

Regional Air Quality Briefing

SEA Stakeholder Advisory Round Table

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Overview

Agency overview

Which air pollutants and communities do we focus on, and why?

Where do priority air pollutants come from?

How does air quality in south King County compare with other areas? What are trends?

What's being done to improve air quality?

Ultrafine particle pollution and University of Washington studies

Current monitoring

Questions?



Agency Vision

All the people and natural systems in our region benefit from clean and healthy air all the time, regardless of socio-economic status or geographic location.

Our region does its part, and more, to protect the climate.



Fine Particle Pollution

Small size; Cardiac and Respiratory Effects

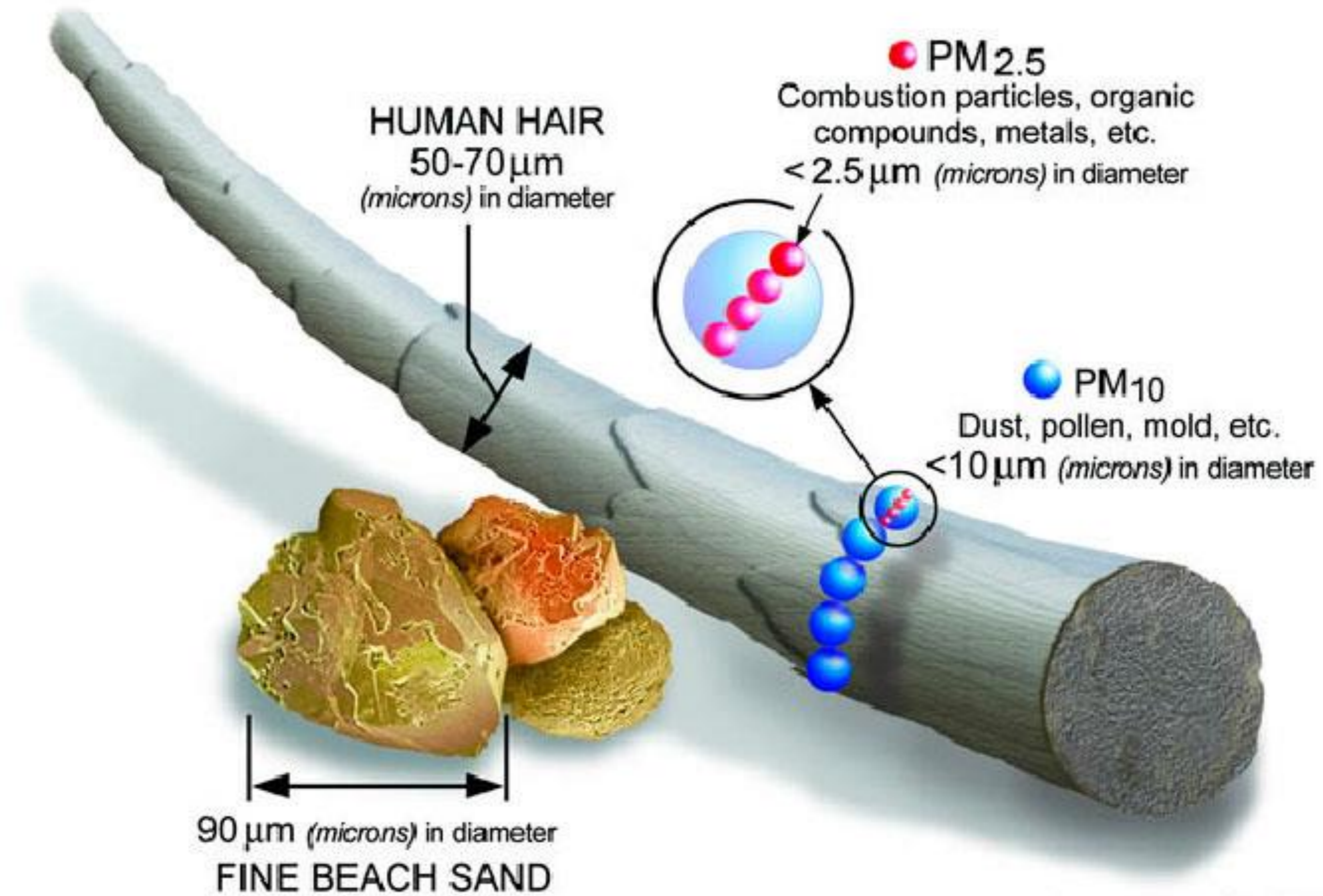


Image courtesy of the U.S. EPA

Why focus on fine particle pollution (PM_{2.5})

Variety of health effects

Most established health effects include:

- Asthma aggravation
- Reduced lung function
- Heart attacks
- Strokes
- Premature death

Well established – based on large body of evidence

National Ambient Air Quality Standard (acute and chronic); local health goal

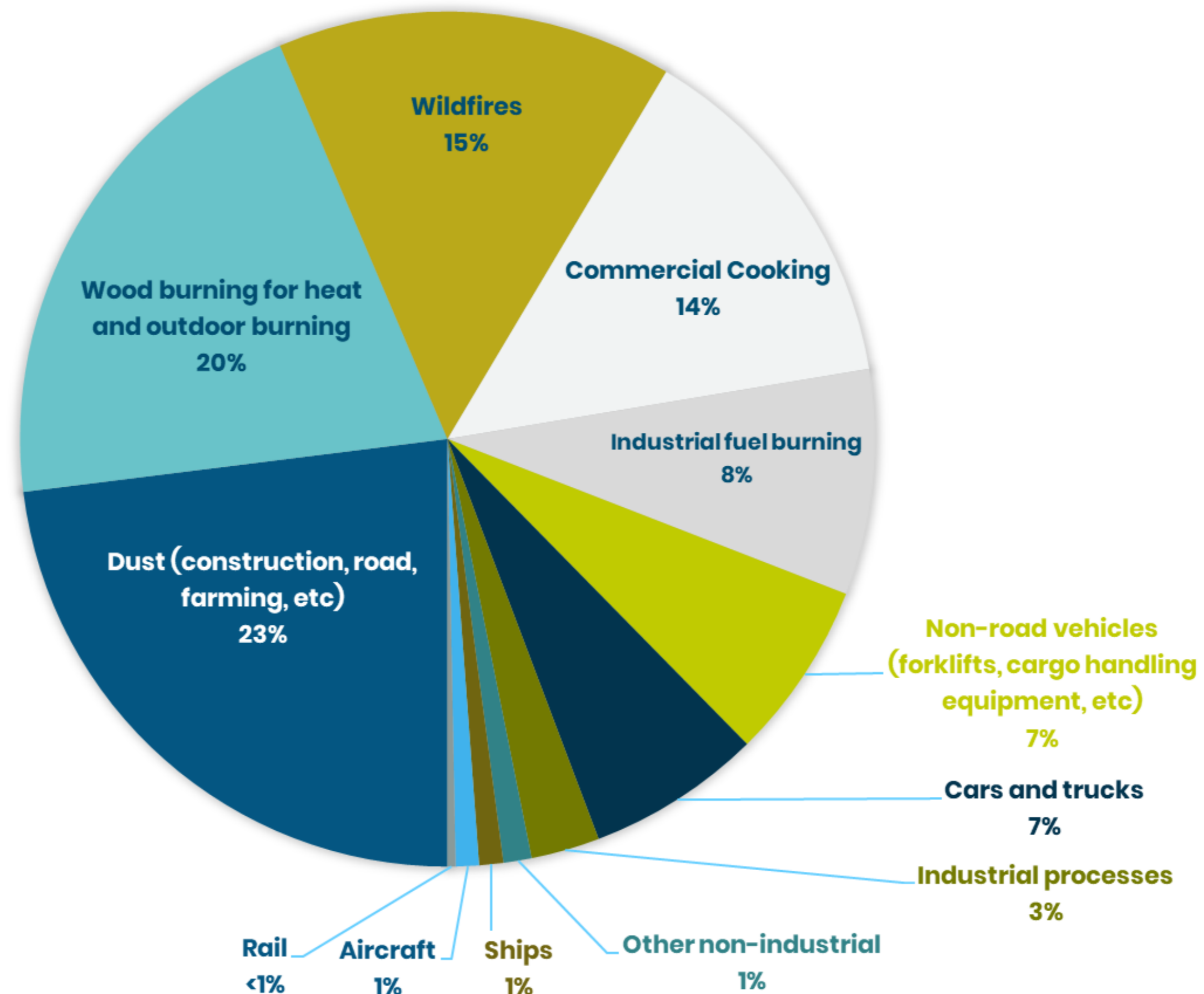


Where does PM_{2.5} come from?



