage, and other carbon-based substances are burned. PAHs are widespread in soil, air, and water throughout the United States and the world.

The amounts and mixture of PAHs in soil are generally consistent over an area, such as within a neighborhood. As a result, we usually expect to find similar levels for each PAH at locations throughout that area. Levels can differ within an area when natural or human-related processes add or remove PAHs from soil. Ratios between specific PAHs can often be used to identify sources of these differences. For example, petcoke and coal contain a different mixture of PAHs than is typically found in cities.

We measured PAHs in soil and on surfaces of the South Deering and East Side neighborhoods and compared those levels to PAHs measured in other locations in Chicago as well as to PAHs in petcoke and coal from the KCBX terminals in Chicago. The PAHs amounts and mixture in the neighborhoods were similar to other locations in the City and different from the PAH levels in petcoke and coal. There is no evidence of contamination from petcoke and coal in the neighborhoods based on these data.

The soil of South Deering and East Side neighborhoods is similar to the rest of Chicago, and different from coal and petcoke.

PAH Profiles in Soil Samples

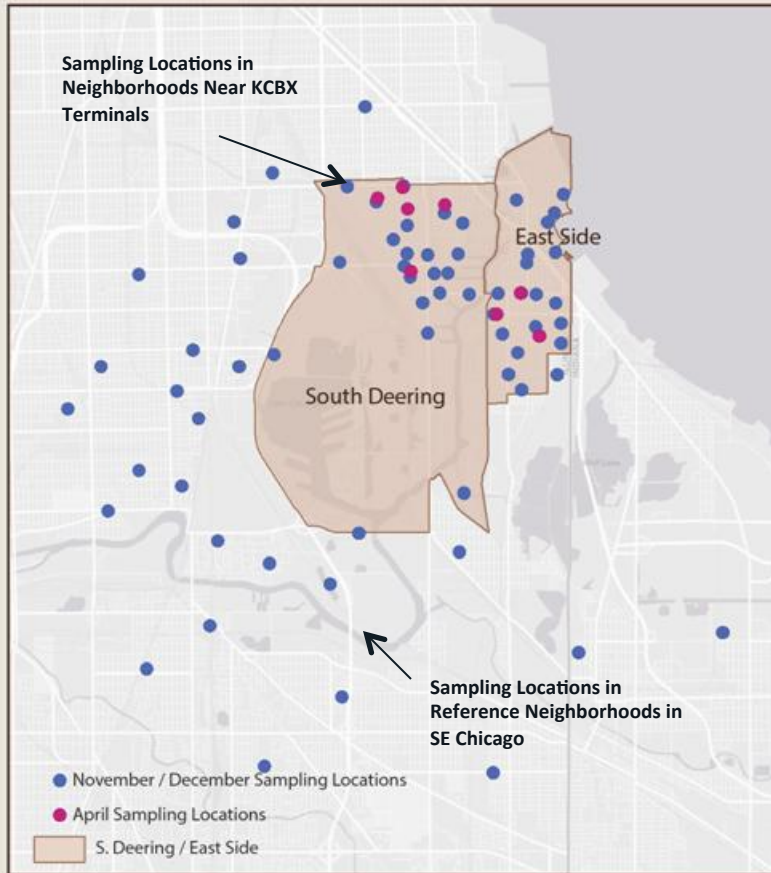


The soil of South Deering and East Side neighborhoods is similar to the rest of Chicago and different from petcoke and coal.

Trace Metals in Soils



GREATER CHICAGO AREA



SAMPLED NEIGHBORHOODS
ABUTTING COAL SITES AND CONTROLS

WHAT ARE TRACE METALS?

Trace metals, such as nickel, zinc, and copper, are metals that are normally found at low levels in the Earth's crust. All soils naturally contain trace metals. Many trace metals are vital nutrients for plants, animals, and humans. Aluminum, iron, calcium, and potassium (not represented in the figures below) make up about 99% of the metals in soil. Trace metals usually make up the other 1%.

