



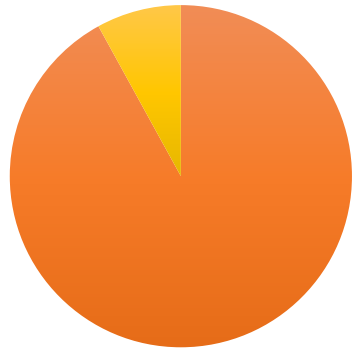
Characterization of Particulate Air Pollution in a Community near the Port of Houston

Inkyu Han, PhD, MPH

University of Texas Health Science Center
(UTHealth) School of Public Health

August 10, 2017

Ambient (Outdoor) Air and Health

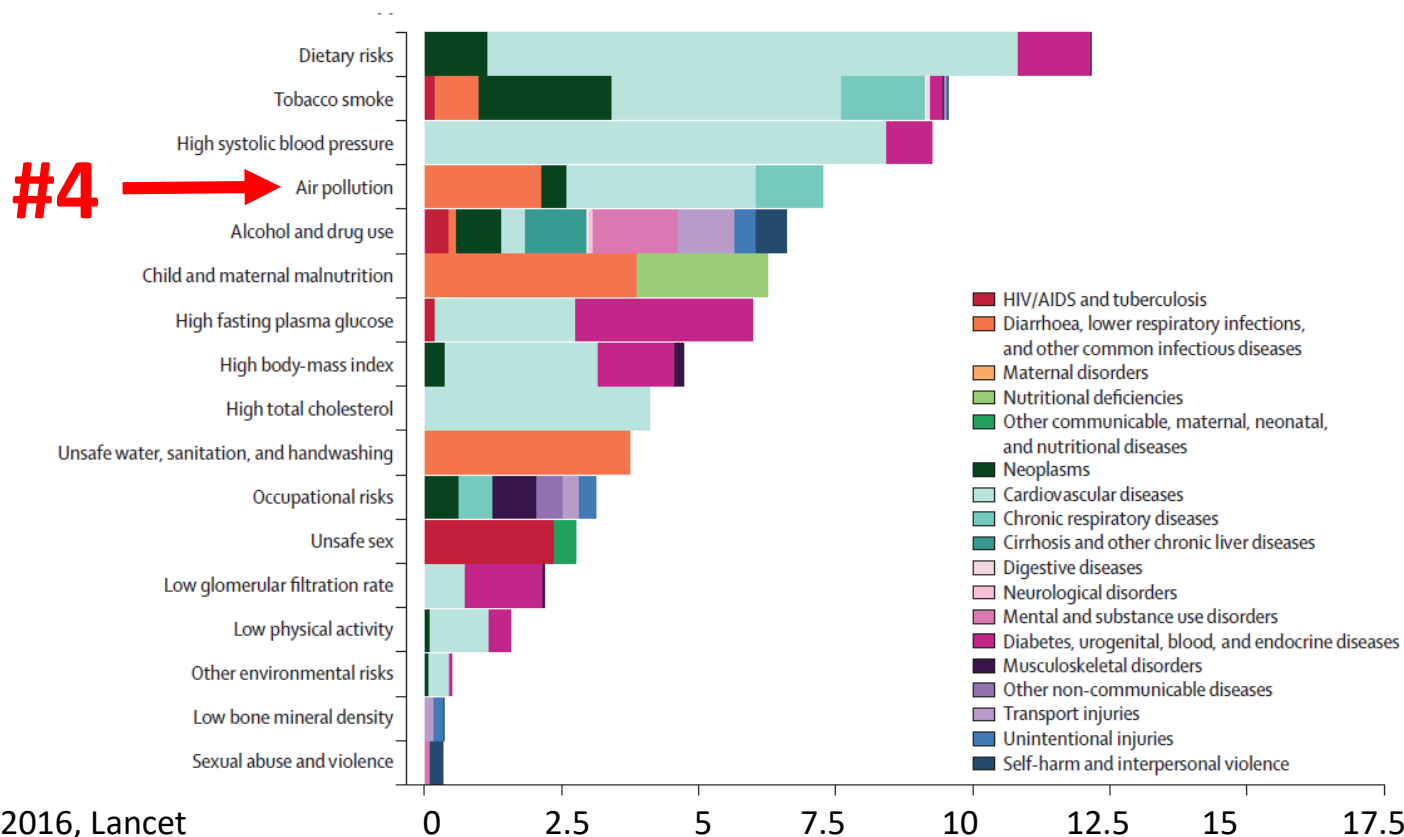


**92% of the world population
(> WHO air quality guidelines)**

**~ 3 Million premature deaths per a year
= 1 premature death per 10 sec**

Source: WHO, 2016

Burden of Air Pollution: Disability-Adjusted Life-Years (DALY) in 2015



