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Forest Service
Urban Natural Resources Stewardship



USING MOSS TO DETECT AIR POLLUTION IN PORTLAND, OREGON: DETAILS OF A GROUNDBREAKING STUDY



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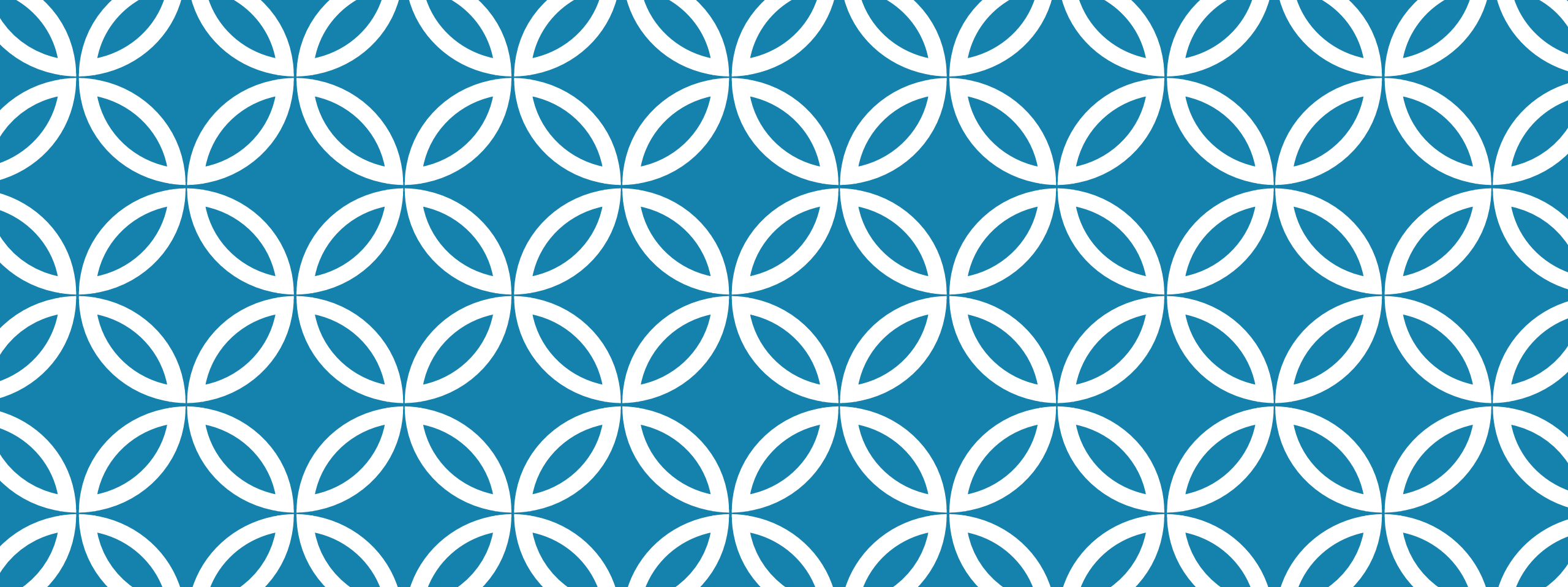
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HOW MOSS EXPOSED POTENTIAL HEALTH CONCERNS IN PORTLAND

Katie McClintock, EPA Region 10
Julie Wroble, EPA Region 10

MOSS DATA SUGGESTED CONCERNS NEAR GLASS FACILITIES — WHAT HAPPENED NEXT?

Oregon DEQ conducted air sampling near a facility in Southeast Portland where the appeared to be a hot spot of metals.

Air samples were collected for about a month in October 2015.

EPA received this data and noted that several metals were present at concentrations that exceeded risk-based screening levels for human health.

Hexavalent chromium was identified as a potential concern given its high toxicity relative to some of the other metals.

Two facilities voluntarily stopped using arsenic, cadmium, and chromium on their colored glass production.