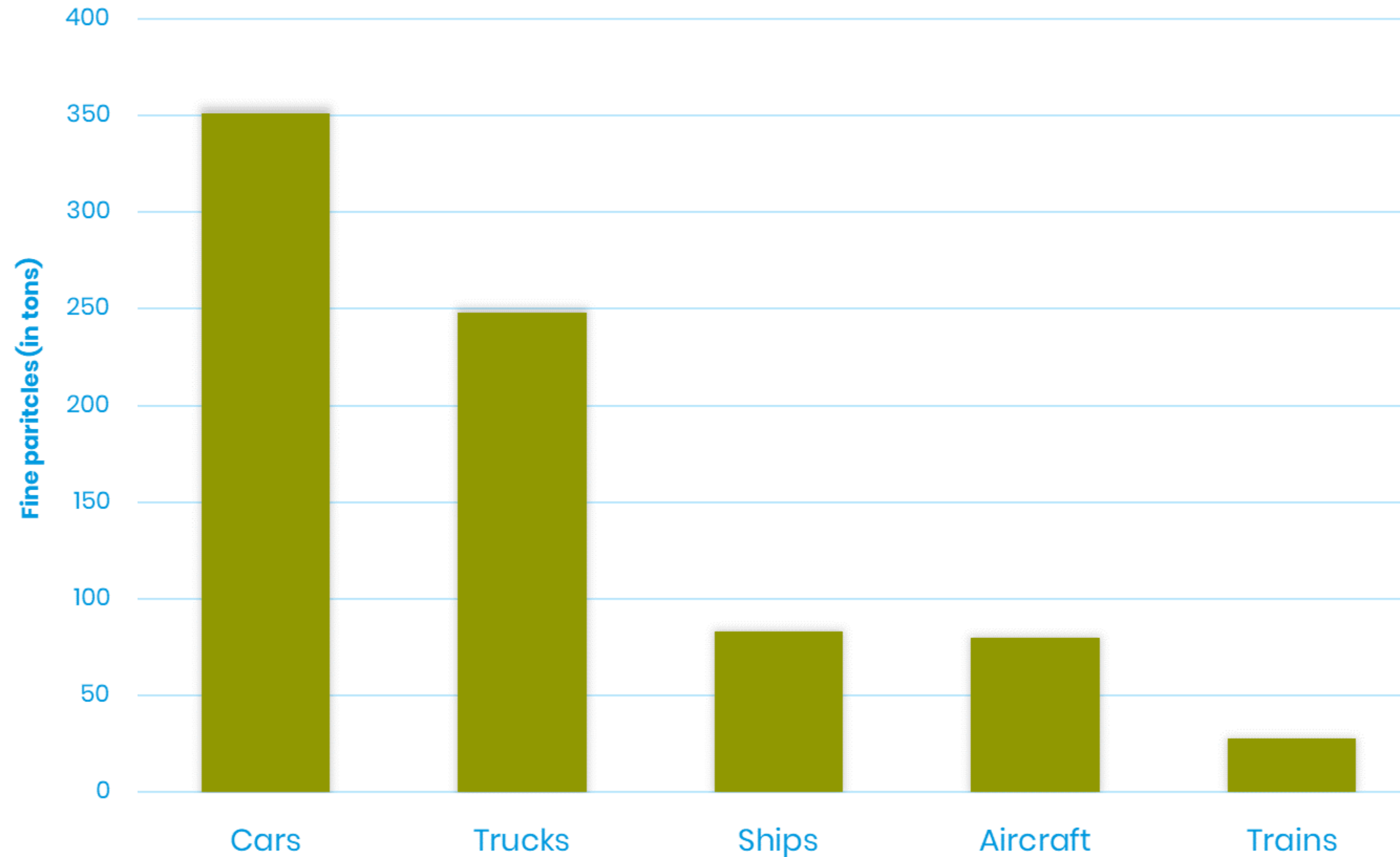
Where does PM_{2.5} come from?

Sources of Fine Particles in King County (2017 EPA NEI)



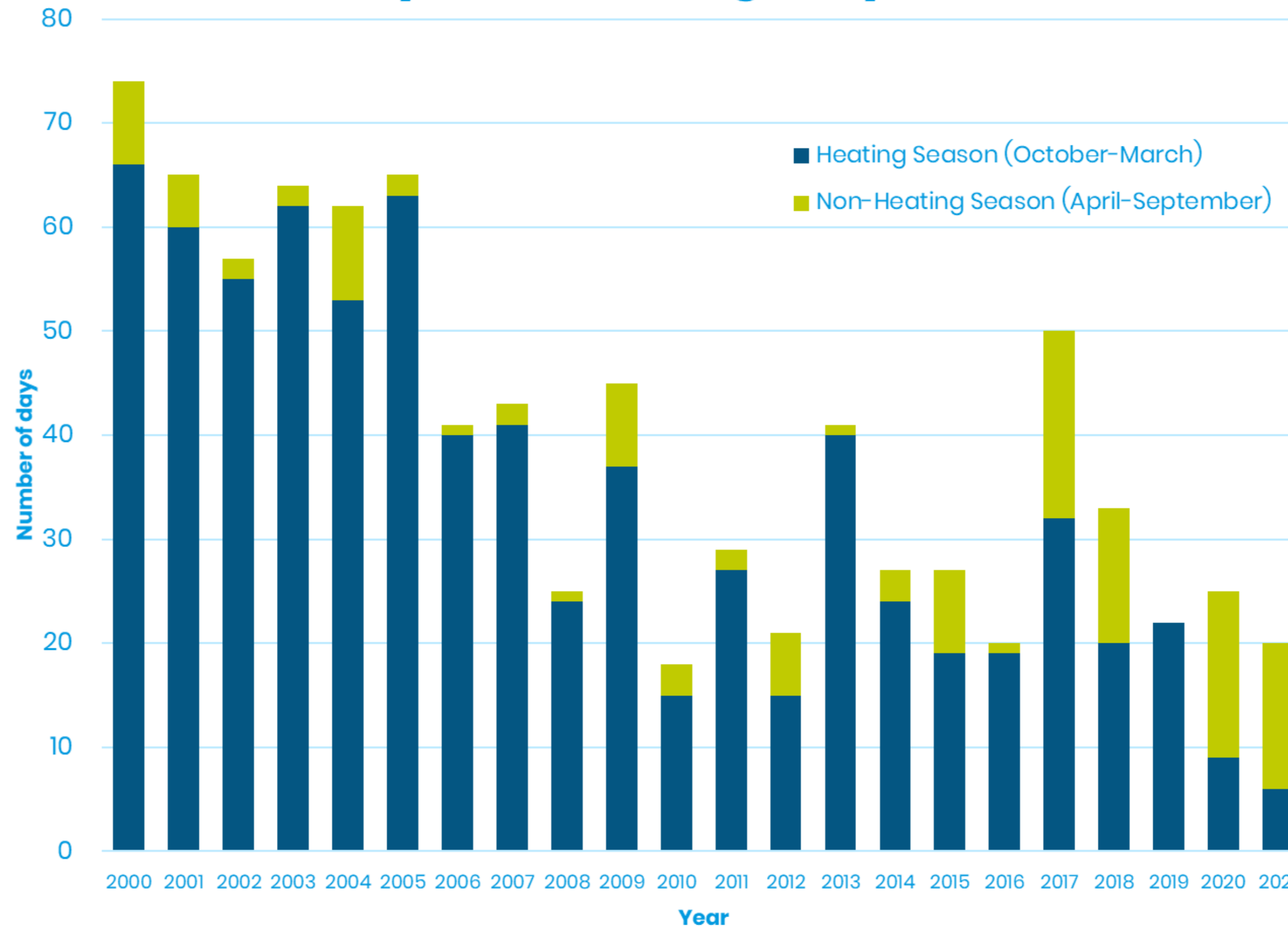
Where does PM_{2.5} come from?