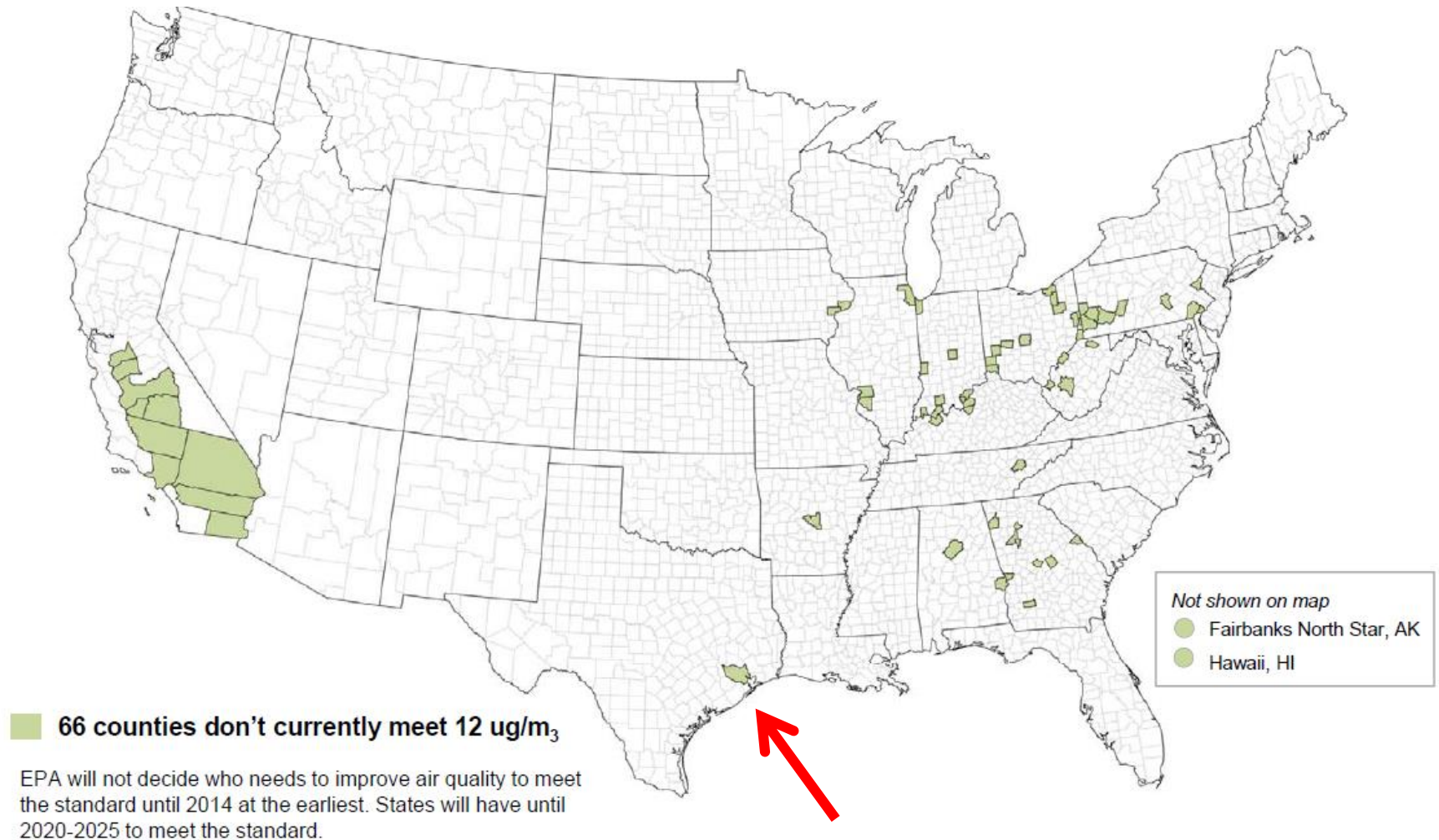
Source: GBD 2016, Lancet

National Ambient Air Quality Standards (NAAQS)

Six “Criteria” Pollutants

Acceptable ambient air concentrations established that would be protective of **general population** including **sensitive groups**.

Annual PM_{2.5} Standard (12 ug/m³)



Daily Mean PM2.5 Concentrations from 01/01/00 to 12/31/15

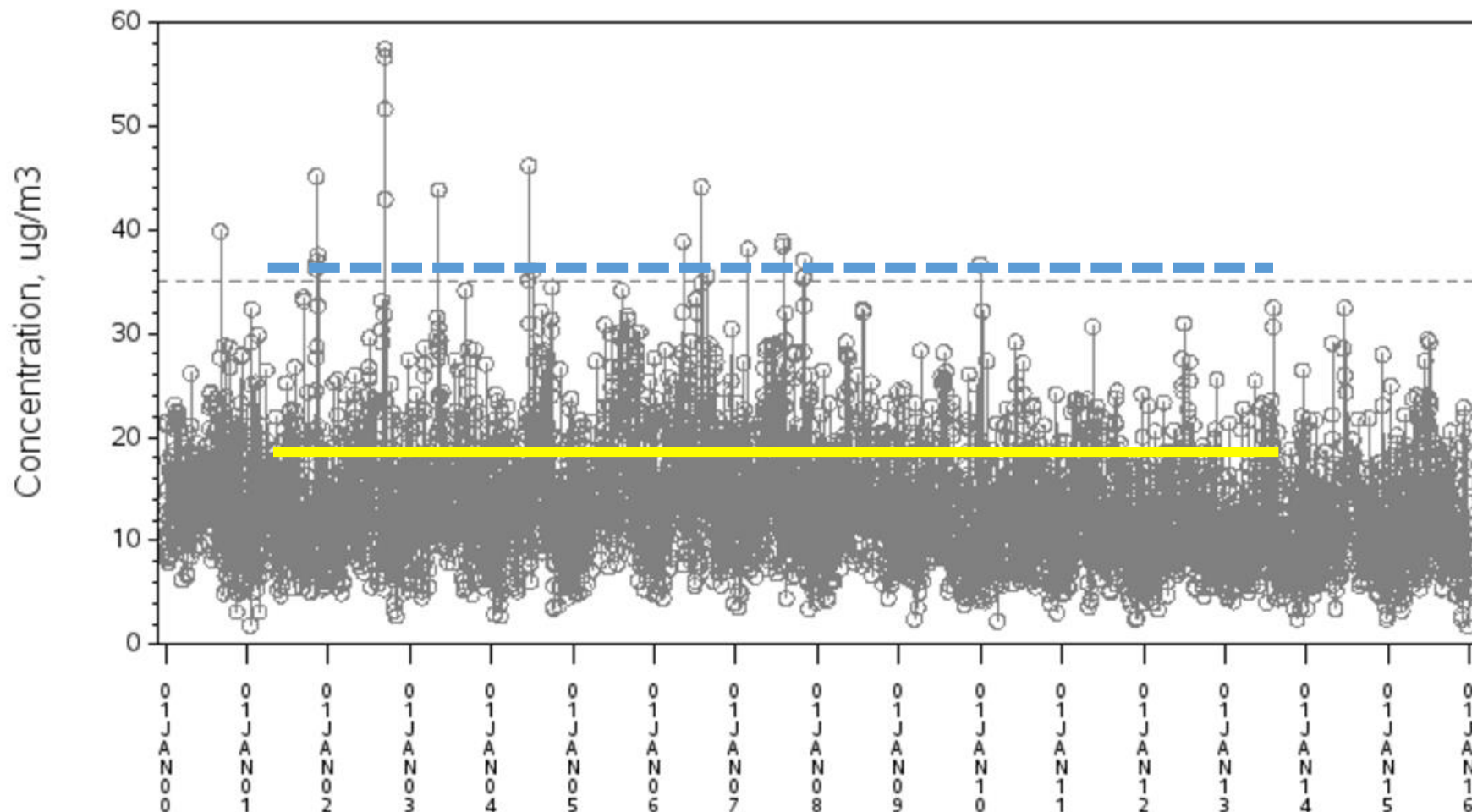
Parameter: PM2.5 - Local Conditions (Applicable standard is 35 ug/m3)

