Contaminants in Artificial Turf Stormwater Runoff: Testing an Alternative to Crumb Rubber

By Jenée Colton

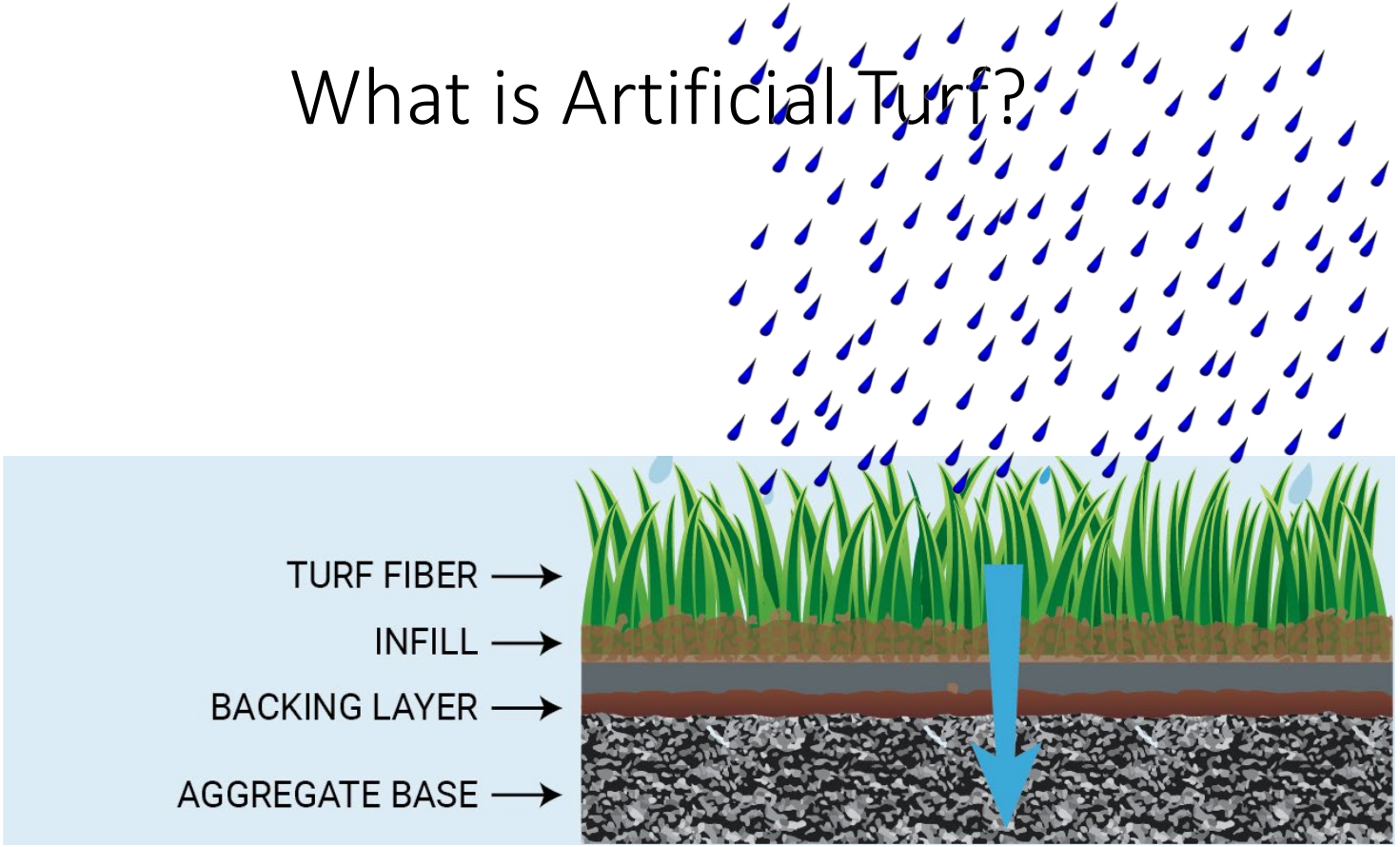
Science Seminar
November 2019

Water and Land Resources Division

King County

Photo: Chris Santella

What is Artificial Turf?



Artificial Turf Infill

Photo: Drguttorm under Creative Commons license

Photo: Jenee Colton, Ravensdale Field

Crumb Rubber Infill

- Documented release of metals to stormwater (zinc)
- Requires Enhanced Treatment of stormwater runoff (a sand filter to remove metals)

New fields run $1.6-1.8 million.
Treatment system ~ $200,000.

King County Parks

Objectives:

- Migrate away from crumb rubber (CR)
- Improve water quality
- Stormwater permit variance

TPE ?

Photo: Ravensdale Field, Jenée Colton

King County regulates…

King County

Stormwater Services

Parks

SCIENCE!!