2017 King County Fine Particle Emissions, On-road and aircraft
(including Sea-Tac, Boeing Field, Renton Field)



When is PM_{2.5} highest – Days over health goal

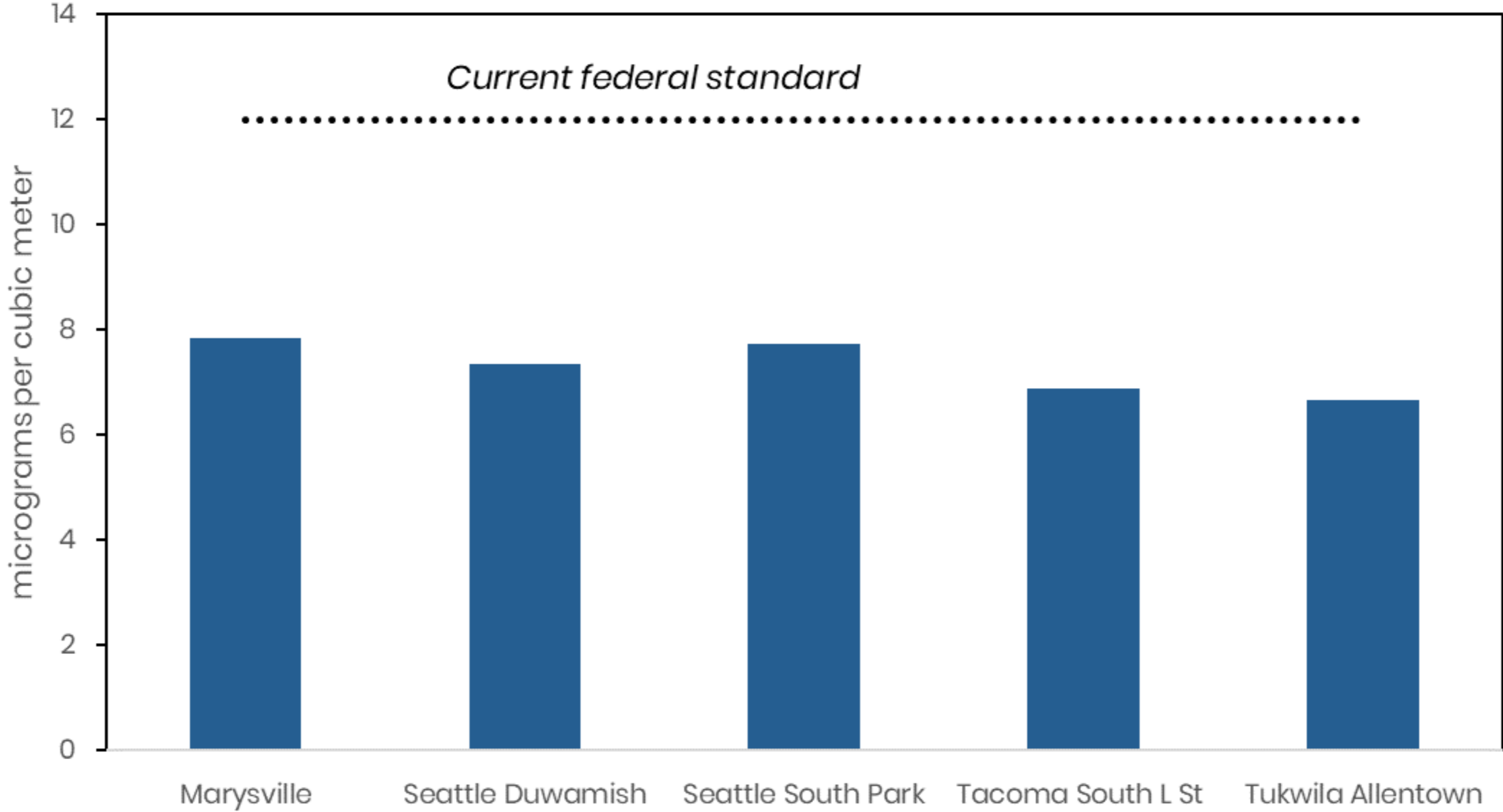
Days over the Agency Health Goal



National Ambient Air Quality Standards Fine Particle Pollution (Annual)

Annual Fine Particle Levels

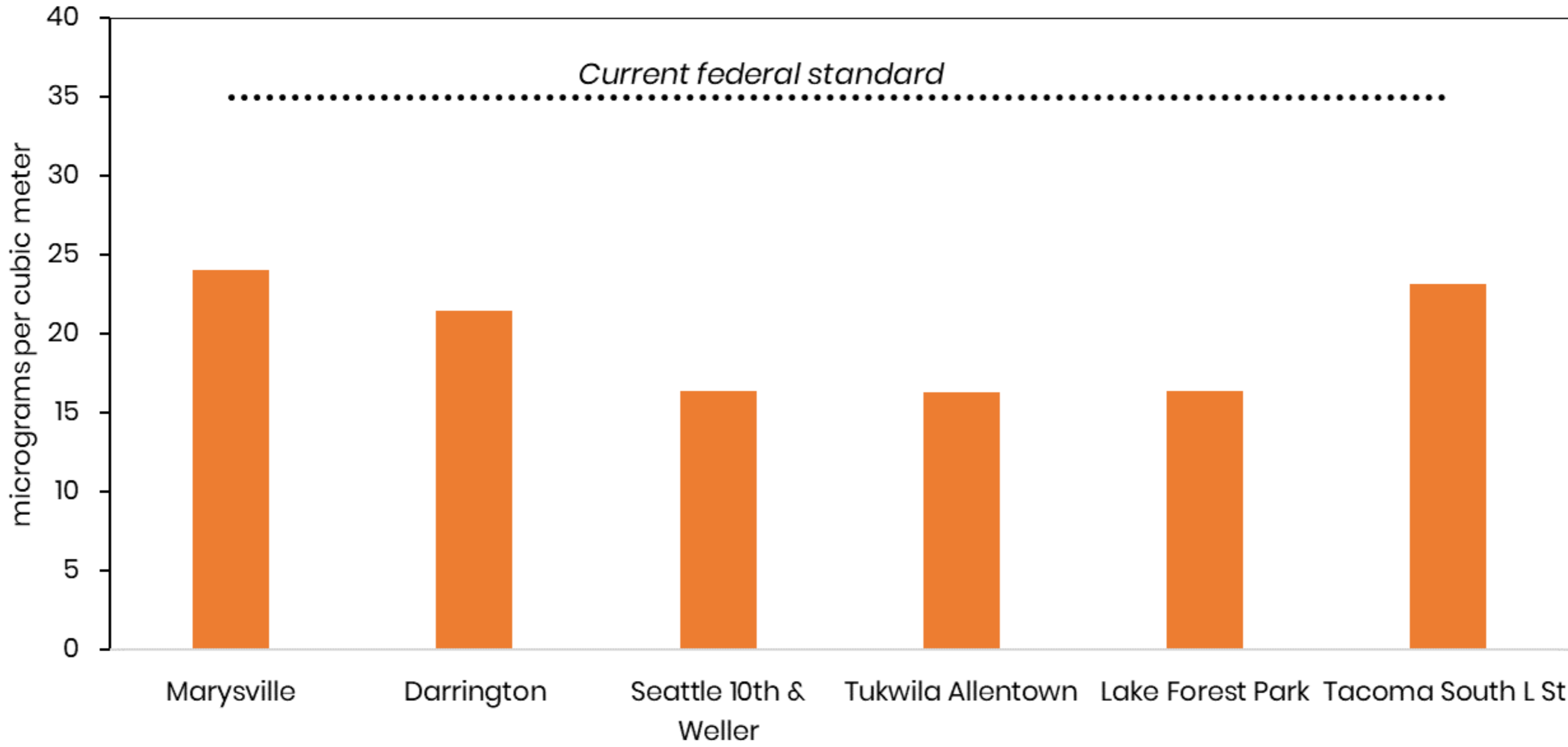
(2019-2021, wildfires excluded)