WHAT WAS FOUND IN AIR SAMPLES IN OCTOBER

	Chromium (ng/m3)	Cobalt (ng/m3)	Arsenic (ng/m3)	Selenium (ng/m3)	Cadmium (ng/m3)	Lead (ng/m3)	Nickel (ng/m3)	Manganese (ng/m3)	Beryllium (ng/m3)
Minimum	17.4	0.1	1.1	0	0.8	2.2	1.4	3.4	0.007
Maximum	439.5	3.5	101.1	271.1	195.4	248.3	17.0	50.5	0.062
Average	71.5	0.9	31.7	44.3	29.4	42.9	5.4	18.6	0.016
Urban Background from NATTS sites	1.6-4	0.05-3	0.2-1.4	0.1-1	0.04-0.5	2-10	0.8-2.8	3.2-19.5	<MDL
EPA RSLs	0.08 (IRIS, C)	0.31 C, 6.3 N	0.65 C, 16 N	21,000 N	1.6 C, 10 N	150 N	11 C, 15 N	52 N	1.2 C, 21 N

Authorities investigating potential health risks of exposure to air pollutants found in SE Portland



By Jim Ryan | The Oregonian/OregonLive

[Email the author](#) | [Follow on Twitter](#)

on February 03, 2016 at 9:02 PM, updated February 18, 2016 at 8:58 AM

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Oregon authorities are investigating the potential health risks of exposure to high amounts of cadmium and arsenic found in the air in Southeast Portland.

The pollutants have been found in the air near [Southeast 22nd Avenue and Powell Boulevard](#), according to preliminary air quality monitoring data.

The pollutants in the air are present at levels higher than short- and long-term health standards, the Oregon Department of Environmental Quality and Oregon Health Authority said in a news release Wednesday.

The effects of exposure to the pollutants depends on how much of the pollutants people are exposed to and the duration of time they're around them, the news release said.

The agencies are making maps that will show the affected areas, according to the news release. The intersection of Southeast 22nd Avenue and Powell Boulevard is next to Powell Park, and Cleveland High School is among other nearby landmarks.

PORTLAND'S TOXIC AIR

[Bullseye Glass resumes using cadmium amid continued state monitoring; activist claims insufficient transparency](#)

[State investigates hexavalent chromium pollution increase in Southeast Portland](#)

[Gov. Kate Brown unveils toxic air cleanup plan, saying: 'This must change'](#)

[Gov. Kate Brown taps attorney as newest interim leader at Department of Environmental Quality](#)

[State finds 'statistically significant' cancer cluster near Portland glassmaker](#)

