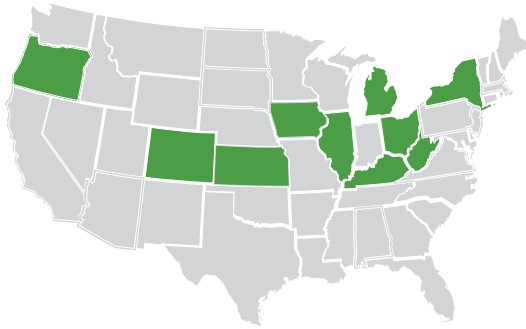


# Real World Global Monitoring Data Demonstrate Siloxanes Pose Negligible Risk to Environment

The silicones industry, independent scientific panels, and government authorities in several world regions committed significant resources to better understand the environmental presence and behavior of siloxanes used to make silicones. These siloxanes are known as octamethylcyclotetrasiloxane (D4), decamethylcyclopentasiloxane (D5) and dodecamethylcyclohexasiloxane (D6). Industry and government-initiated environmental monitoring programs have produced a robust data set that demonstrates that:

- Siloxanes pose little or no risk to the environment
- No regulatory restrictions are warranted



- Boulder, Colorado
- Steamboat Springs, Colorado
- Chicago, Illinois
- Elmhurst, Illinois
- South Iowa City, Iowa
- Wichita, Kansas
- Lexington, Kentucky
- Carrolton, Kentucky
- Adrian, Michigan
- Genesee, Michigan
- Waterford, New York
- Columbus, Ohio
- Gresham, Oregon
- Sistersville, West Virginia



## UNITED STATES EPA D4 MONITORING PROGRAM

### Purpose

To provide the U.S. Environmental Protection Agency (EPA) with data on octamethylcyclotetrasiloxane (D4) in media associated with waste water treatment plants (WWTPs) by assessing concentrations in the aquatic environment.

### Sampling

- Ten sites were municipal WWTPs, which serve residential areas and industrial facilities
- Four sites – privately owned WWTPs – were manufacturers or processors of D4
- Third party scientists sampled and analyzed
  - Influent, effluent and biosolids (organic material that resulted from sewage treatment)
  - Surface water, sediment, fish, and sediment-dwelling organisms

### Status

Samples collected over two periods (Fall/Winter and Spring/Summer) 2016-2017 and the results were submitted to EPA.

### Results

- An evaluation of the data, conducted by independent scientists concluded the monitoring program “provided high-quality data”
  - This evaluation, published in a peer reviewed scientific journal reported **“there is negligible risk from D4 to organisms based on environmentally realistic exposure concentrations.”**<sup>1</sup>

## ENVIRONMENT CANADA/HEALTH CANADA MONITORING STUDY

### Purpose

To determine the occurrence of D4 and D5 in environmental media impacted by wastewater effluent discharges.

### Sampling

A comprehensive surveillance program was conducted by Environment Canada/Health Canada of WWTPs including:

- Monitoring of WWTP influents and effluents receiving water, sediment,
- Analysis of soil from agricultural fields

### Status

Complete.

### Results

- Indicate that the removal efficiency of siloxanes in all WWTPs is very high
- There is no risk posed by D4 and D5 to aquatic and sediment-dwelling organisms<sup>2</sup>

## EUROPEAN UNION RESTRICTIONS MONITORING PROGRAM

### Purpose

To assess the effectiveness of the European Union's REACH Restriction on 'wash-off' cosmetic products that target down-the-drain emissions of D4 and decamethylcyclopentasiloxane (D5) by monitoring the concentration of D4 and D5 over time in influent wastewater from WWTPs in the EU.

### Sampling

3 distinct periods: pre-restriction, phase-out; and post-restriction.

### Status

Monitoring began in late 2017, and is slated to continue for four years.

### Results

- Preliminary results indicate that D4 and D5 WWTP influent concentrations
  - are lower than the predicted levels of D4 and D5 expected in WWTPs
  - and in the case of D4, already consistent with the predicted post-restriction concentrations



- Halle an der Saale, Germany
- Wolfsburg, Germany
- Stalowa Wola, Poland
- Lleida, Spain
- Norrköping, Sweden
- Bury, United Kingdom

## VOLUNTARY LONG-TERM MONITORING OF D4, D5 AND D6 IN AQUATIC ENVIRONMENTS

### Purpose

To determine if concentrations of D4, D5 and D6 in surface sediments and aquatic organisms are stable or changing over the duration of the project at four globally distributed locations.

### Sampling

- Third party scientists collected aquatic invertebrate and fish species from each site
  - In Tokyo Bay, only fish were collected

### Status

- Initiated in 2011 and sampled on an annual basis through 2016
- Sampling campaigns occurred at each site in 2018 to detect temporal changes in environmental concentrations

### Results

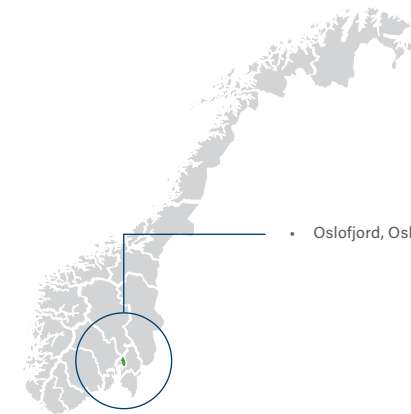
- At all locations, with increased distance from point sources, concentrations of D4, D5 and D6 decreased
- None of the levels detected posed a risk to aquatic organisms<sup>3</sup>
- No significant concentration trend was detectable at any of the four locations (no environmental concentration increase was found over the course of the monitoring program)



- Lake Ontario, Great Lakes, Canada and United States
- Lake Pepin, Minnesota, United States



- Tokyo Bay, Tokyo, Japan



- Oslofjord, Oslo, Norway

1. Nusz JB, Fairbrother A, Daley J, Burton GA. (2018). Use of multiple lines of evidence to provide a realistic toxic substances control act ecological risk evaluation based on monitoring data: D4 case study. Science of the Total Environment 636:1382-1395.

2. Wang D-G, Steer H, Tait T, Williams Z, Pacepavicius G, Young T, Ng T, Smyth SA, Kinsman L, Alaei M. (2013). Concentrations of cyclic volatile methylsiloxanes in biosolid amended soil, influent, effluent, receiving water, and sediment of wastewater treatment plants in Canada. Chemosphere 93:766-773.

3. Woodburn KB, Seston RM, Kim J, Powell DE. (2018). Benthic invertebrate exposure and chronic toxicity risk analysis for cyclic volatile methylsiloxanes: Comparison of hazard quotient and probabilistic risk assessment approaches. Chemosphere 192:337-347.