Stormwater Services

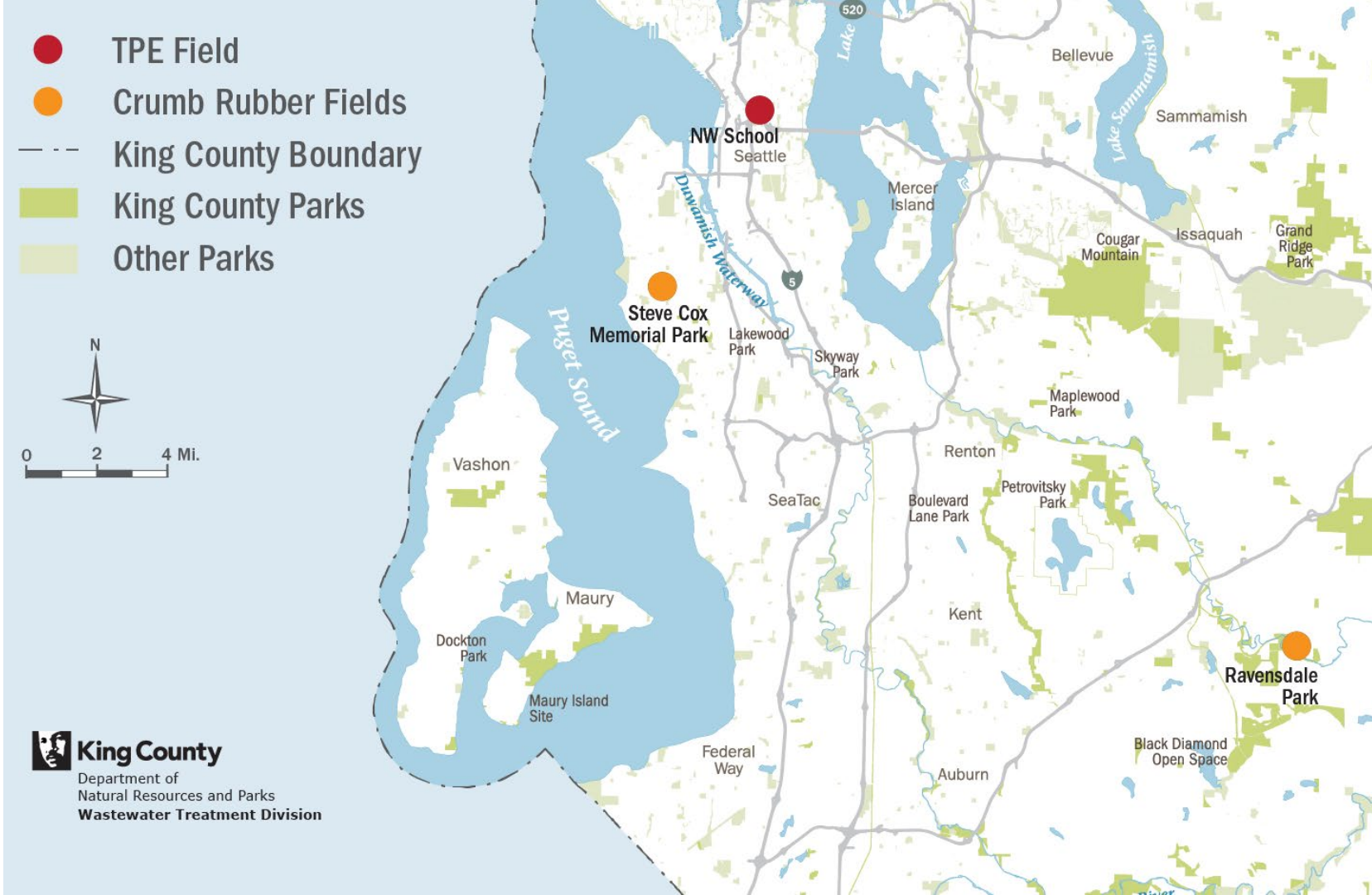
Objectives:

- Does TPE need enhanced stormwater treatment?
- Is stormwater from TPE cleaner than CR?
- Avoid regrettable substitute

Photo: TPE samples, Jenée Colton

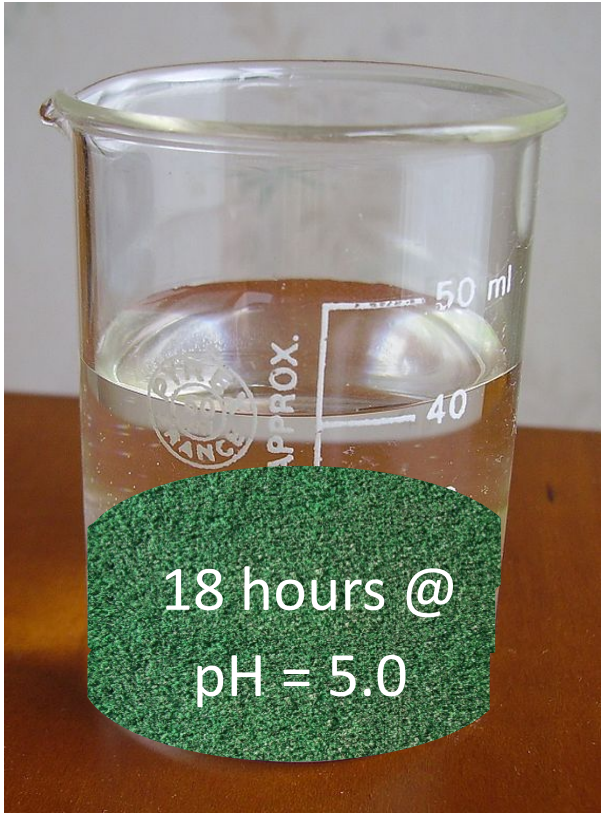
THE STUDY

Used Infill Locations



Laboratory Testing

- Synthetic Precipitation Leaching Protocol (SPLP)
  - Laboratory Simulation
  - Worst case