CBSA: Houston-The Woodlands-Sugar Land, TX

County: Harris

State: Texas

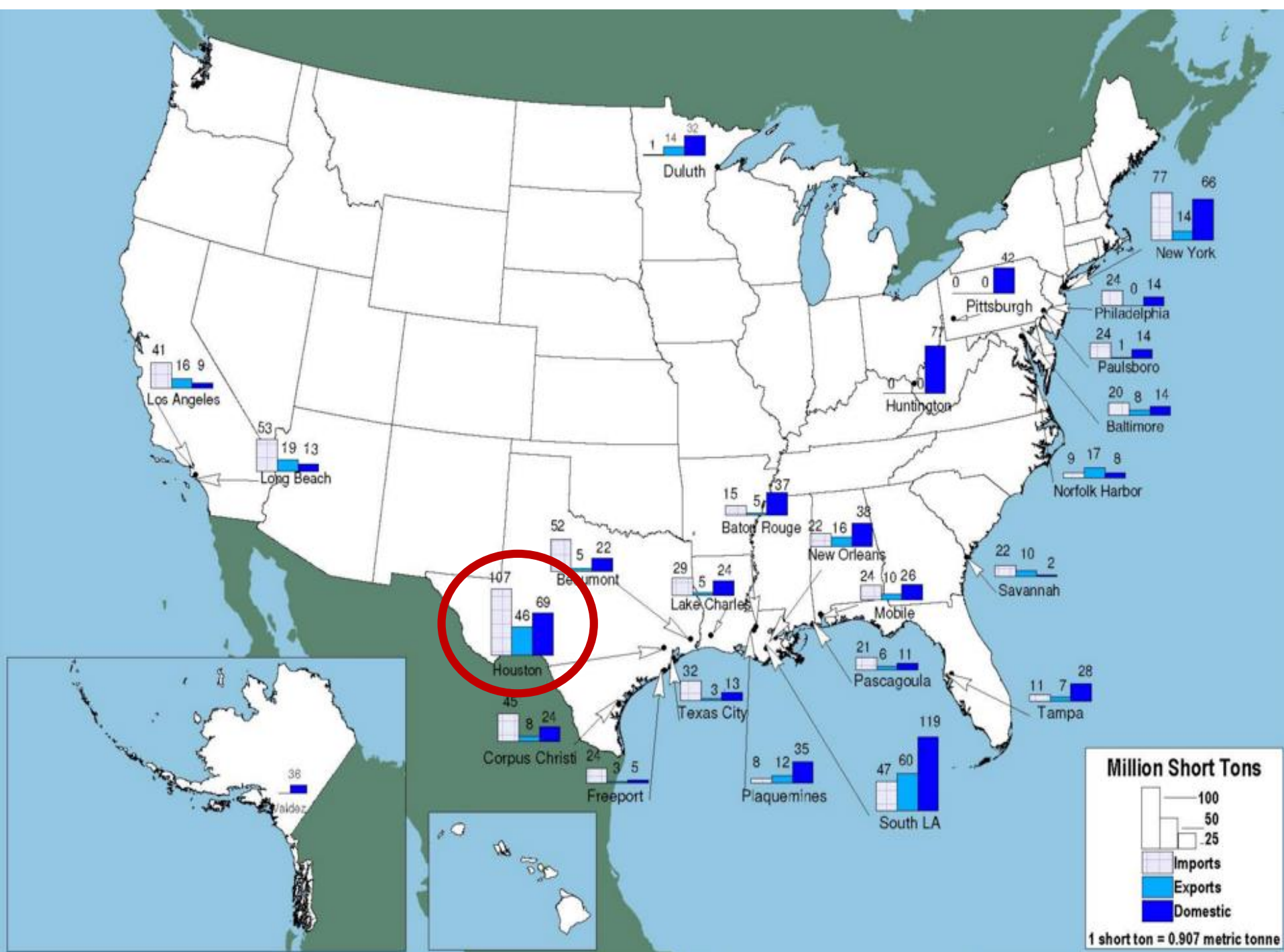
AQS Site ID: 48-201-1035, poc 1



Source: U.S. EPA AirData <<https://www.epa.gov/air-data>>

Generated: November 30, 2016





Ship Emission and Mortality

60,000 annual death



Corbett et al., 2007

Diesel Emission





Investigating Cancer Cluster Concerns



Melanie A. Williams, Ph.D. Branch Manager
Cancer Epidemiology and Surveillance
Branch

Heidi Bojes, Ph.D., Director
Environmental & Injury Epidemiology
& Toxicology Unit

February 26, 2015

Health Concerns

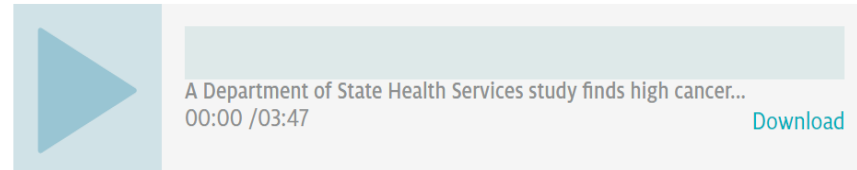
NEWS

Texas: Possible Cancer Clusters In East Harris County and Houston

A Department of State Health Services study finds high cancer rates in neighborhoods near highly industrialized areas, but it stops short of identifying the cause.

CARRIE FEIBEL | JUNE 23, 2015, 6:00 AM (LAST UPDATED: AUGUST 14, 2015, 10:09 PM)

Share



A new scientific study by the state of Texas finds higher than expected levels of certain cancers east Harris County and eastern Houston neighborhoods. But the report only looks at the incidence of cancer. It does not investigate possible causes, such as pollution, nearby industry, lifestyles or random chance.