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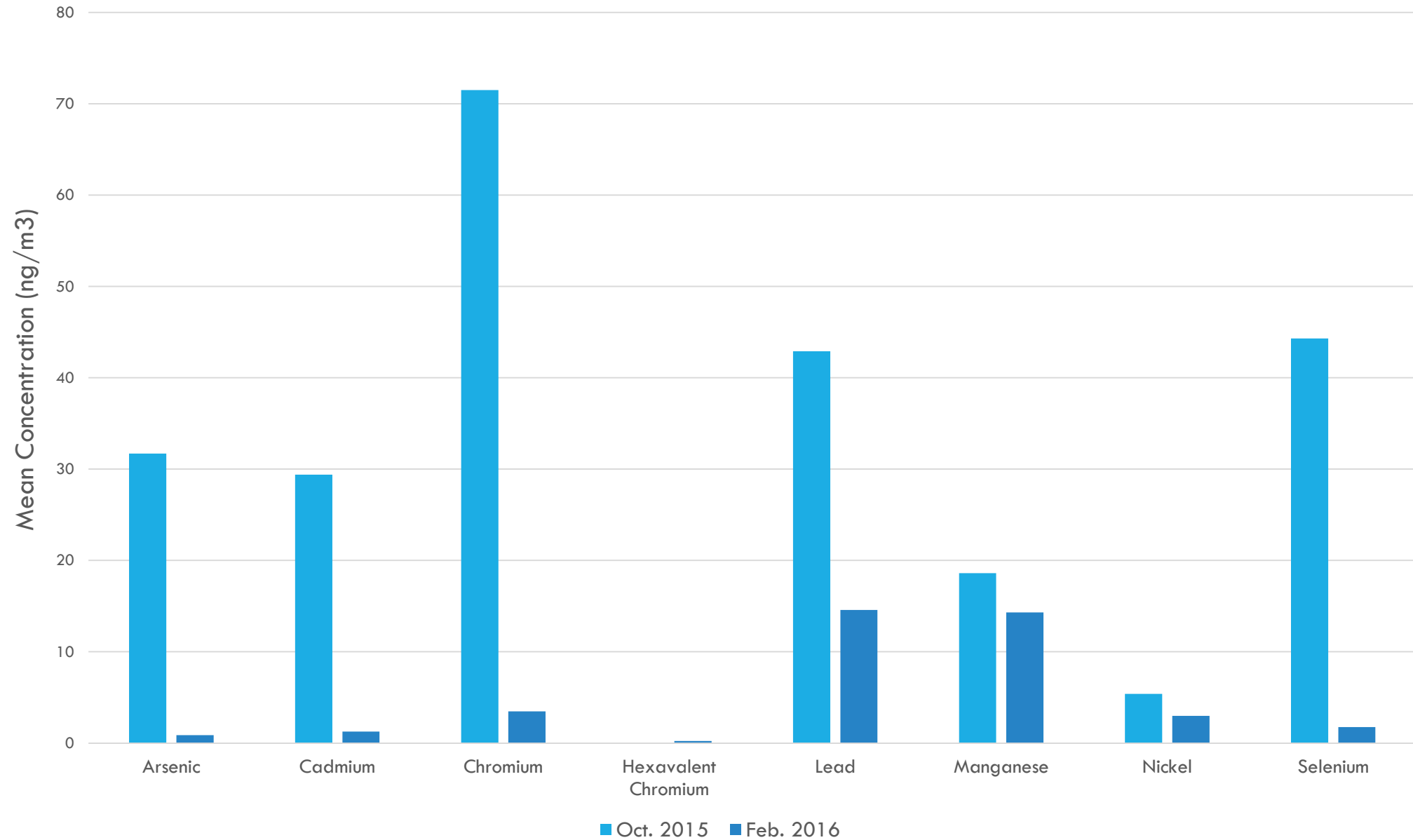
IN A BLIND TEST,
75%
OF OREGONIANS
CHOSE CHEVY.

SEE FOR YOURSELF

NORTHWEST
Chevy Dealers

WHAT DO PORTLAND CITY
EMPLOYEES MAKE?

Comparison of Ambient Air Monitoring Results Near Bullseye Glass (October 2015 and February 2016)