Analyze Liquid

$$\text{WQS Ratio} = \frac{[\text{Chemical}]}{\text{Lowest WQS}}$$

Testing

For Used Infills Added Step:

Rinse 1st

Rinsed Infill To SPLP

SPLP test (New Infills)

Analyze

Rinsate

Leachate

Chemicals Tested

Organics

110

36 Volatile

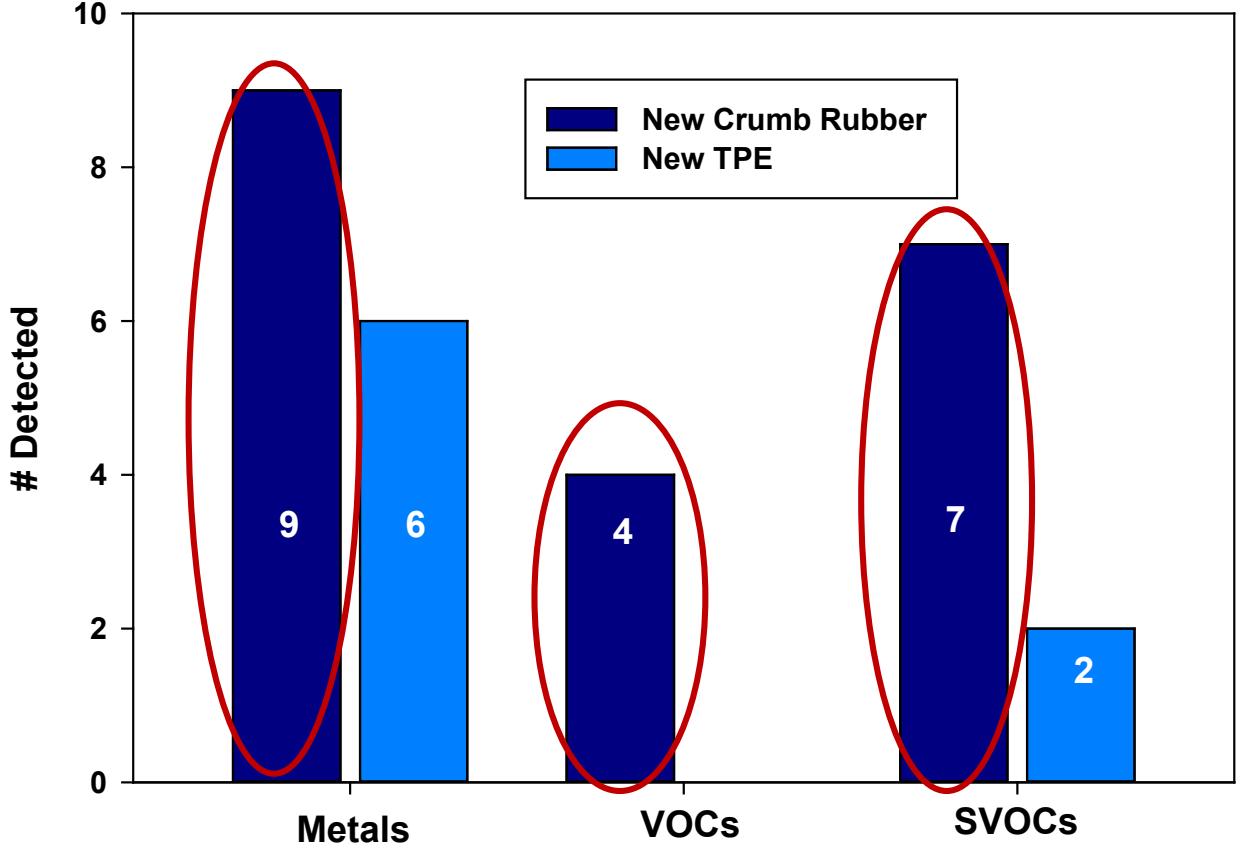
64 Semivolatile

Metals

14

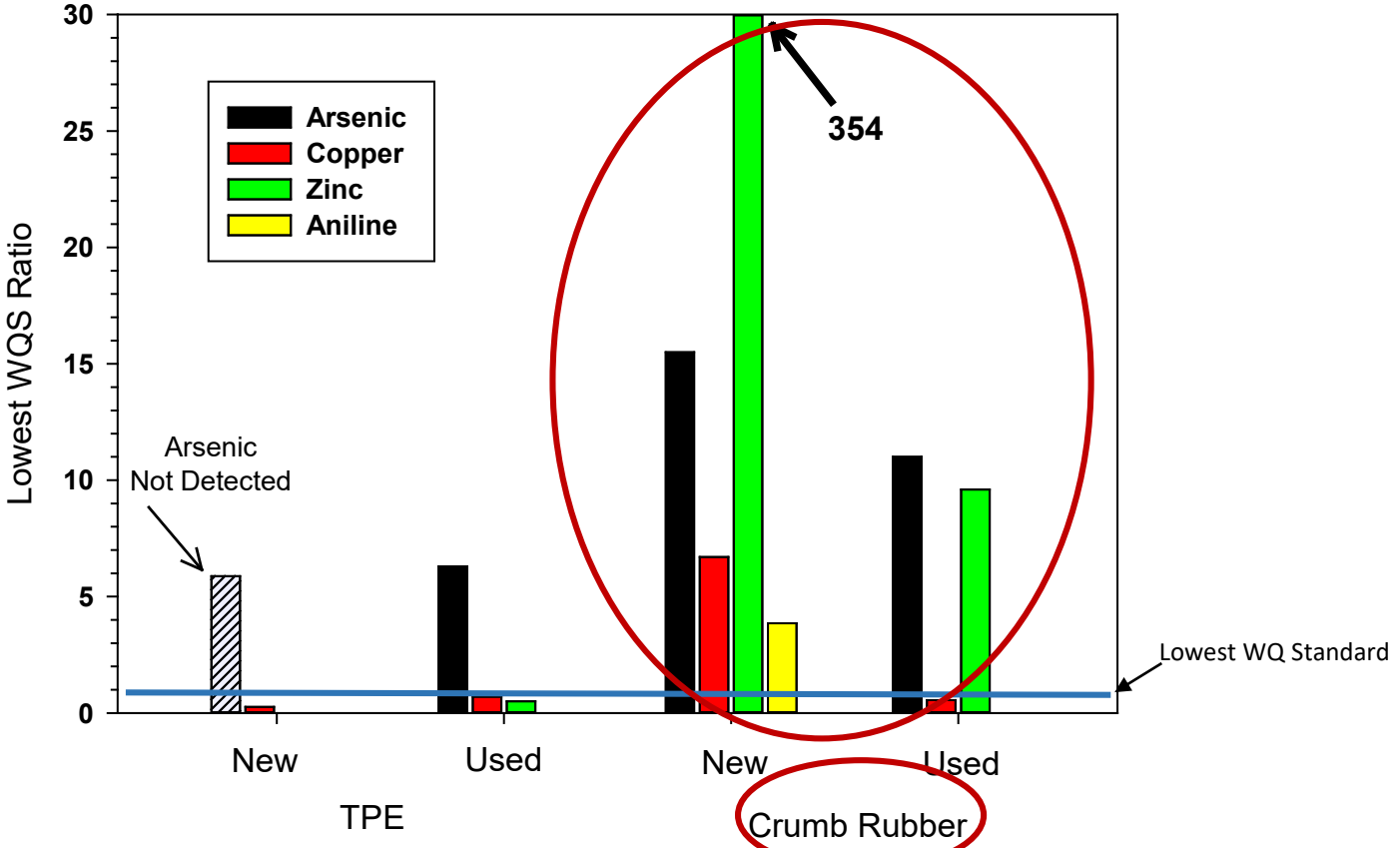