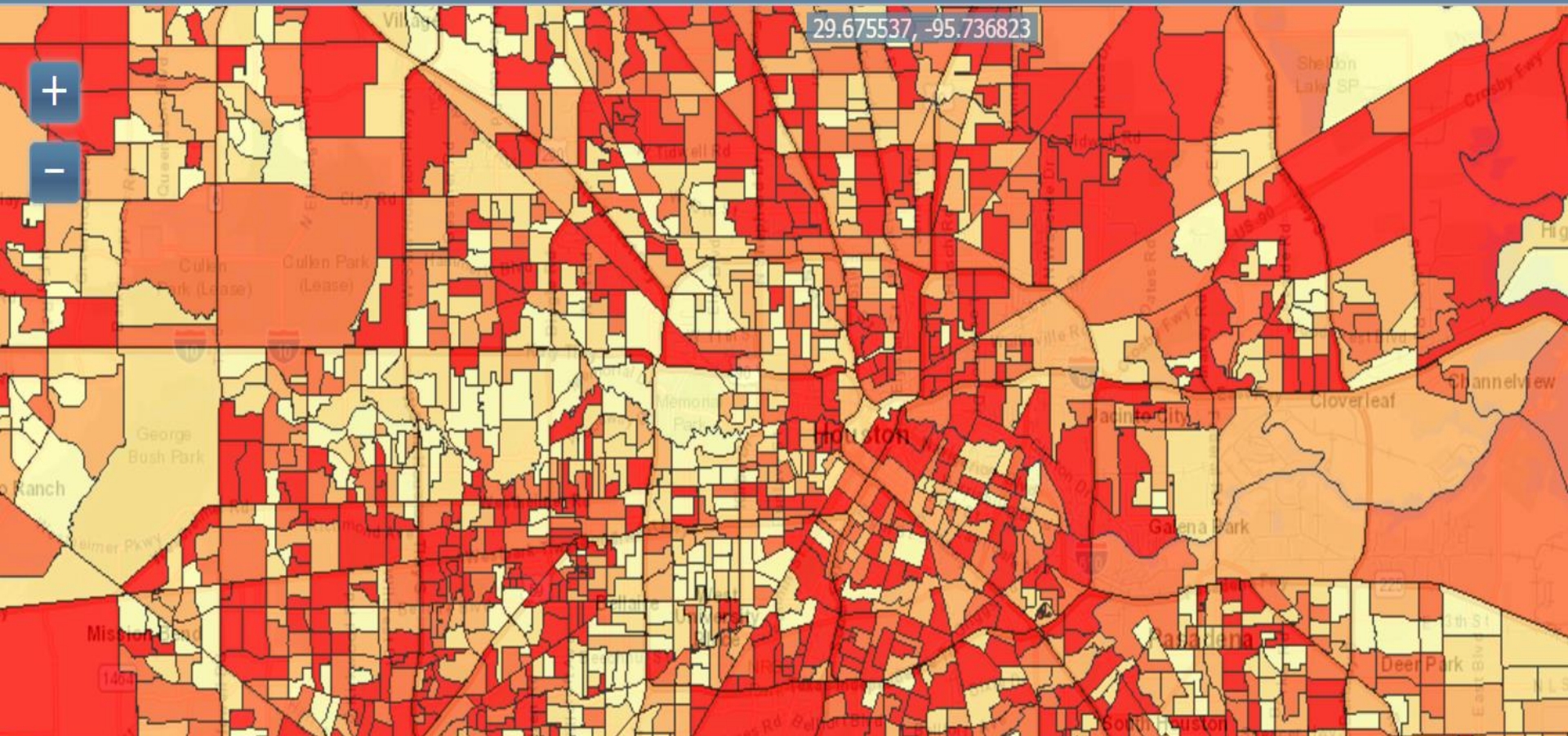
The study is significant because it was conducted by the [Department of State Health Services](#), not an outside group. *The complete report can be read below.*

Source: Houston Public Media

Poverty Levels in the Study Locations

EPA EJSCREEN EPA's Environmental Justice Screening and Mapping Tool (Version 2016)

Generate Reports ▼ Add Maps ▼ Erase Print Measure Bookmarks ▼ Basemap

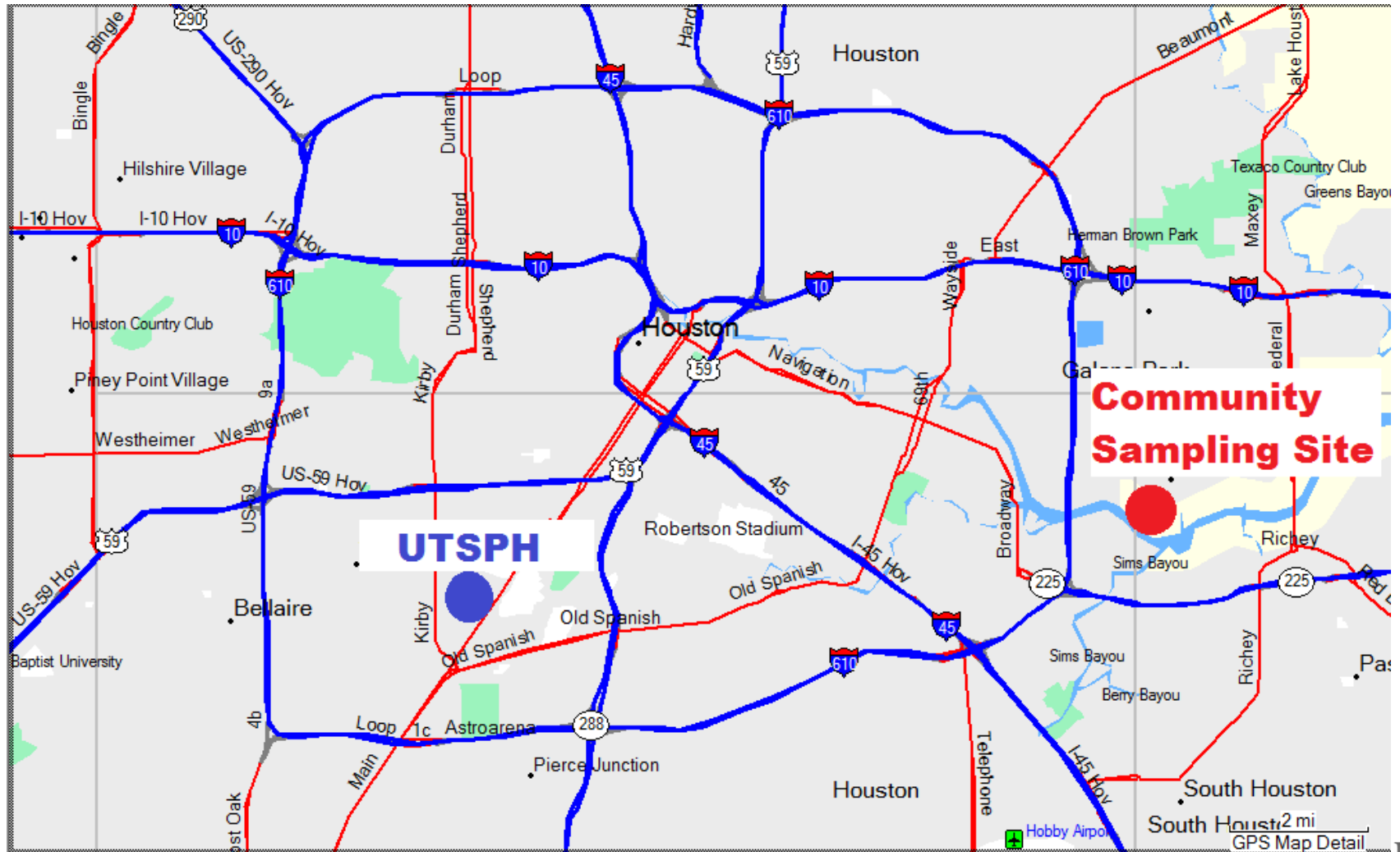


Objectives

To characterize size distributions of elements in ambient air impacted by industrial and traffic sources in Houston, TX.