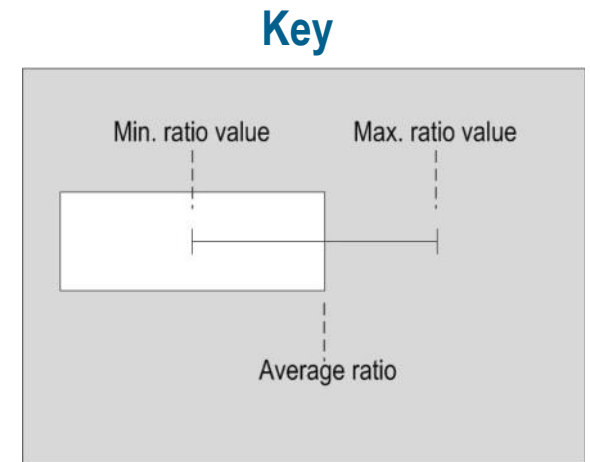
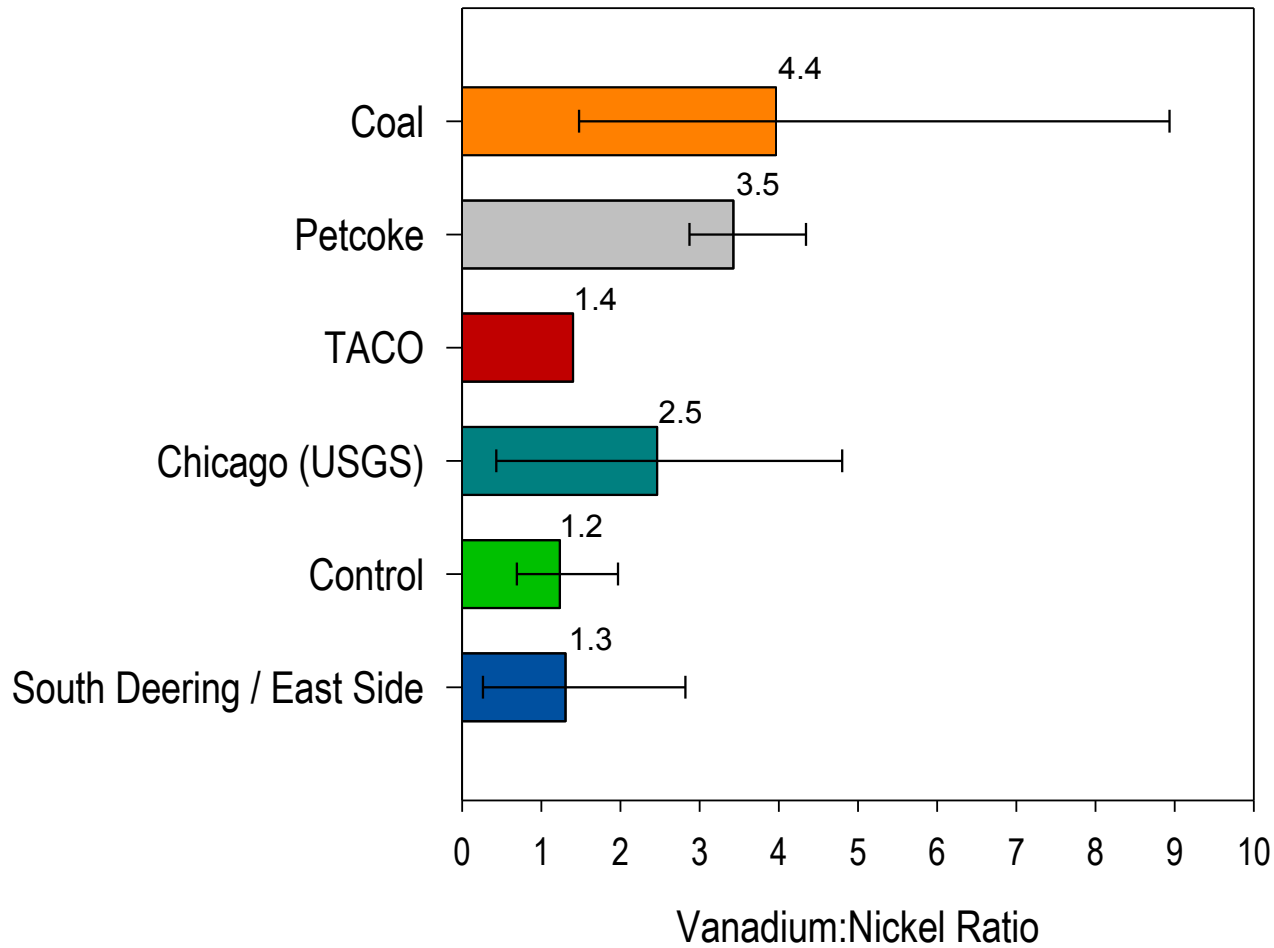
Amounts of trace metals in soils vary from location to location as soil types vary. If soil type is fairly consistent over an area, such as within a neighborhood, we usually expect to find similar levels for each trace metal at locations throughout that area. Levels can differ within an area when natural or human-related processes add or remove trace metals from soil. Ratios between specific trace metals can often be used to identify sources of these differences.

Substances such as petcoke and coal are not formed by the same processes that create soil. As a result, trace metal levels and ratios in these substances are generally different from those in soil. For example, the ratio between vanadium and nickel in petcoke and coal is quite different from the ratio of vanadium and nickel in natural soil. Finding soil with vanadium to nickel ratios that differ from natural soil and are similar to those of coal and petcoke may indicate the presence of these substances in that soil.

We measured vanadium, nickel, and other trace metals in soil and on surfaces of the South Deering and East Side neighborhoods and compared those levels to trace metals measured in other locations in Chicago as well as to levels in petcoke and coal from the KCBX terminals in Chicago. The trace metal amounts and ratios in the neighborhoods were similar to other locations in the City and different from the levels in petcoke and coal. There is no evidence of contamination from petcoke and coal in the neighborhoods based on these data.