Findings

#1 More chemicals detected in new crumb rubber than TPE leachate



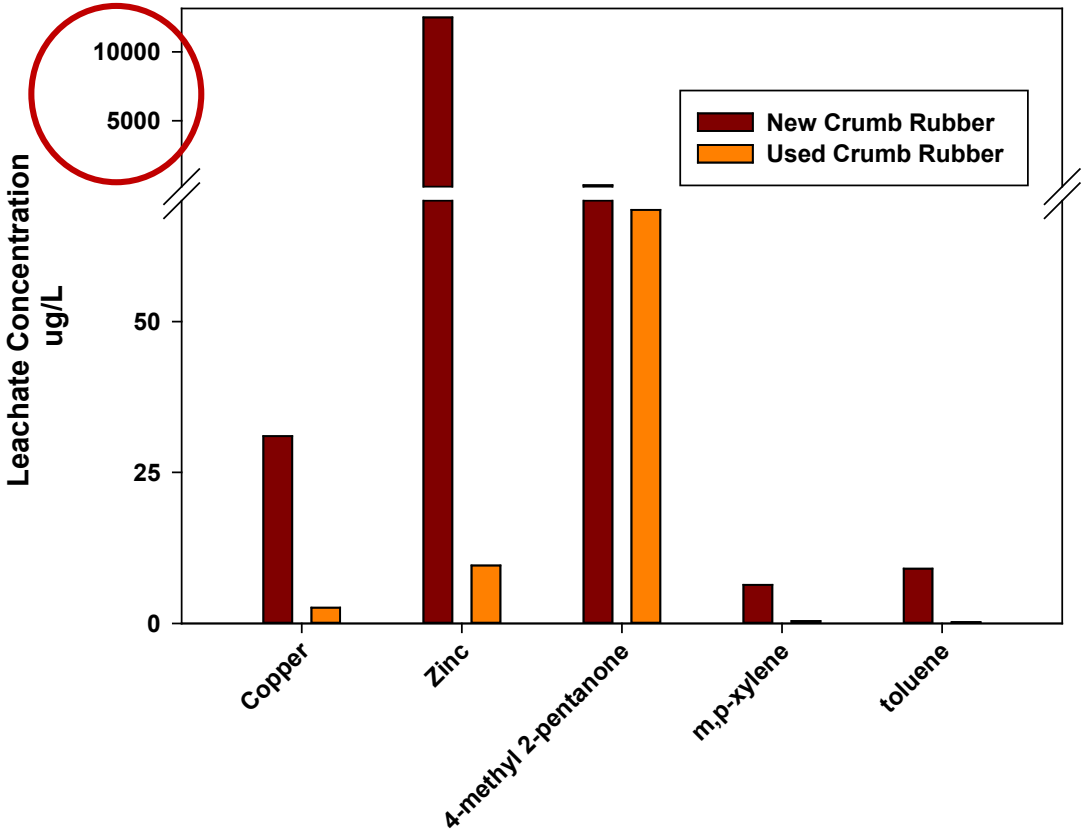
Findings

#2 Chemicals in crumb rubber leachate are more toxic than TPE leachate



Findings

#3 Chemical leaching from new infill is less than used infill



Supplemental Findings

What about those rinsates?

