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Washington

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Project: Deployment of 1000 PFAS Detectors Through Washington Ports and Residential Areas by PFAS Action Response Team.

Employer: Air Quality Program | Washington Department of Ecology.

Project Manager: Missouri University of Science and Technology.

Date: Wednesday, January 31, 2024

Project Description:

What are PFAS?

Per – and polyfluoroalkyl substances (PFAS) are a group of manufactured chemicals not found naturally in the environment. The unique physical and chemical properties make them resistant to water, oil and heat. For decades PFAS have been used in various industrial applications such as fire-fighting foams and metal plating, as well as consumer products including on carpeting, waterproof clothing and upholstery. Much of what is known about PFAS is based on studies on perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS).

Why should be concerned about PFAS?

PFAS do not break down easily in the environment which means these chemicals last for a long time once released. With repeated exposure some PFAS compounds may build up in the blood and organs, and they have been shown to be associated with some adverse health effects.

Can PFAS be found in outdoor air?

Yes, PFAS have reportedly been detected in outdoor air. These detections have been geographically associated with PFAS chemical production sites or large industrial manufacturing process utilizing PFAS-containing materials.

Can PFAS be found in indoor air?

Yes, some PFAS chemicals have been measured in indoor air and household dust. Certain PFAS chemicals like fluorotelomer alcohols (FTOHs) are often found in indoor air while PFOS and PFOA have been detected in household dust. Levels in the home will depend on the types of consumer products in the home. However, there is limited information about health risks associated with inhalation of the various PFAS that have been found in indoor air.

Are levels higher in outdoor or indoor air?

Because of the concentrated presence of consumer products containing PFAS and lower air circulation rates, typical levels of PFAS are expected to be higher indoors, compared to outdoor air.

Do PFAS have an odor?

No.

Is there a difference to health between inhaling of PFAS or ingesting PFAS-containing dust?

If present in air, PFAS is likely absorbed into the body by the inhalation route of exposure; however, this route of exposure likely contributes far less PFAS to the body than eating and drinking contaminated food and water.

Does inhaling PFAS while showering pose a health risk?

Showering with water containing the common PFAS chemicals, PFOS and PFOA, is not likely a health risk because exposure during a shower is not long enough to inhale significant amounts of PFAS. Also, PFOS and PFOA would not be present in the steam at shower water temperatures due to their higher than water boiling points. However, it is advisable to follow any public health recommendation in place for water.

Is the outdoor air safe to breath if a known source of PFAS is identified?

Air concentrations below standards are anticipated to pose no or minimal risk to the public health, including sensitive individuals such as the elderly and children. The concentrations that exceeded the health-based standards were found around large manufacturing facilities for PFAS.

Which PFAS are most volatile (e.g., most likely to evaporate)?

Most PFAS evaporate into the air at very low rates. However, it is known that certain types of PFAS are more volatile than others. Based on differences in volatility and the variety of industrial uses of PFAS chemicals, additional information is needed to more fully understand the transport and transformation of PFAS and the associated human exposure routes.

Can PFAS be released into the air from an industrial smokestack?

Yes. Stack test data have confirmed PFAS emissions from smokestacks using a modified version of an existing test method. These sources include PFAS manufacturing facilities and large industrial users of PFAS-containing products. No USEPA approved stack test method for measuring PFAS in air is currently available.

What is the temperature at which PFAS can be destroyed in an incinerator?

Most references in the published literature report PFAS destruction at temperatures greater than 1,200°F. However, some sources call for temperatures greater than 2,000°F, along with the consideration of other important combustion parameters needed for complete destruction.

What air pollution control devices are best for PFAS?

No facilities currently have air pollution control devices that were installed specifically to address PFAS emissions. Some have installed controls for PFAS emissions including thermal oxidizers, carbon absorption and wet scrubbers with packed bed fiber filters. The appropriate control strategy will likely vary based on the specific PFAS chemicals involved. More research is necessary to determine if the PFAS is permanently captured and not simply transferred to other media, such as wastewater or sludge.

What are known sources of PFAS to the air?

Known (and suspected) air sources have been identified at Teflon manufacturing facilities, PFAS containing coating facilities, chrome platers, landfills, and wastewater treatment plants.

How do air sources of PFAS contaminate water?

PFAS can attach to particles or dissolve in rain and snow, which are then deposited to land and water from the air. This is a process known as atmospheric deposition.

What are the recommended methods for monitoring PFAS in air and rain?

There is currently no U.S. Environmental Protection Agency (USEPA) approved method for ambient air monitoring of PFAS, although method development is underway.

What stack ("smokestack") test method is recommended for PFAS?

There is currently no USEPA approved stack test methodology.

Can PFAS be transported long distances in air?

Yes. Atmospheric deposition of PFAS many miles downwind from a manufacturing facility has been demonstrated. Contaminated groundwater was caused by atmospheric deposition of PFAS from industrial emissions of PFAS. Additionally, PFAS have been sampled and found in remote regions such as the arctic.

Can PFAS be transformed in air?

Yes, some PFAS compounds transform in the air. For example, volatile precursors like 8:2 FTOH can transform to PFOA in the air.