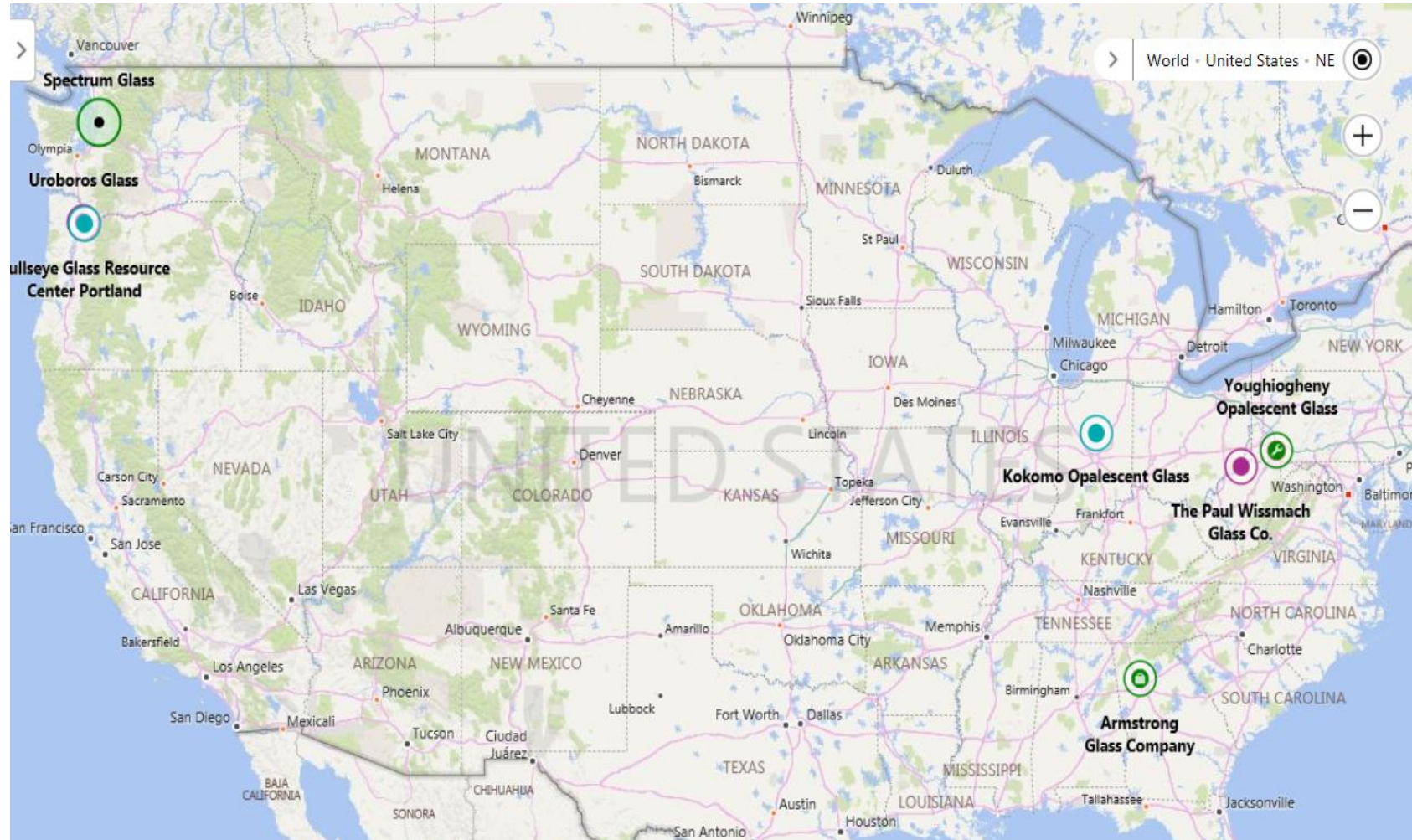
WHAT DO THESE DATA TELL US?

Given the dramatic decreases in air concentrations of metals, especially arsenic, cadmium, and chromium, it is likely that the two colored glass manufacturer's were responsible for at least a portion of the metals detected in Portland air.

Air concentrations while these facilities were operating under formerly normal circumstances likely indicate long-term air concentrations of levels that raise potential health concerns.

Soil sampling to date doesn't indicate a potential health risk from deposition of metals from air to soils.

BIG PLAYERS IN THE COLORED GLASS INDUSTRY



HOW WAS THIS DATA USED BY REGULATORS

DEQ used the moss data to target the installation of a monitor around Bullseye Glass. Which confirmed emissions levels were of concern.

In this case, the moss data lead to EPA clarifying a rule and DEQ taking regulatory actions against facilities.

Identified a sector (stained glass manufacturing) which had not been identified as being a large contributor to metal HAP emissions.

Investigating other sources

May lead to future rule changes

HOW WAS THIS DATA USED BY DEQ?

Previous studies by DEQ had identified air toxics in Portland.

The moss study focused their efforts.

After confirming the monitoring results near first hot spot, DEQ has installed other monitors.

Will likely result in improvement in air quality in Portland in short term.

Long term, DEQ also received funding for a toxics program and committed to develop a regulatory air toxics framework for the state moving forward.

FOR CONSIDERATION

Moss has potential to be a good screening tool, but we will need to develop it further

Ambient air monitoring is susceptible to meteorological conditions, expensive, very limited and time consuming. Moss could provide very useful screening level information once the method is established.

Could explore the correlation of soil concentrations and moss to see if can predict.

Could explore using further analysis of moss and comparison with source testing filters or raw materials/products from facilities to identify specific facilities without air monitors.

Similar moss studies other urban areas might identify other key industries of concern.

In addition to establishing the method for future moss studies, would need geographical limitations based on lichen and moss availability would be useful for future targeting.

CURRENT STATUS

Oregon DEQ is continuing to monitor the air around several hot spots.

Weekly update of air concentrations with rolling averages are being posted at:

- <http://saferair.oregon.gov/Pages/index.aspx>

Oregon Health Authority is planning on doing a Public Health Assessments in Fall 2016 that will address chronic exposures.

Investigating other contributors to hot spots.