Local Dusts Settle on Fields

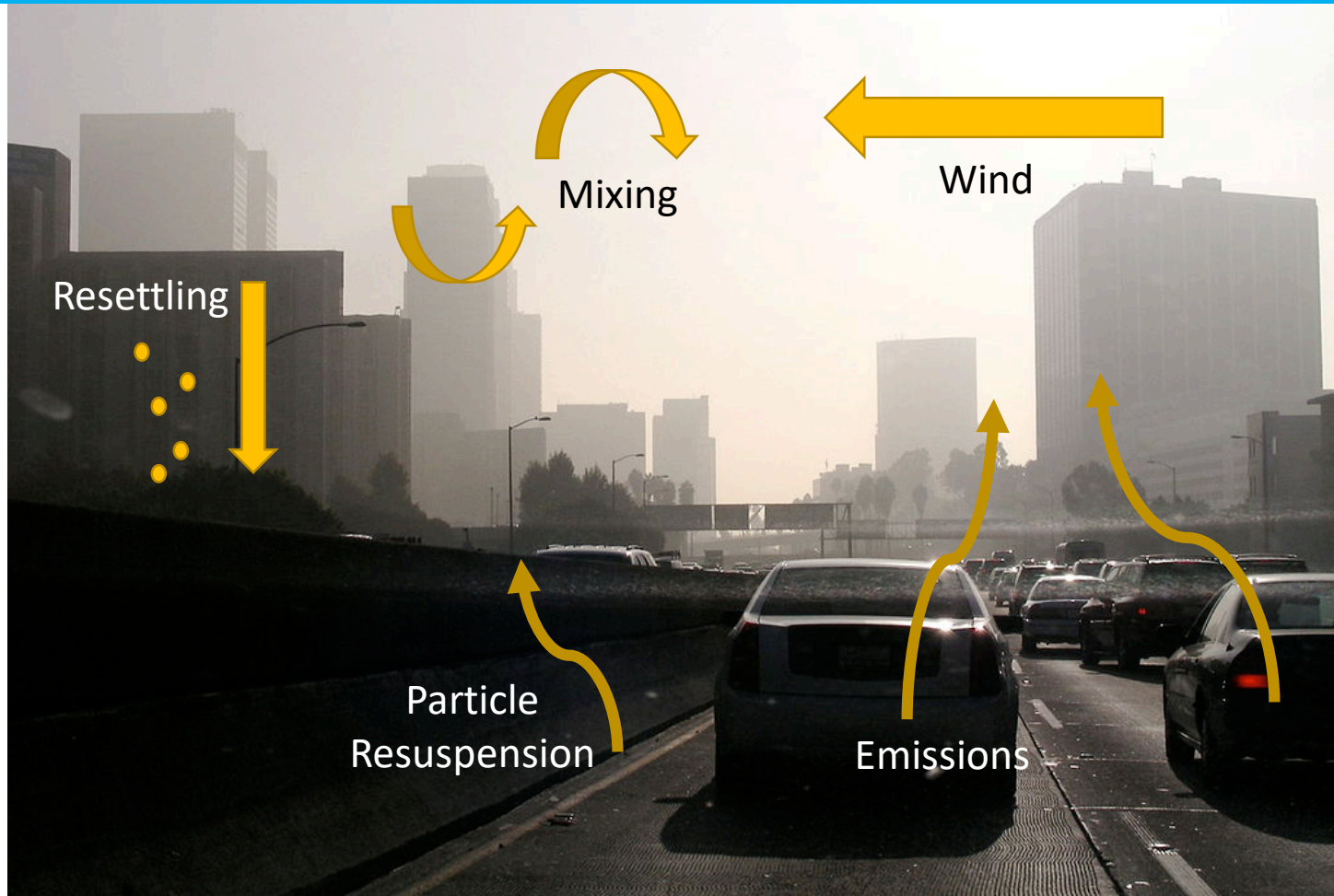