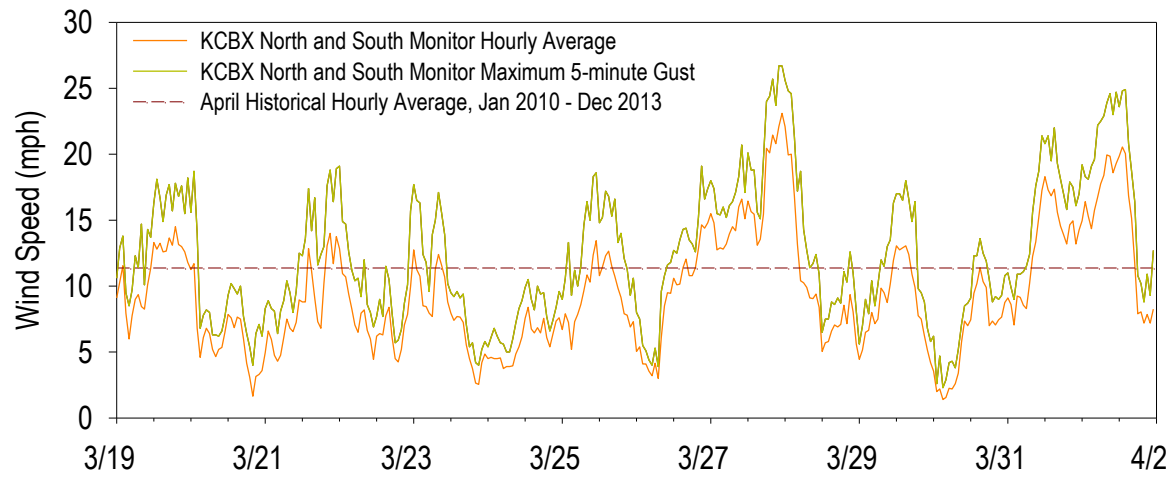
Trace metals in soil of South Deering and East Side neighborhoods are similar to those in soil from control neighborhoods and different from petcoke and coal.

Signature Metal Ratios



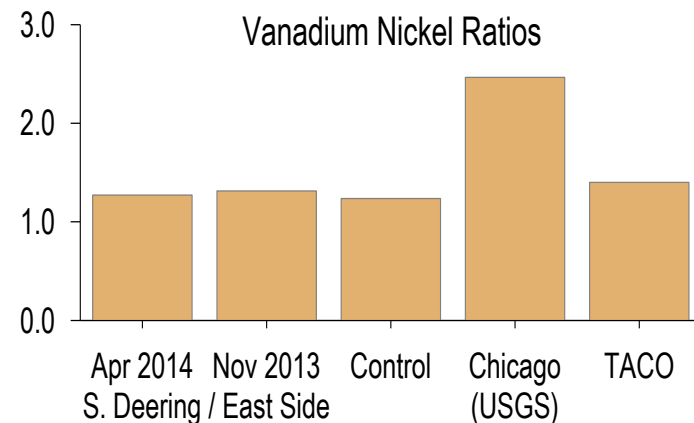
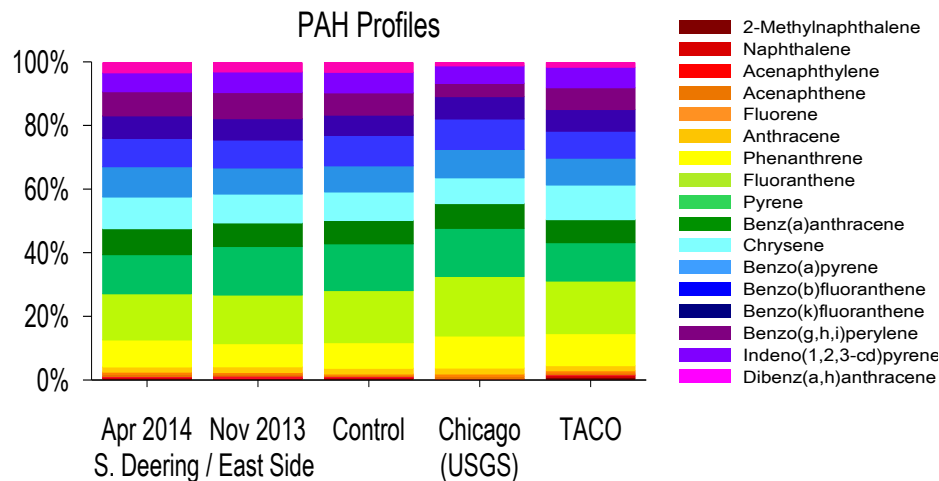
April 2, 2014 Sampling

- Samples collected from 39 locations in parks within the abutting neighborhoods after extended period of windy and dry conditions
 - 39 surface dust samples
 - 8 soil samples
- Parks selected ranged from within 0.25 miles to greater than 1.5 miles of the KCBX terminals



April 2, 2014 Sampling

- April sample results consistent with findings for samples in South Deering and East Side neighborhoods collected in late November-early December 2013
- PAHs and petcoke/coal signature components and ratios not detected



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800-825-5343

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