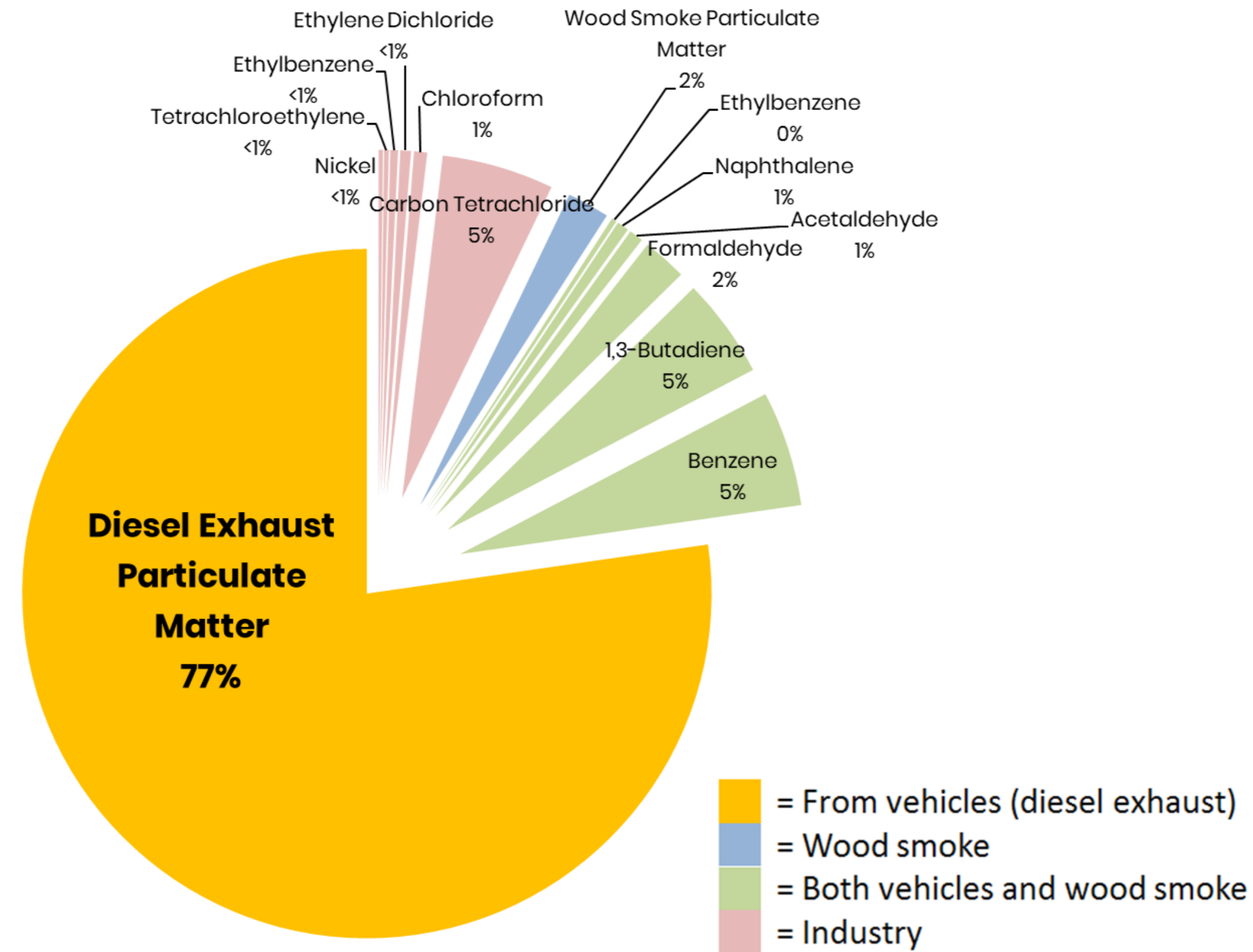
National Ambient Air Quality Standards Fine Particle Pollution (Daily)

Daily Fine Particle Value vs. Federal Standard

(2019-2021, wildfires excluded)