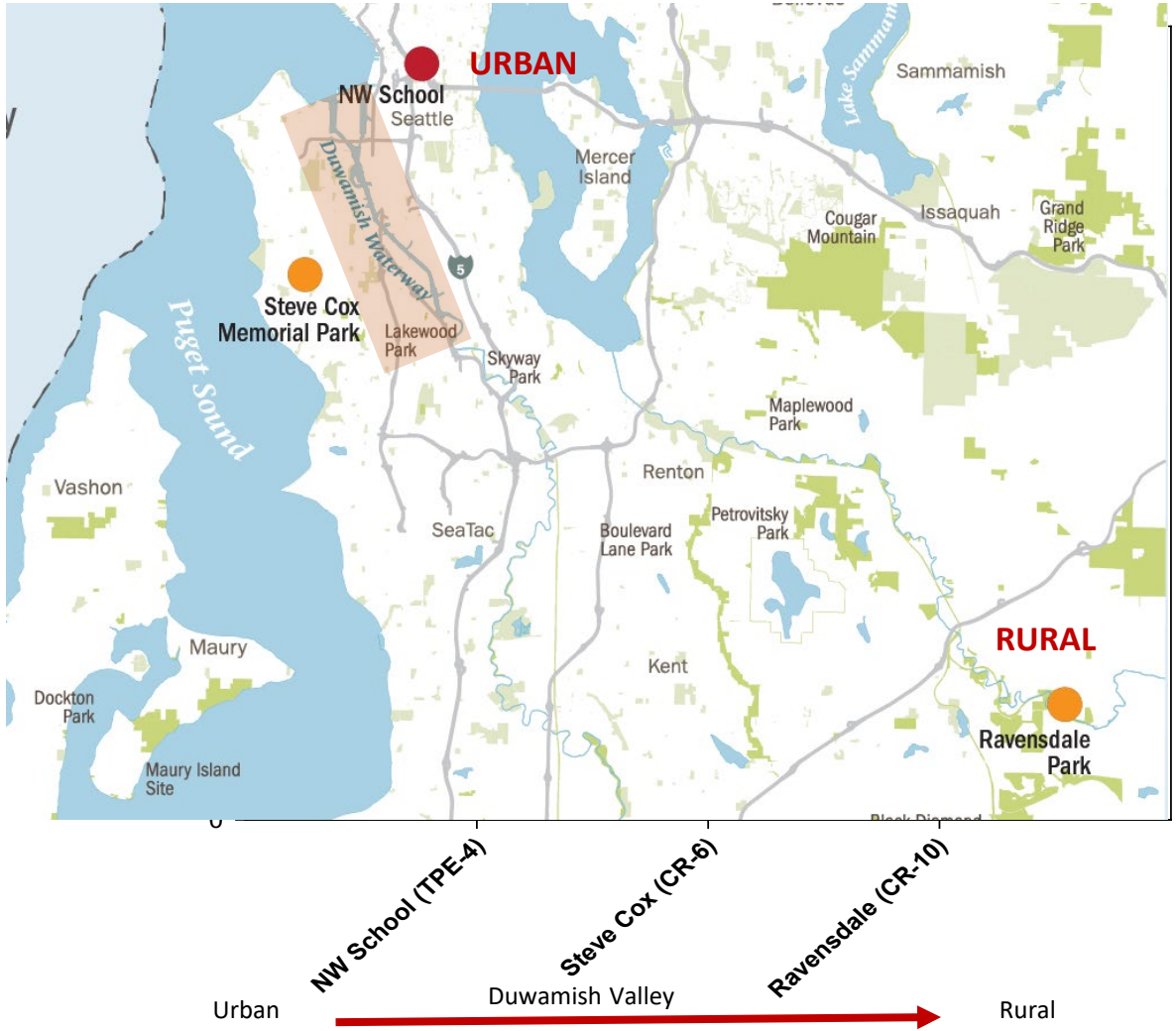
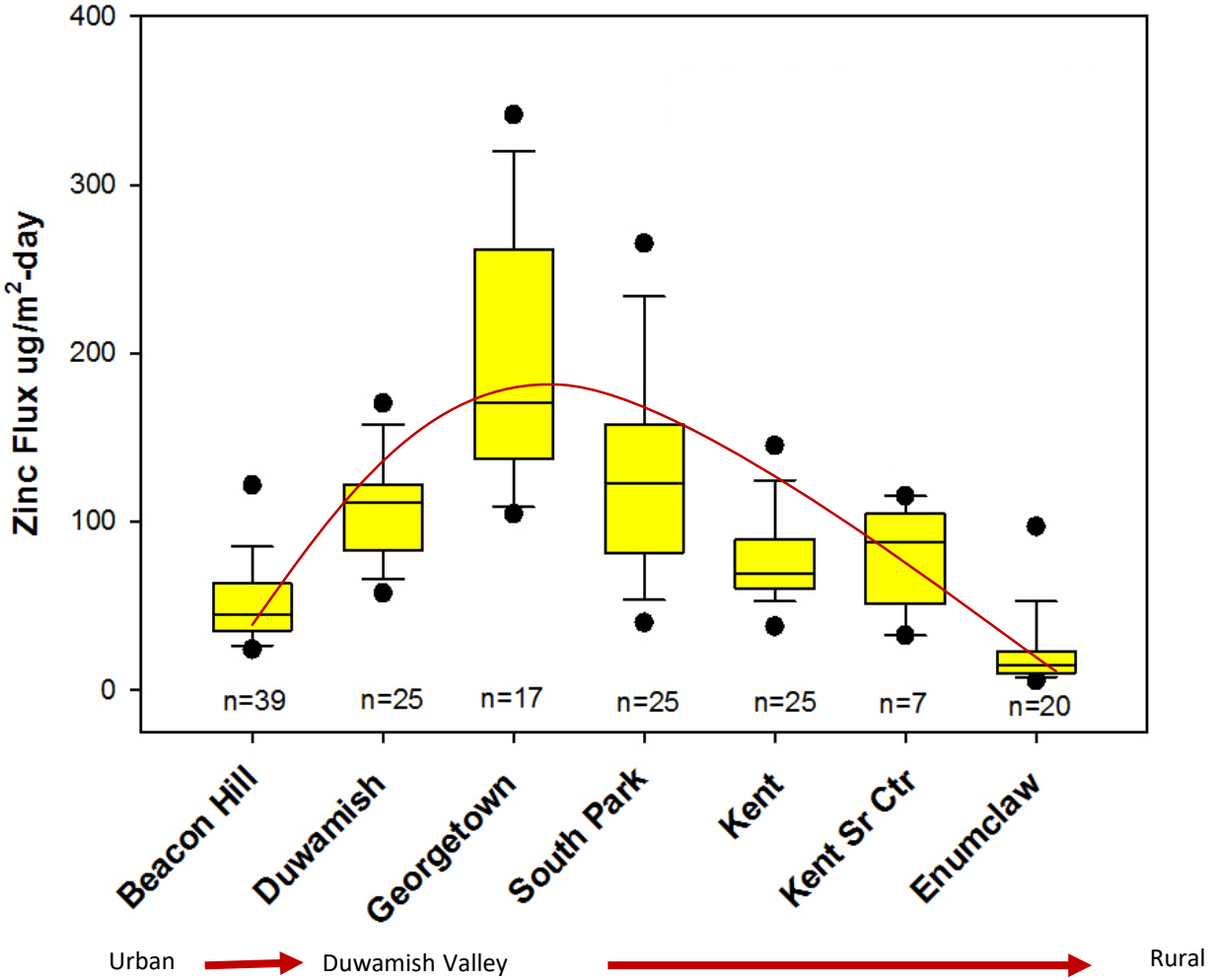