To provide compositional data for further health studies.

Sampling locations



Comparison of Demographics

Category	Active sampling site community	UTHealth
Total Population ¹	2,275	5,431
Ethnicity (%)		
Non Hispanic Whites	0	47
Non Hispanic Blacks	82	16
Hispanics	17	17
Non Hispanic Others	1	20
Median Household income	\$24,856	\$87,937

Source: US Census, 2016

Sampling Method

Size-fractionated PM collected on weekly basis



Size fraction


< 0.25 μm

0.25 -0.5 μm

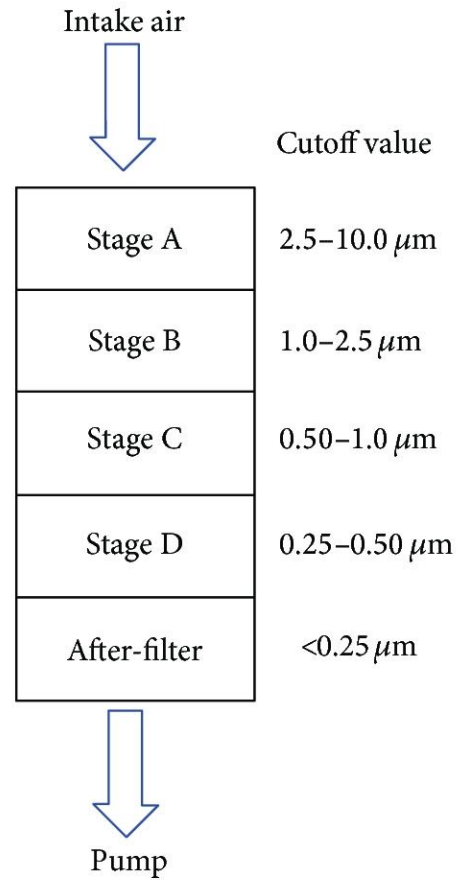
0.5-1.0 μm

1.0-2.5 μm

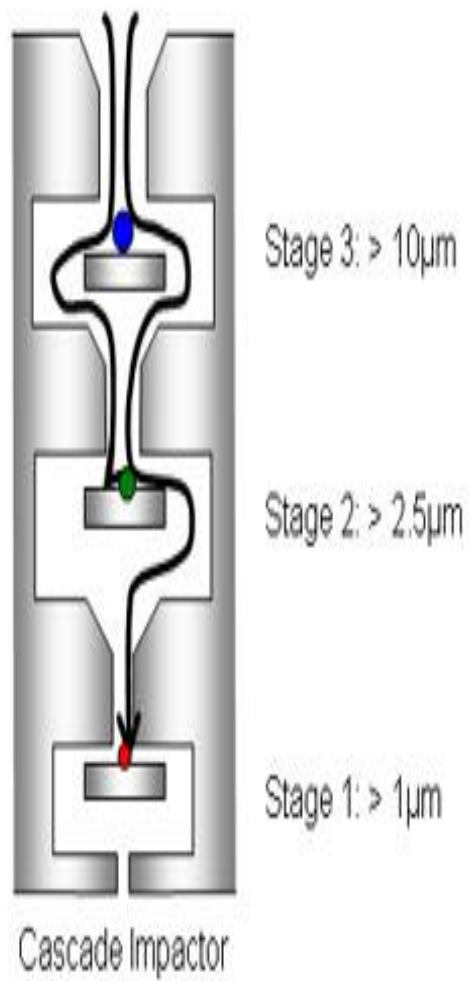
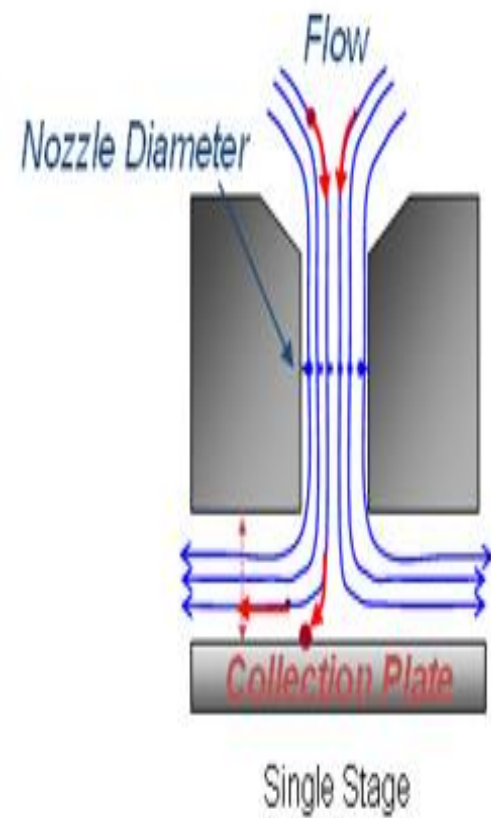
> 2.5 μm



The sampling campaign is on-going process started from 2016.