Diesel exhaust largest potential cancer risk from air pollution sources

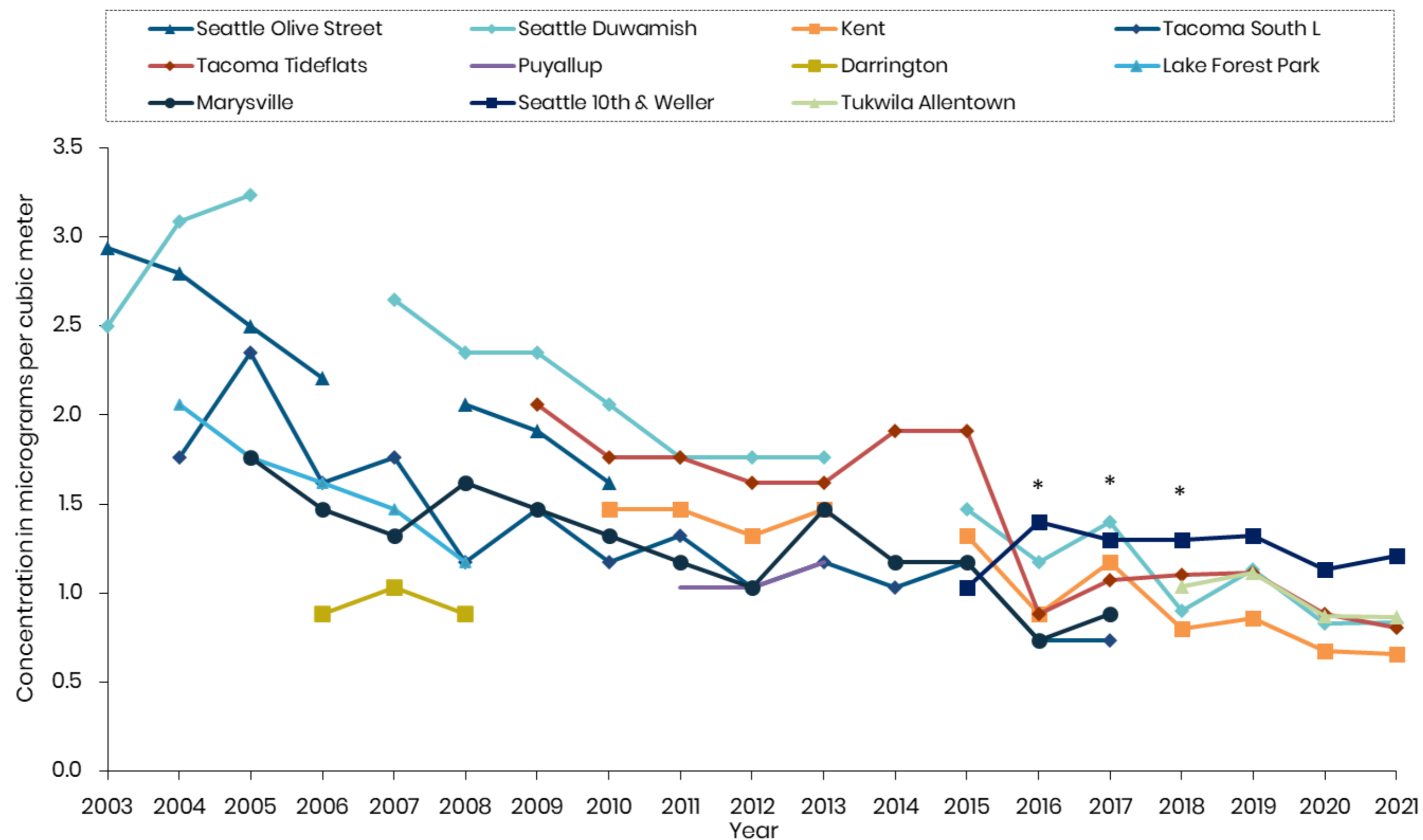


PSCAA, 2016 Chinatown-International District Air Toxics Study, <https://pscleanair.gov/DocumentCenter/View/3399>

Where is diesel exhaust highest?

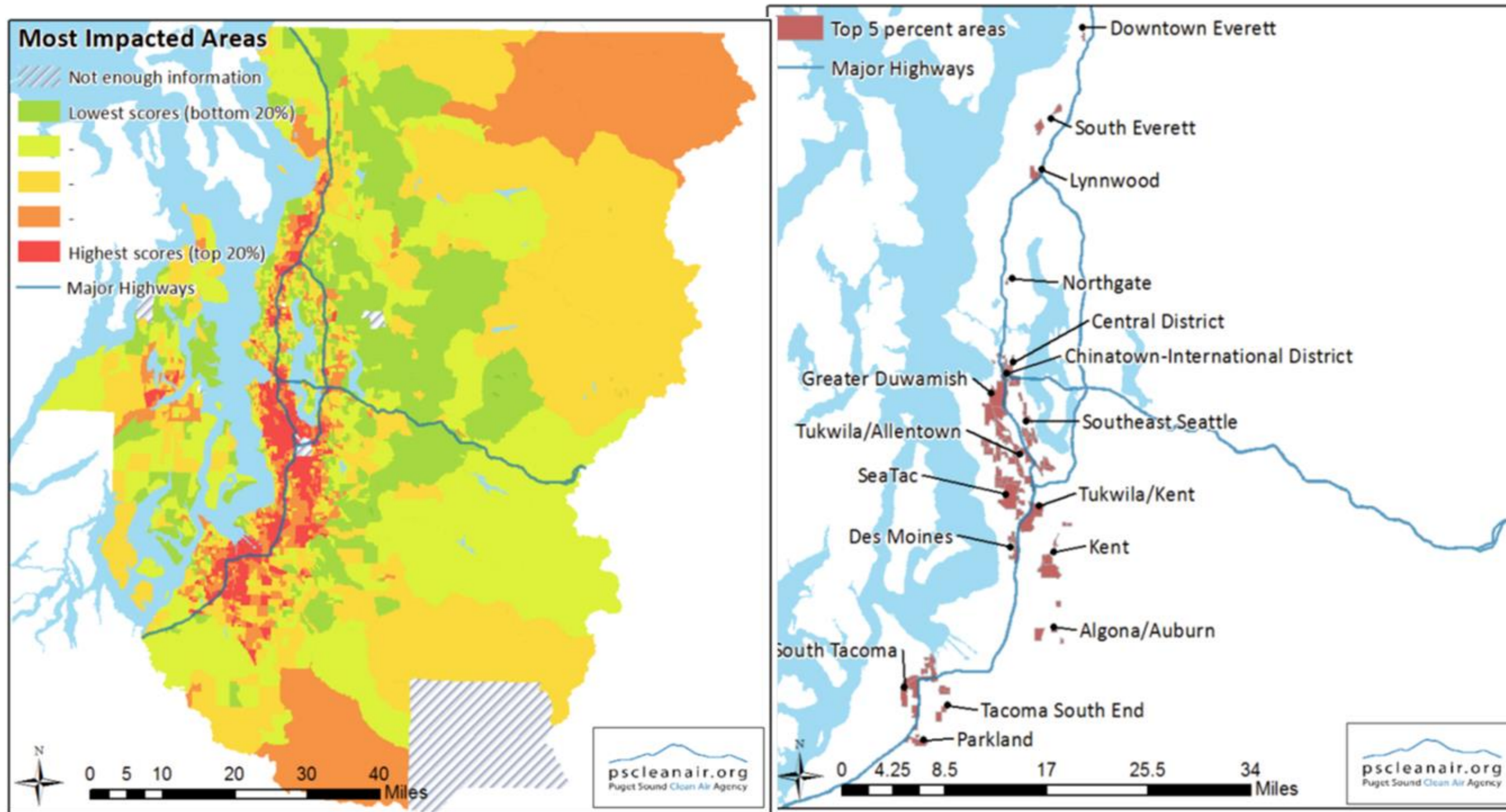
Black Carbon Annual Mean Concentrations

(wildfire days excluded)



*Data less than 75% in a quarter at Seattle 10th & Weller in 2016; Seattle Duwamish in 2017; and Tukwila Allentown in 2018.

Where do we focus? Highly impacted communities combines air pollution risk, socioeconomic barriers, and poor health



Grant programs that improve air quality across communities

Northwest Ports Clean Air Strategy. Truck “ScRAPs” program has replaced 400 old polluting trucks with clean ones.

Sound Transit locomotive upgrades

Over 200 SeaTac Airport taxis converted to compressed natural gas engines; electrification of ground support equipment

Retrofit over 650 school buses, private, and public fleets

Electric charging station for municipal vehicles

Tugboats servicing Des Moines and Elliott Bay were repowered and retrofitted

Idle-reduction technology on diesel emergency vehicles

Uncertified wood stove scrappage program

“Ultrafines” – emerging area of research, University of Washington studies

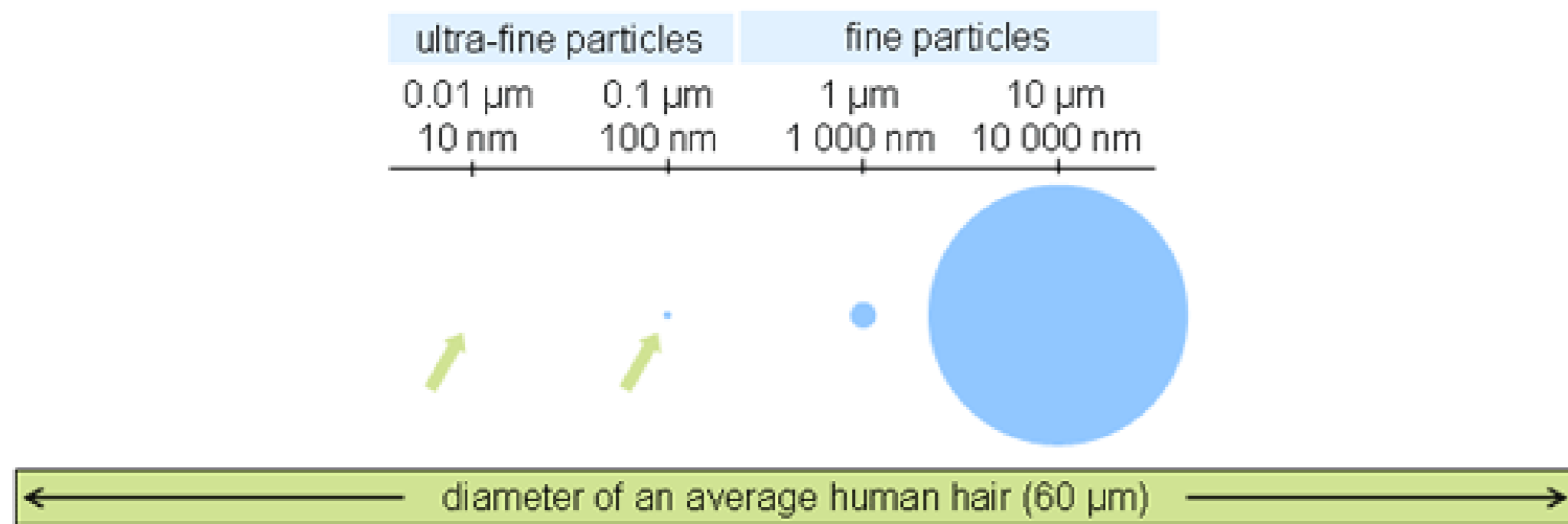


Table 3-1. Key causality determinations for PM_{2.5} and UFP exposures.