What regulations cover PFAS in air?

At the federal level, chrome platers are not allowed to add additional PFOS-containing mist/fume suppressants (above 1%) after 9/21/2015. The AQD's inspections of affected chrome plating sources in 2017 and 2018 showed compliance with this requirement. However, most replacement

mist/fume suppressants still contain PFAS chemicals, just not the specific compound called PFOS. If PFAS are emitted above certain thresholds, they would be required to meet a health-based screening level in the air before a company could be issued an air permit. However, several permitting exemptions exist for PFAS use under the current air toxics regulations.

What health-based screening levels exist for air?

The AQD derived health-based screening levels for PFOA and PFOS. Both screening levels are 0.07 micrograms per cubic meter (µg/m³) with a 24-hour averaging time. If both PFOA and PFOS are present in the air emissions, the combined concentration of these substances must be below 0.07 µg/m³, with a 24- hour averaging time. Screening levels are health protective values, such that if air concentrations do not exceed these levels, adverse health effects are not expected. Screening levels are designed to be protective for sensitive individuals, including children and the elderly. Additional screening levels could be developed as other PFAS are identified in future permit applications.

Are different states finding PFAS in air?

Yes. Minnesota found PFAS in outdoor air several years ago, and NC found PFAS in rainwater.

What are the USEPA and Agency for Toxic Substances and Disease Registry (ATSDR) doing regarding PFAS in air?

On February 14, 2018, the USEPA announced their PFAS Action Plan and associated Fact Sheet:

https://www.epa.gov/sites/default/files/2019-02/documents/pfas_action_plan_021319_508compliant_1.pdf

ATSDR also maintains a web site dedicated to PFAS:

https://www.atsdr.cdc.gov/pfas/index.html

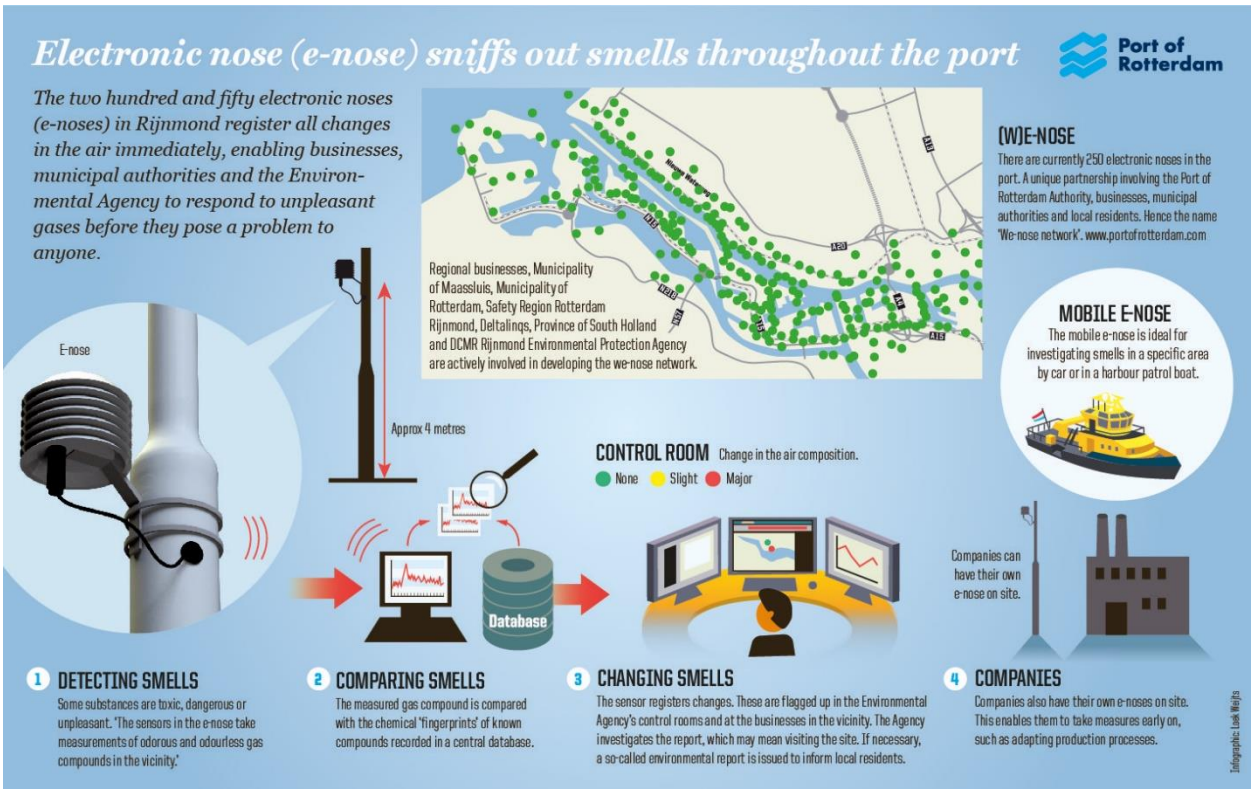
FACT SHEET: Biden-Harris Administration Takes New ...:

https://www.whitehouse.gov/briefing-room/statements-releases/2023/03/14/fact-sheet-biden-harris-administration-takes-new-action-to-protect-communities-from-pfas-pollution/