Principle of Operation





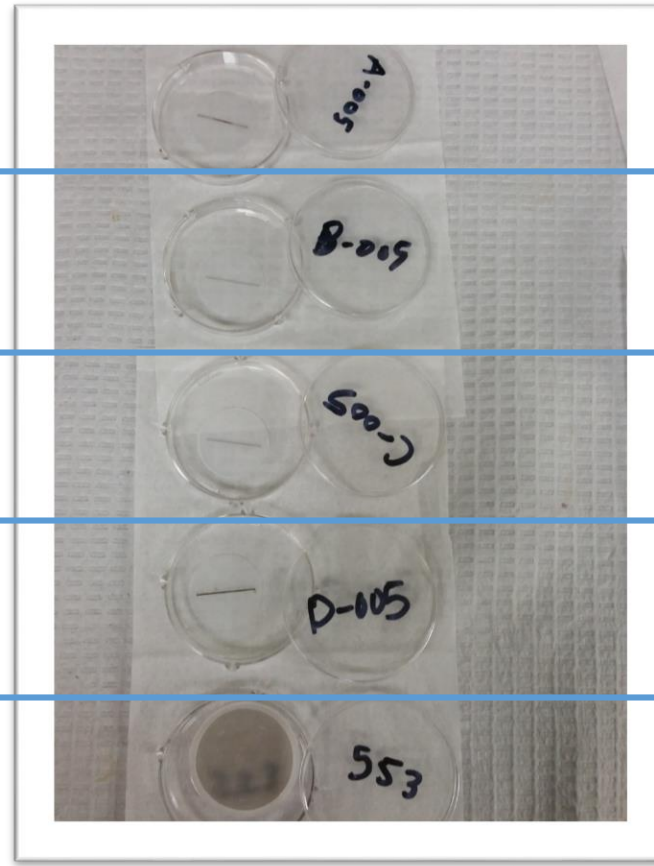
> 2.5

$1.0 - 2.5$

$0.5 - 1.0$

$0.25 - 0.5$

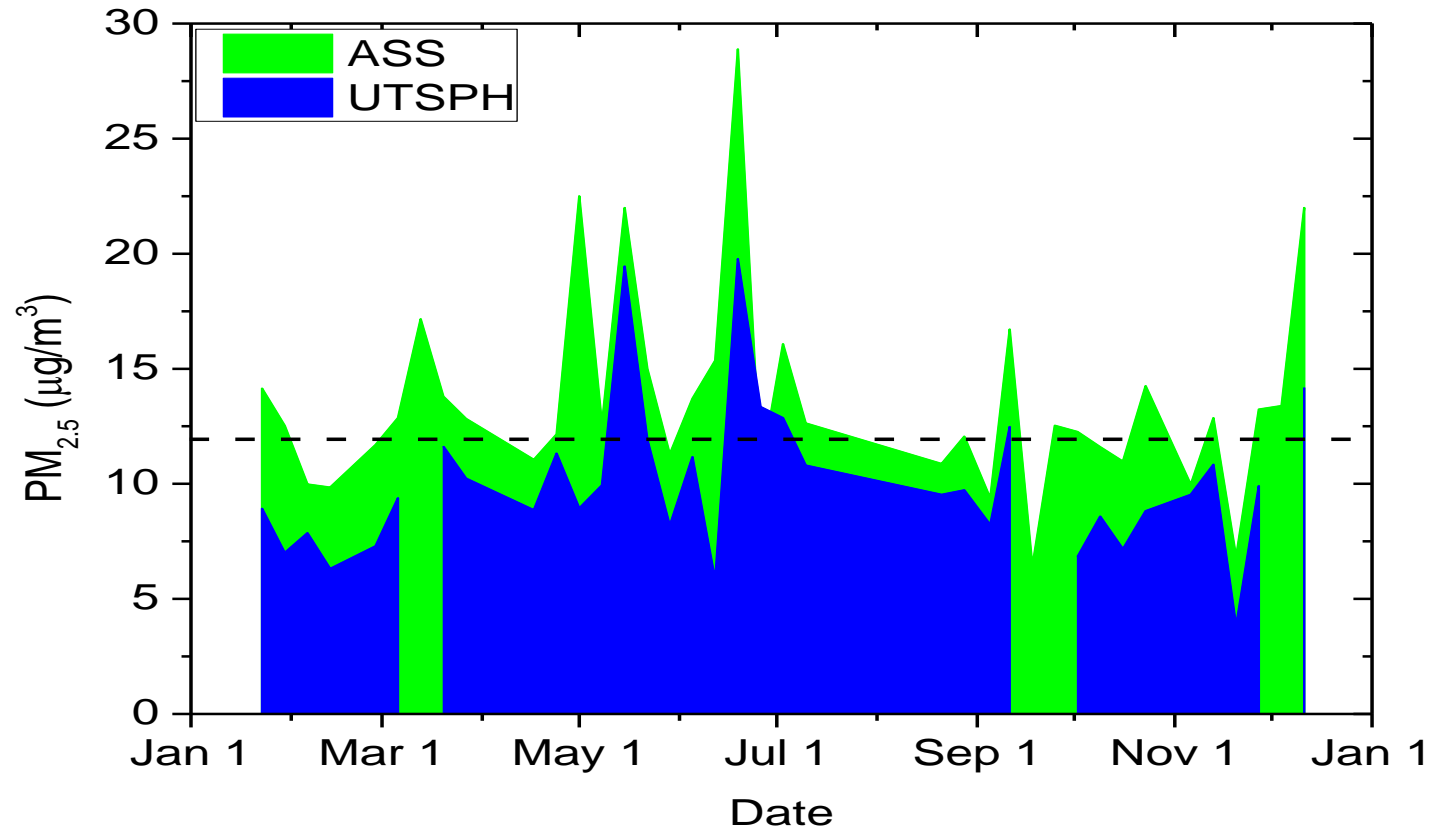
< 0.25



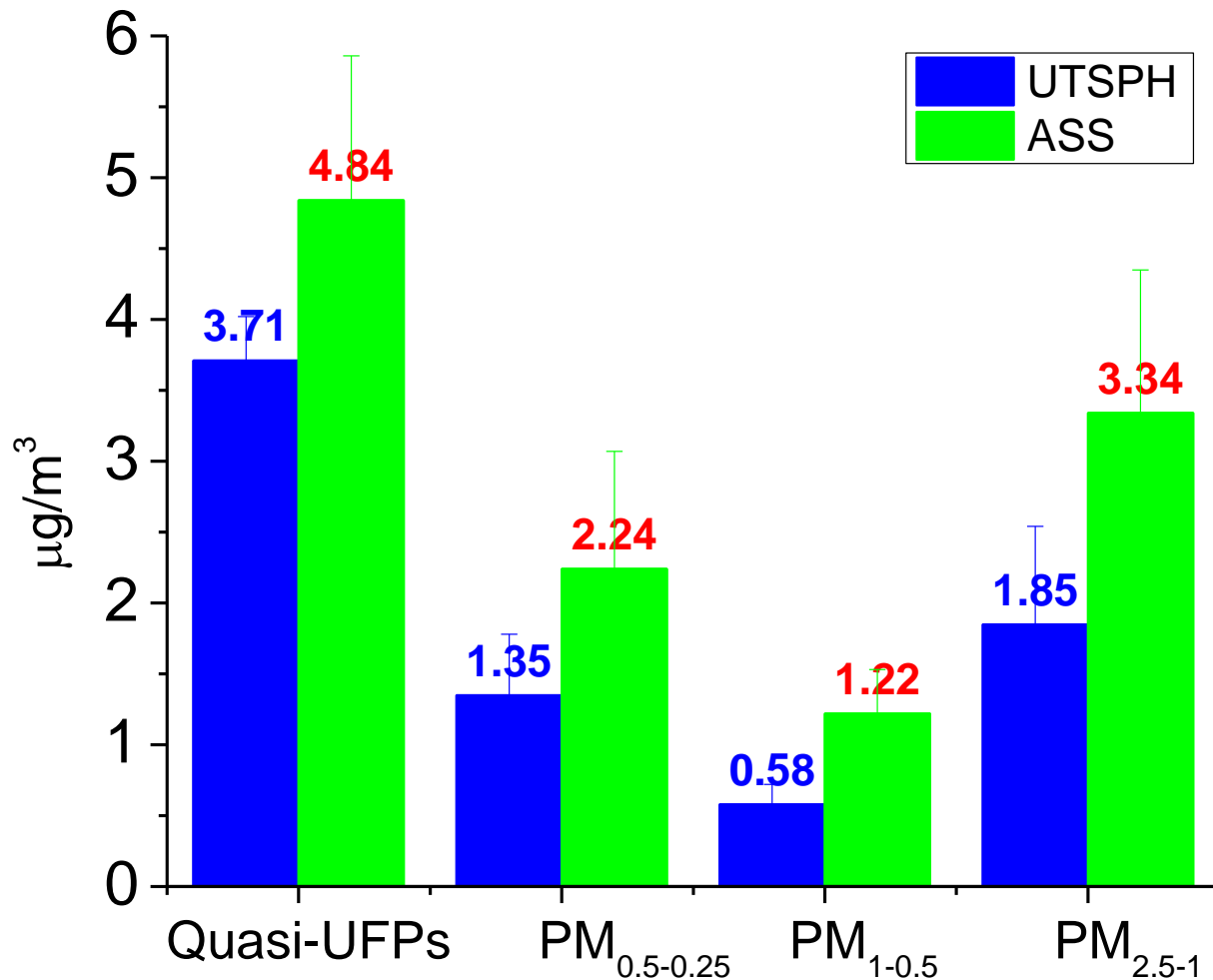
Element Analysis

- Filter digestion