Health Outcome	Size Fraction	Exposure Duration	2009 ISA	2019 ISA
Mortality	PM _{2.5}	Long-term	Causal	Causal
		Short-term		
Cardiovascular effects	PM _{2.5}	Long-term	Causal	Causal
		Short-term		
	UFP	Short-term	Suggestive of, but not sufficient to infer	Suggestive of, but not sufficient to infer
Respiratory effects	PM _{2.5}	Long-term	Likely to be causal	Likely to be causal
		Short-term		
UFP	Short-term	Suggestive of, but not sufficient to infer	Suggestive of, but not sufficient to infer	
Cancer	PM _{2.5}	Long-term	Suggestive of, but not sufficient to infer	Likely to be causal
Nervous System effects	PM _{2.5}	Long-term	---	Likely to be causal
		Short-term	Inadequate	Suggestive of, but not sufficient to infer
	UFP	Long-term	---	Suggestive of, but not sufficient to infer
		Short-term	Inadequate	Suggestive of, but not sufficient to infer

Current monitoring work

We are doing an air toxics study to update our potential risk values across the region and identify trends.

Recently got EPA funding to install a long-term fine particle monitoring station in the Sea-Tac area

In summary

We focus on PM_{2.5} pollution, and specifically diesel PM_{2.5} because of their established health impacts.

Improvement in PM_{2.5} levels leads to improved health outcomes.

PM_{2.5} and diesel trends and new technology encouraging; legacy fleets remain a challenge – many grants and programs target these

Health effects of ultrafine pollution are not yet well understood; we continue to track local and national studies

Thank you & Questions

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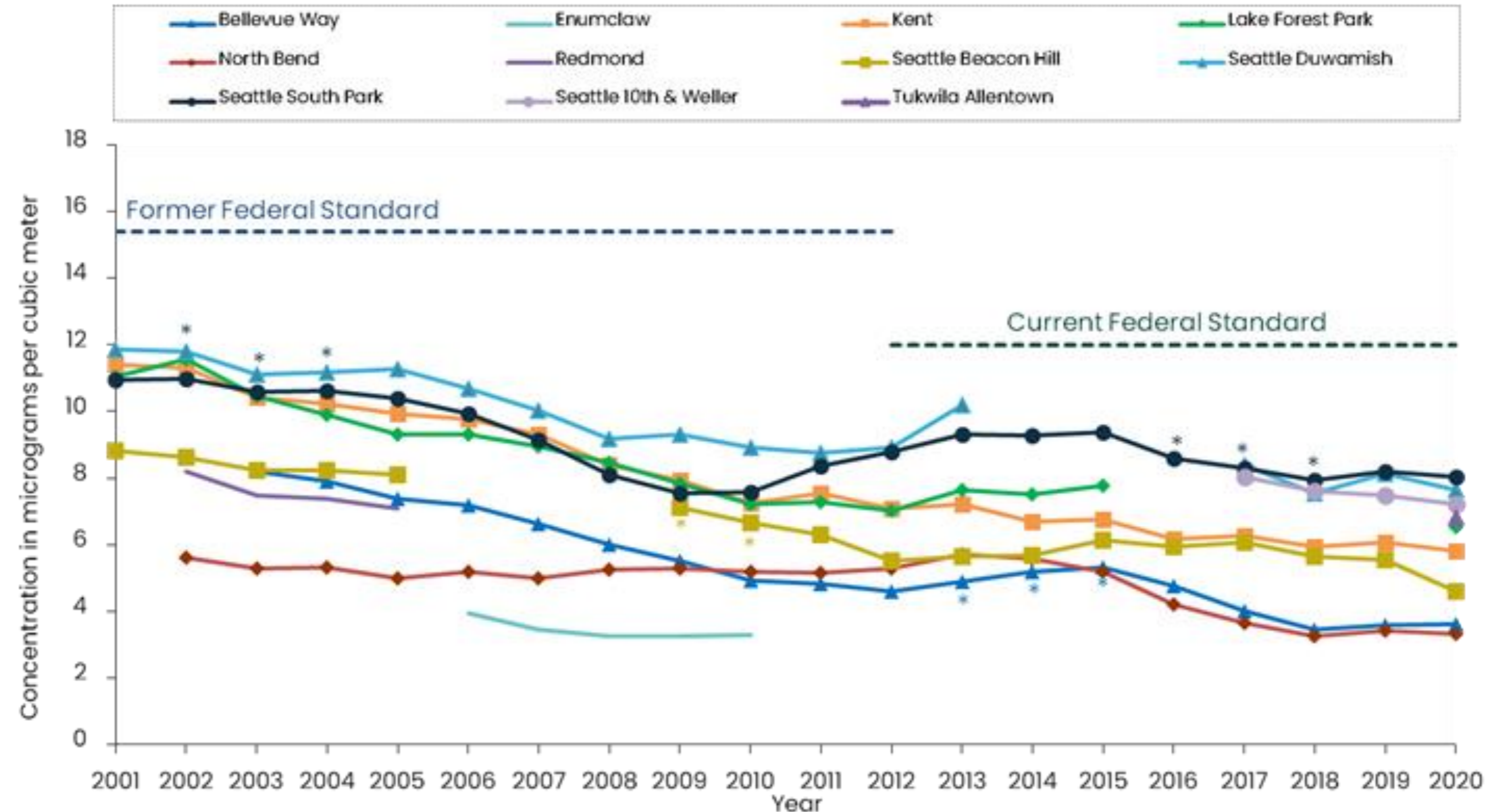
www.pscleanair.gov

Extra slides

Where is PM_{2.5} highest?

King County PM_{2.5} Annual Design Values

(3-year average of wildfire-excluded annual mean concentrations)



Note: Duwamish data are FRM from 1999-2005, 2007-09, nephelometer 2006,2010, FEM 2011-2020. Beacon Hill data are FRM from 1999-2009, FEM 2010-20. Lake Forest Park data are FRM from 1999-2007, nephelometer 2008-2020. South Park data are FRM from 1999-2004, nephelometer 2005-2020. Bellevue Way data are FRM from 2001-2004, nephelometer 2005-20. Redmond data are FRM from 2000-2002, nephelometer 2003-2005. Queen Anne data are nephelometer from 2002-2015. Olive Way data are nephelometer from 2003-2013. North Bend data are FRM from 2000-2004, nephelometer 2005-2020. Kent data are FRM from 1999-2004, nephelometer 2005-2010, FEM 2011-2020. Enumclaw data are nephelometer from 2000-2009.