Photo: Aliazimi

Local Sources



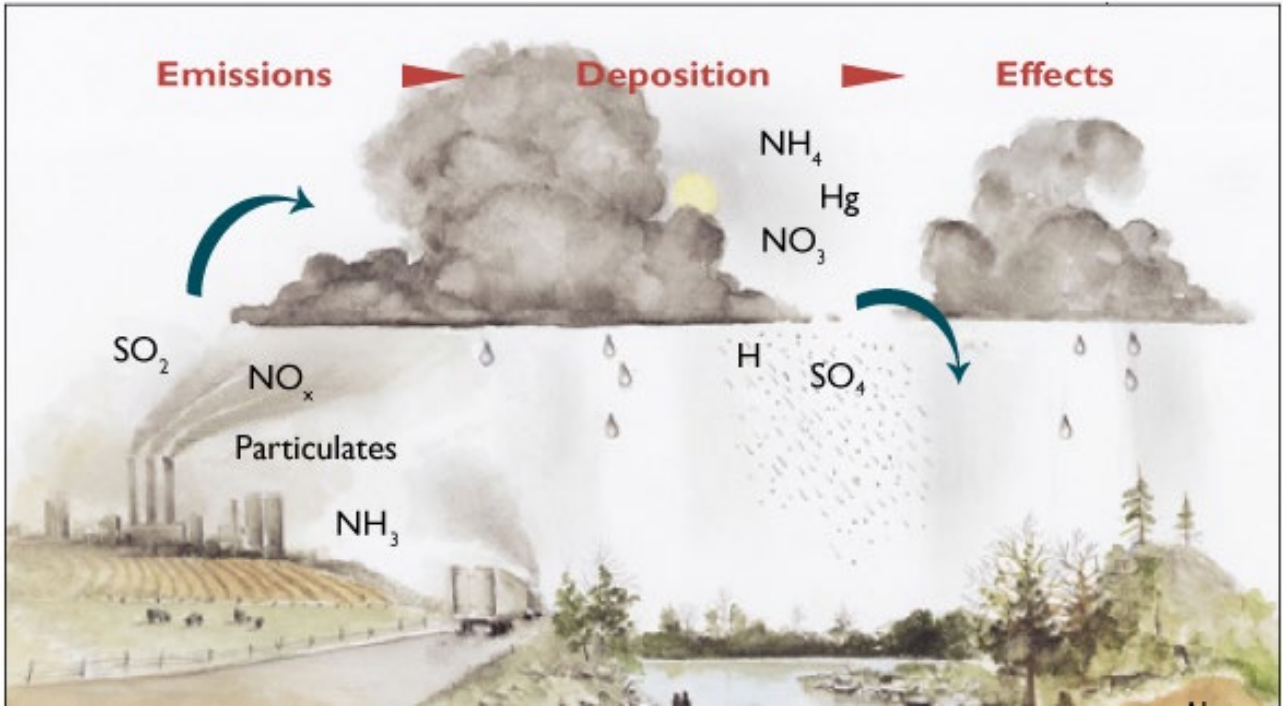
Annual Air Deposition



Data from Colton et al. (2011)

Supplemental Finding

Local sources may contribute more contamination to runoff than infills.



Happy Endings

- TPE better than crumb rubber.
- No enhanced treatment needed.
- KC Parks will receive permit variance.

…and there was much rejoicing

YAYYYYYYYY!!!