 - CEM Mars5 Xpress microwave oven
- Element analyses
 - Agilent 7300 ICP/MS
 - NIST standard reference material (SRM) 1648a for QC

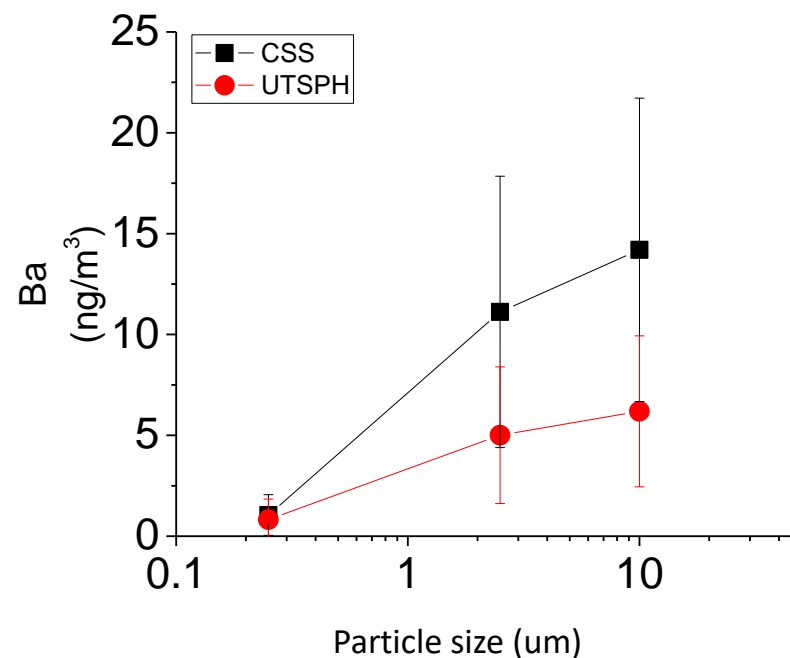
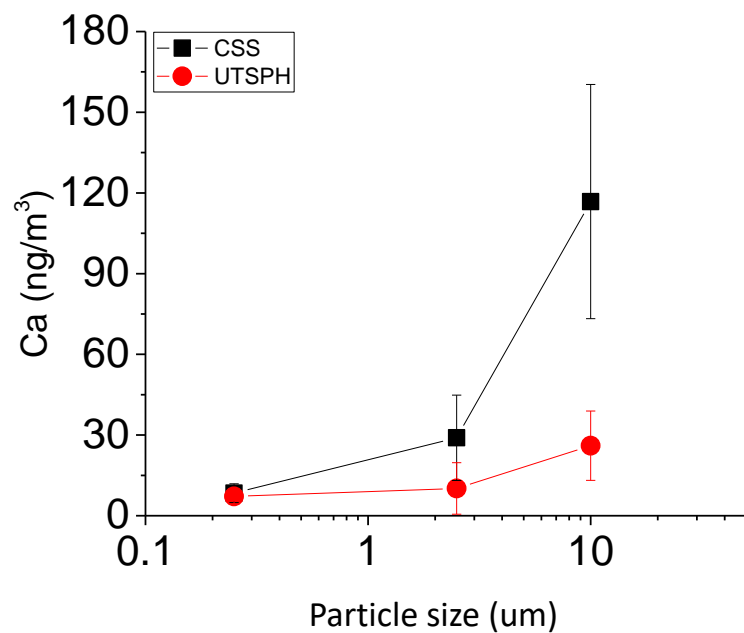
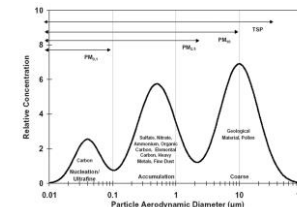
2016 PM_{2.5}