*Indicates an estimate based on incomplete data. Data less than 75% complete in a quarter at South Park in 2002 & 2016, Beacon Hill in 2008, Bellevue way in 2013

Prevailing winds

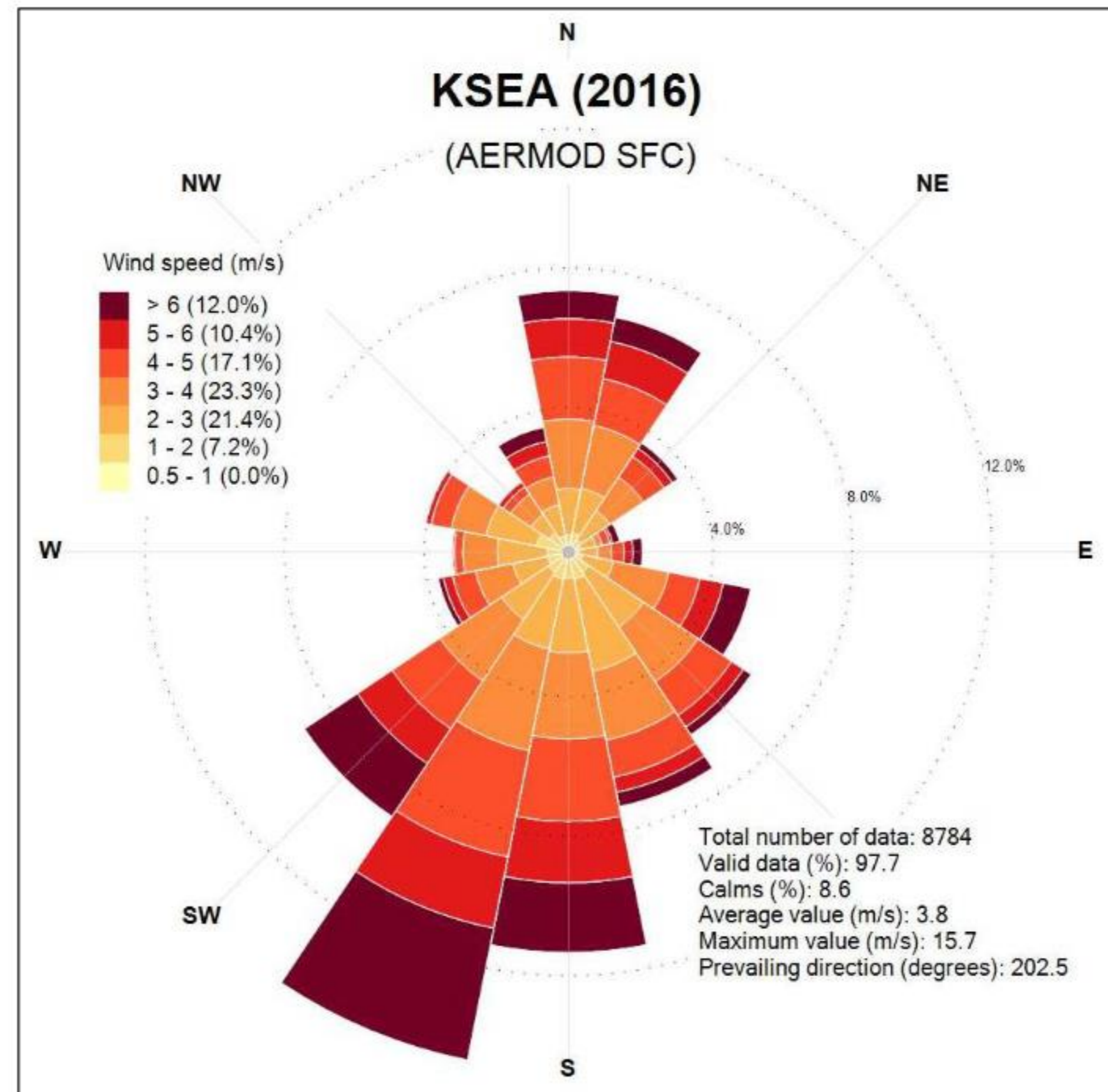
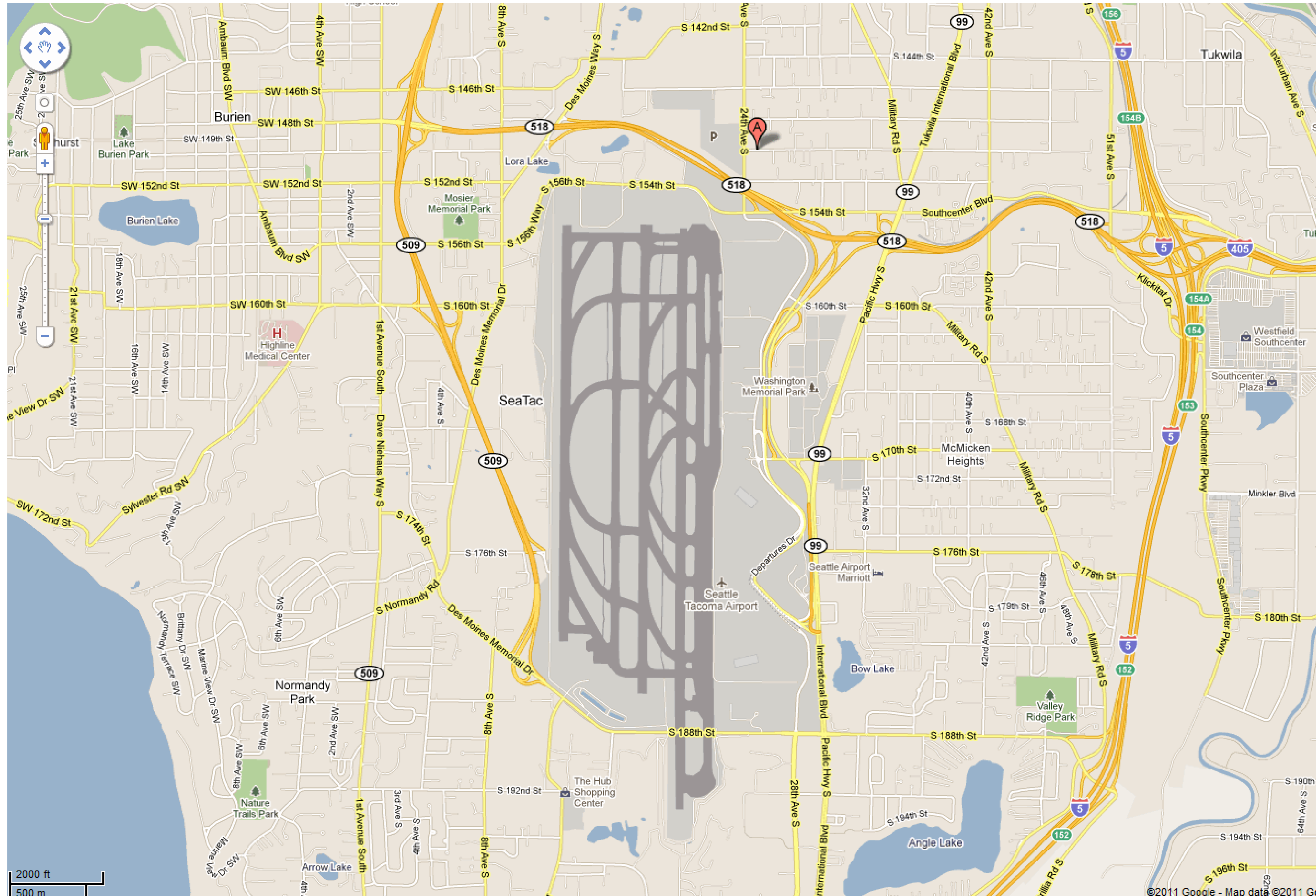