Acknowledgements

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Thank you.

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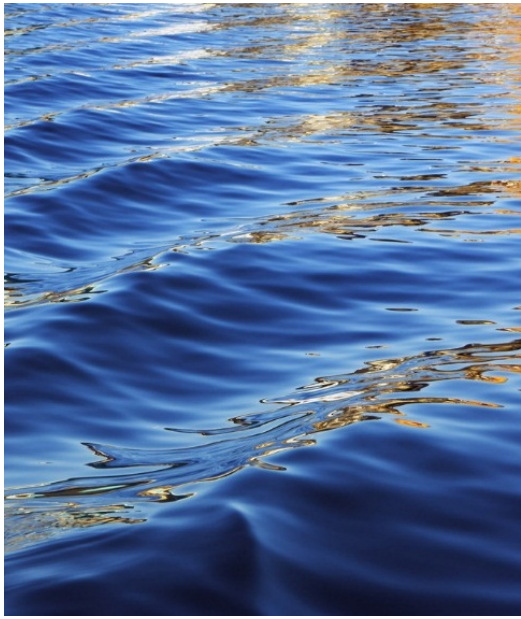
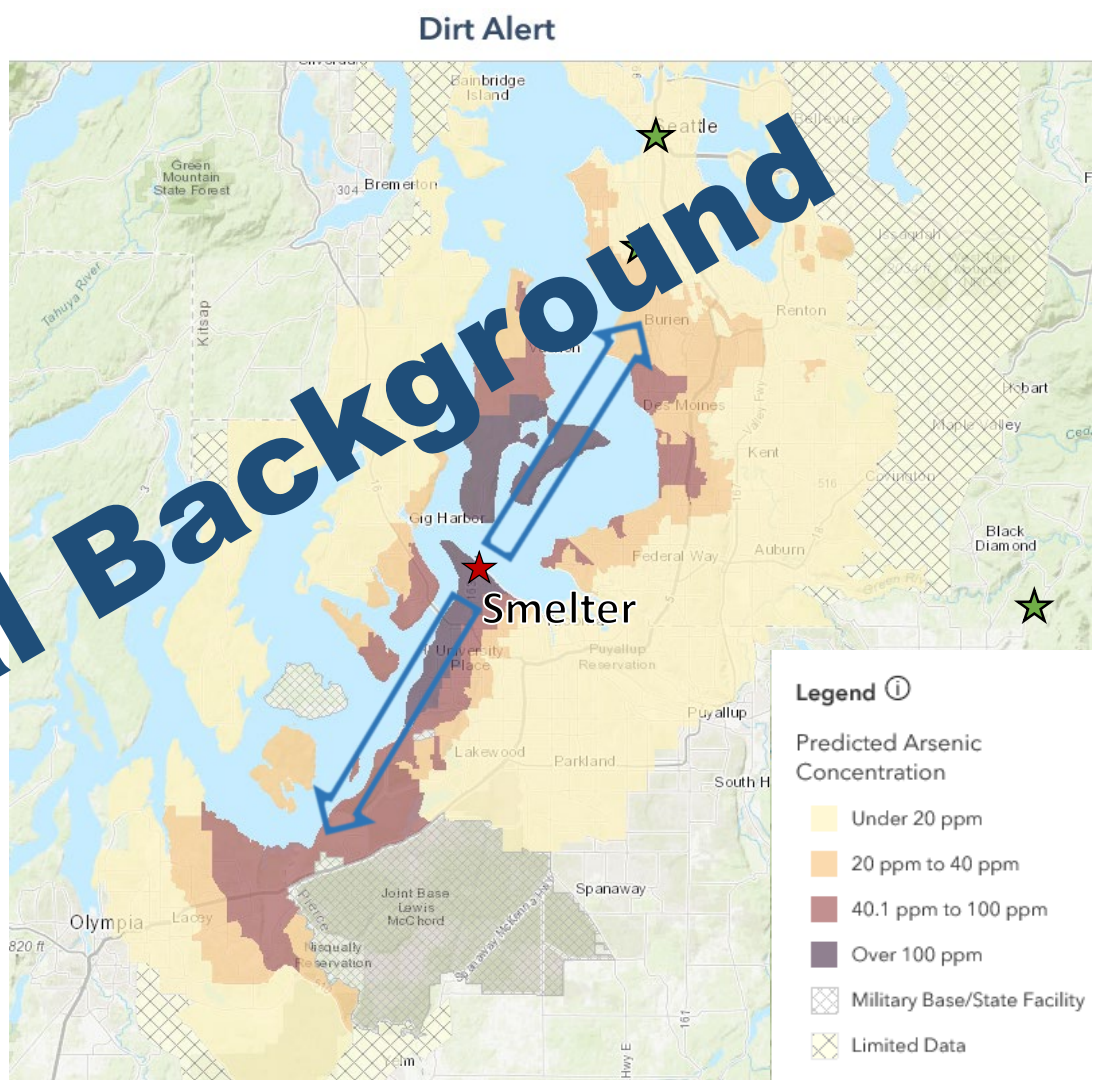


Tacoma Smelter Arsenic Plume



Regional Background

WA Dept. of Ecology
Dirt Alert website

Findings

#2 Chemicals in crumb rubber leachate are more toxic than TPE leachate