Cutting-Edge Advanced Technologies

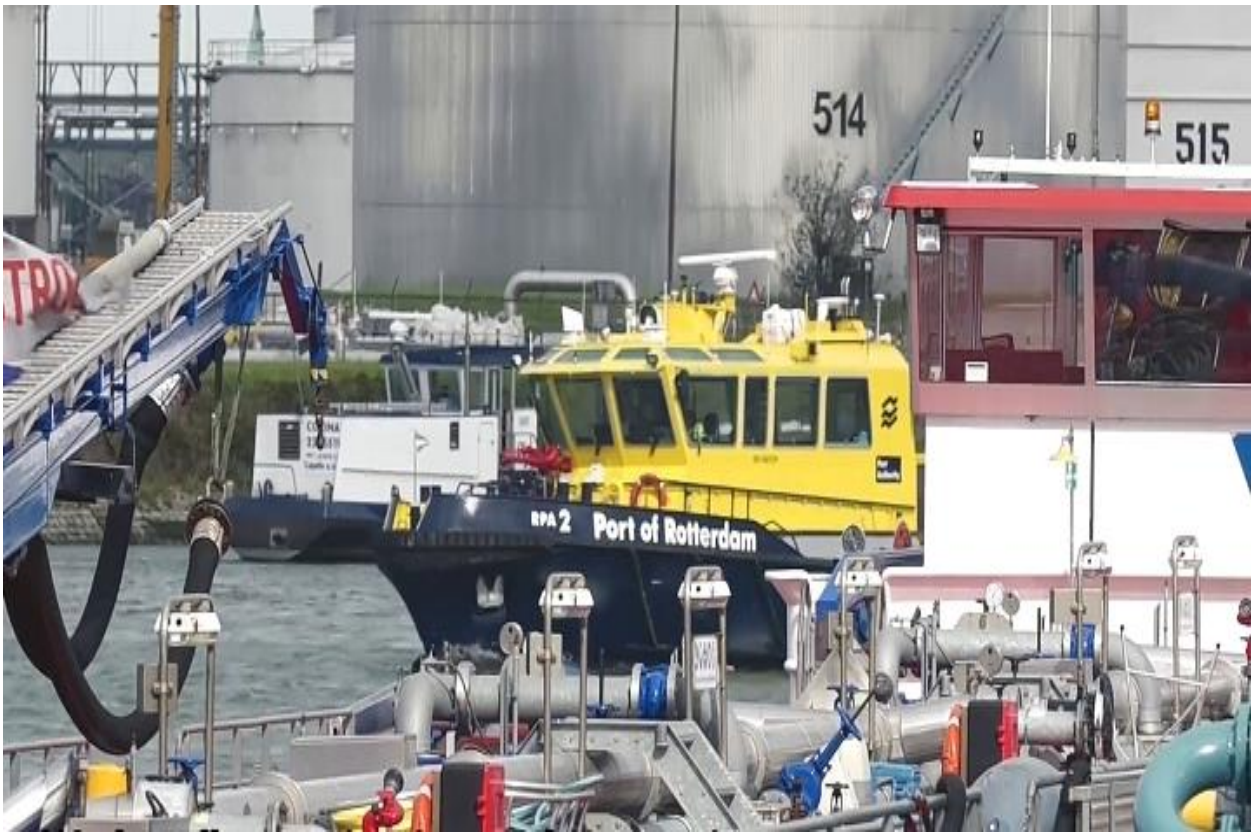
“Electronic nose or E-nose” and “open ended hollow coaxial cable resonator sensors” are two technologies that sniff out gases throughout the ports. 1000 electronic noses and resonator sensors distributed through Washington ports and residential areas, register all changes in the air immediately enabling businesses, municipal authorities, and environmental agency to respond to unpleasing gases before they pose a problem to anyone.

Some substances are toxic, dangerous, or unpleasant. The sensors in the E-nose and resonator sensors take measurements of odorous and odorless gas compounds in the vicinity. The measured gas compound is compared with the chemical fingerprints of known compounds recorded in a central cloud database.



These are flagged up in the environmental agency's control rooms and at the businesses in the vicinity. the agency investigates the report, which may mean visiting the site. if necessary, an environmental report is issued to inform residents. Companies also have their own e-noses on sites. This enables them to take measures early on, such as adapting production processes.

The **mobile** E-nose is ideal for investigating gases in a specific area by car or in a harbor patrol boat. Deployment of 1000 electronic noses and resonator sensors in the ports creates a unique partnership involving Washington environmental authorities, businesses, and residents. Hence the name "**we-nose network**".



Mission:

Developing health-based screening levels for PFAS compounds, as needed. Learning about how PFAS is used and estimating potential air releases. As the uses of PFAS chemicals by industry are identified through air permit applications the AQD will screen allowed emissions for any potential adverse health effects as required in the air toxics rules. Appropriate air permitting measures for PFAS (such as material limits, material substitution, control requirements, emission limits and/or stack dispersion requirements) will be included in future air permits, as necessary.

Sincerely,

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