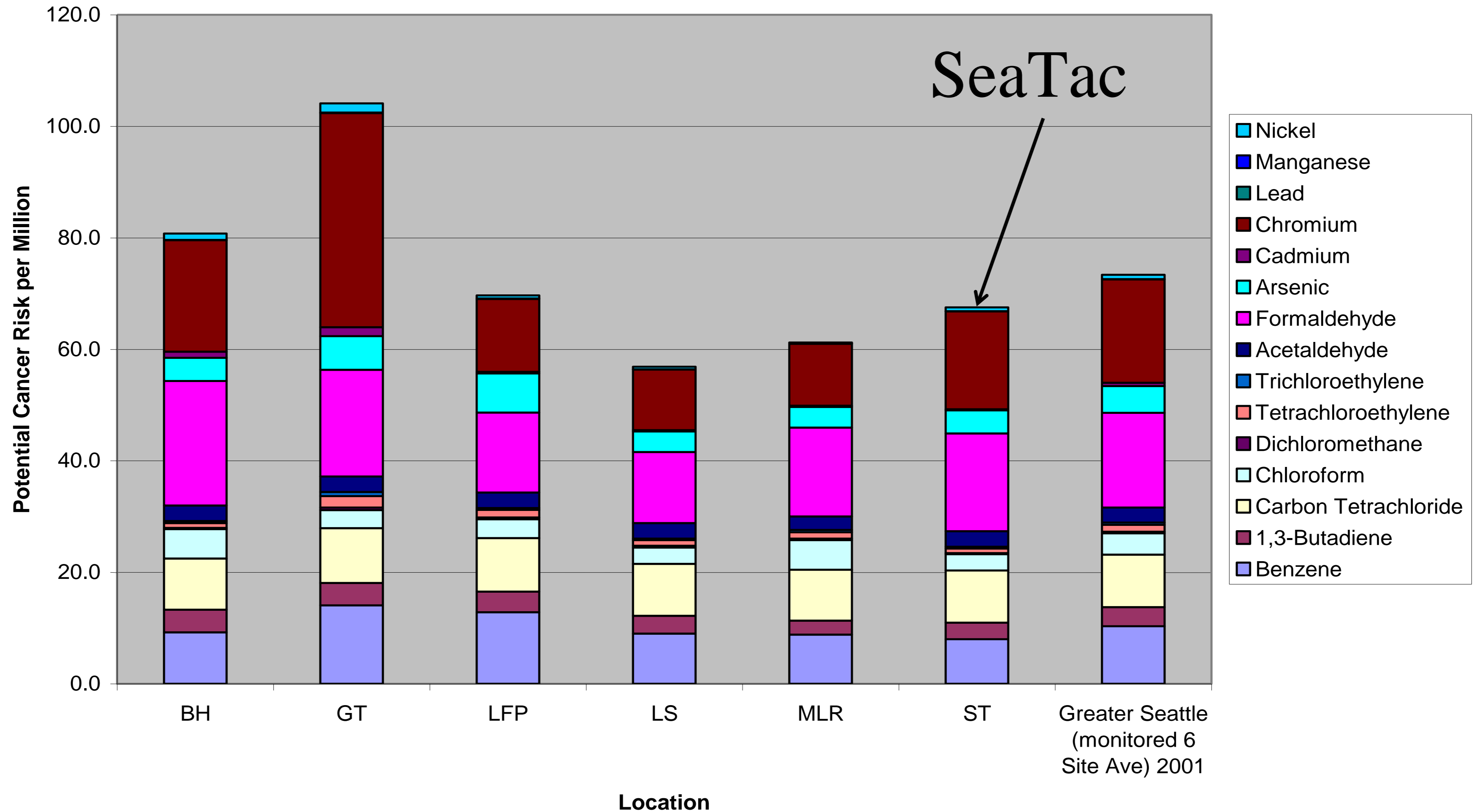
Figure 31. Wind rose of KSEA (Seattle-Tacoma International Airport) data for year 2016, after AERMET processing.

Location of SeaTac Monitoring Site in 2001 Study



What do we already know about air toxics in the Puget Sound area?

Figure 3-3: Potential Cancer Risk Estimates per 1,000,000 for 6 Monitoring Sites in Greater Seattle in 2001



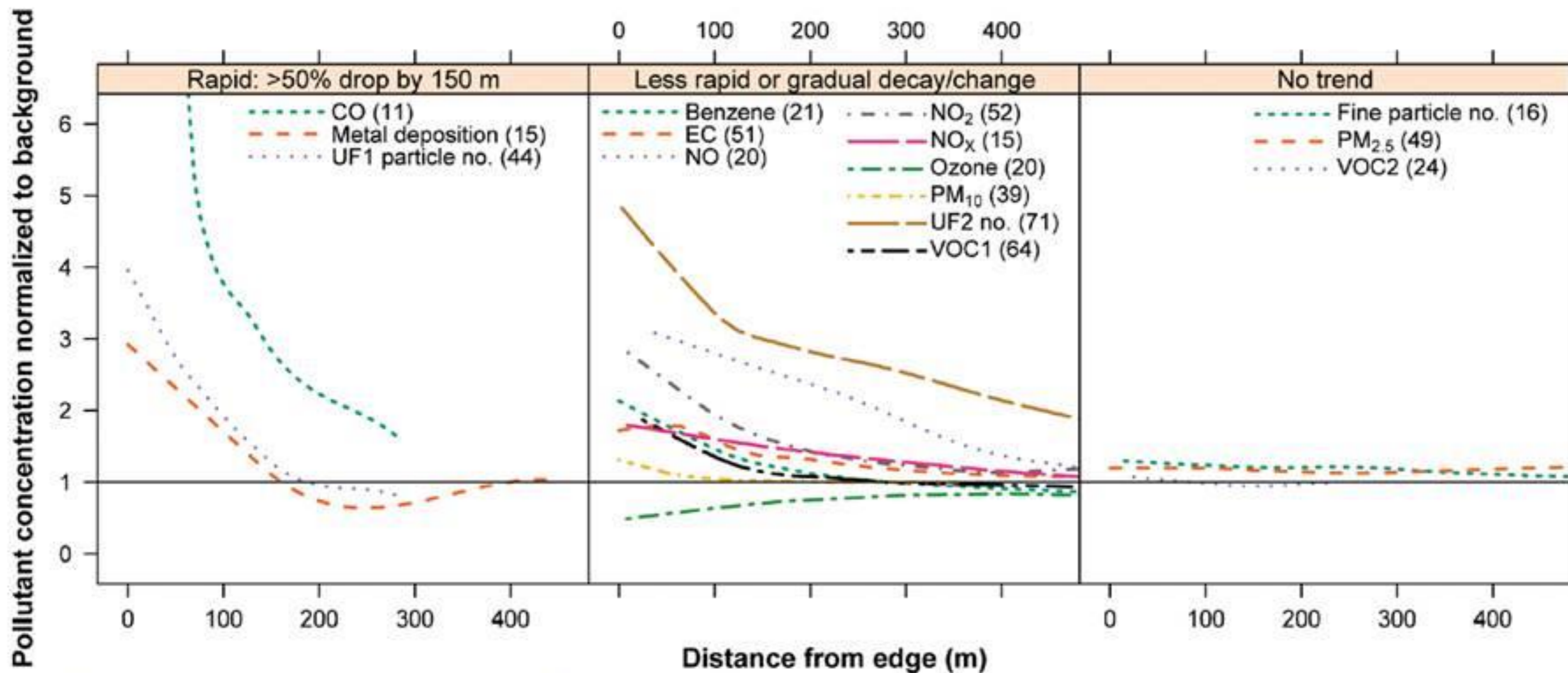


FIGURE 2. Local regression of background normalized concentrations on distance. The horizontal line indicates background concentration. A loess smoother ($\alpha = 0.75$, degree = 1) is fitted to each pollutant which is placed into one of three groups. The regression sample size, n , is given in parentheses after each pollutant.