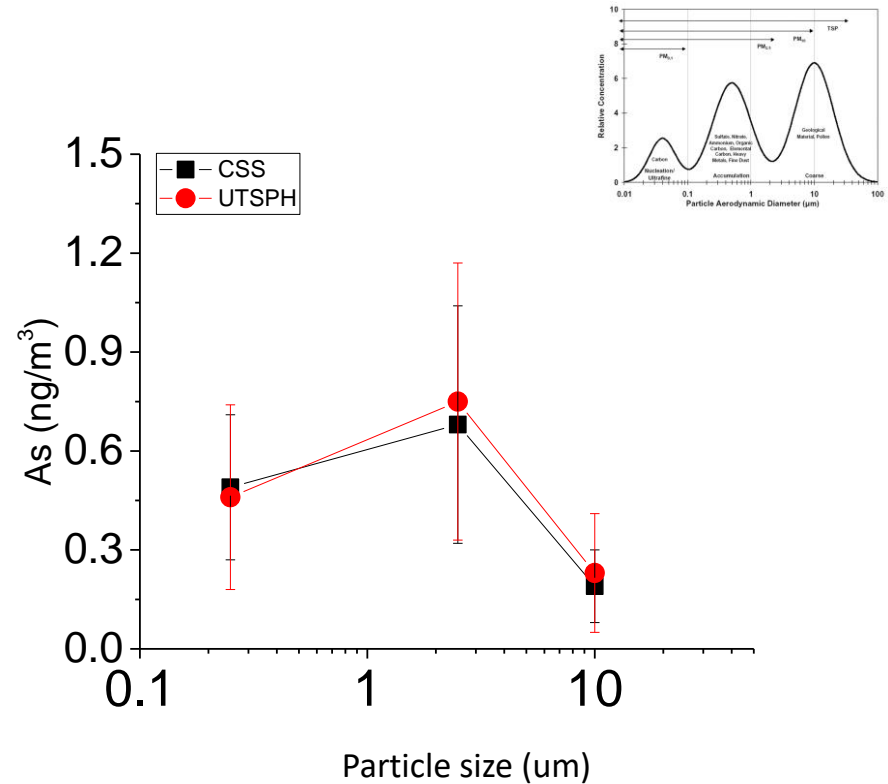
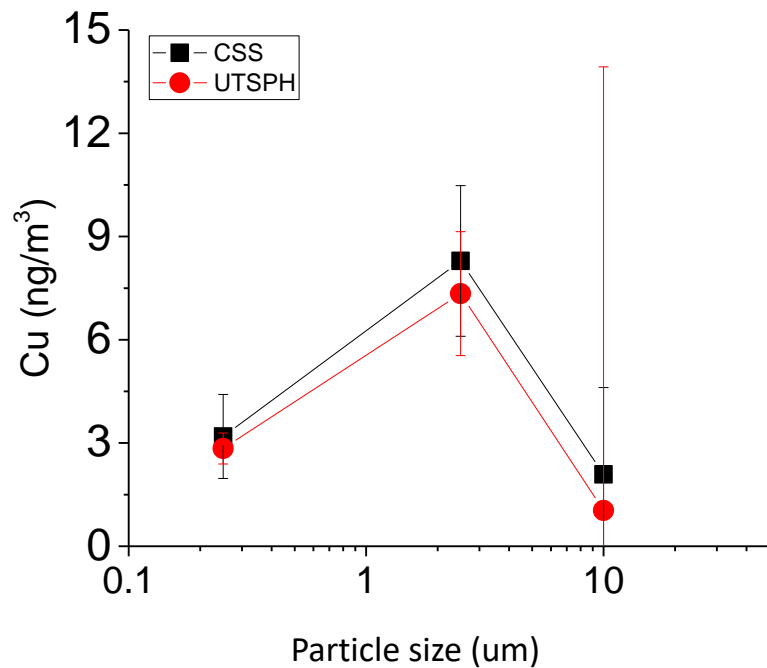
Size-Fractionated PM



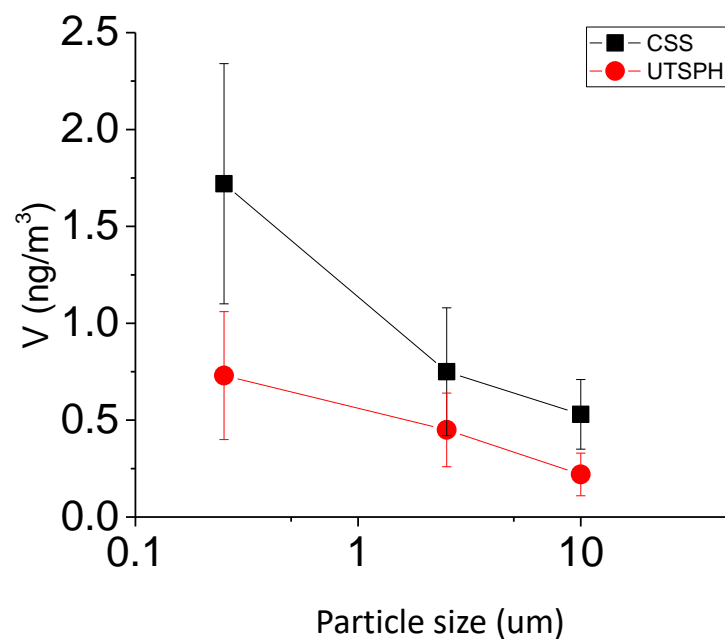
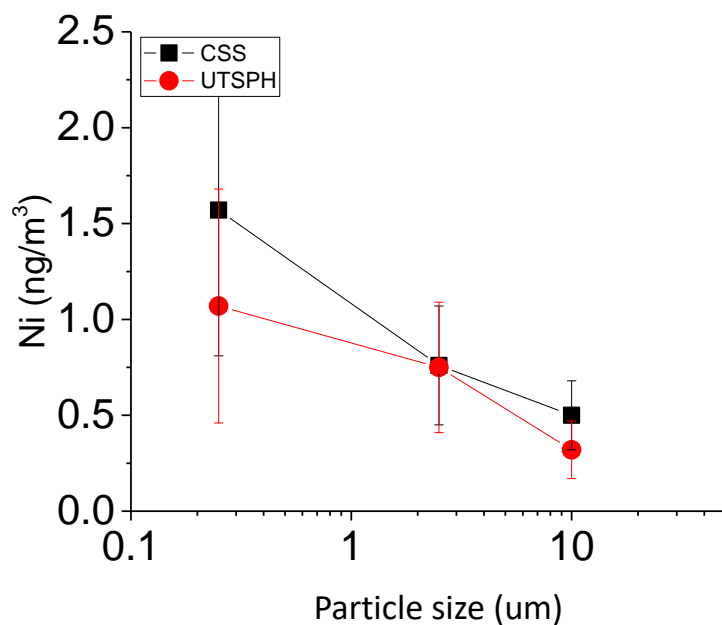
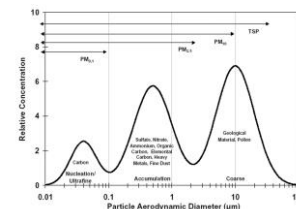
Coarse Mode PM



Accumulation (Fine) Mode PM



(Quasi-)Ultrafine Mode PM



Summary

- **Average PM₁₀** concentrations at the active sampling site (CSS) were **23.6** $\mu\text{g}/\text{m}^3$ consisting of
 - Coarse PM ($12.0 \pm 3.1 \mu\text{g}/\text{m}^3$)
 - Accumulation PM ($6.8 \pm 2.6 \mu\text{g}/\text{m}^3$)
 - Quasi-UFP ($4.8 \pm 1.3 \mu\text{g}/\text{m}^3$)
- **Coarse PM**
 - Most elements (Na, Mg, Al, K, Ca, Mn, Fe, Ba, Se, Sr, Pb) were the highest
- **Accumulation PM**
 - Cu, Zn, As
- **Quasi-UFP**
 - Nickel (Ni) and V were the highest in quasi-UFP

Future Studies



Acknowledgement

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Thank you

Inkyu.Han@uth.tmc.edu

Dept. Epidemiology, Human Genetics, and Environmental Sciences
University of Texas Health Science Center
School of Public Health

Southwest Center for Occupational and Environmental Health