CALL FOR PARTICIPATING MUNICIPALITIES
National Survey of Municipal Sewage and Wastewater Treatment Plants

Project Summary. Most chemicals used in consumer products, their transformation products, and human metabolites are ultimately washed down the drain and are collected in municipal sewers. Efficient chemical monitoring at wastewater treatment plants (WWTPs) thus may provide up-to-date information on chemical usage rates and human exposures for epidemiological assessments of sewage-borne chemicals (antibiotics, R_x-drugs, emerging contaminants, etc.). This so-called "sewage epidemiology" approach has been employed by researchers to evaluate drug use in communities via measurement of drug levels in raw wastewater. The present project seeks to capitalize and expand on this concept of "sewage metrology" by analyzing all WWTP process flows (influent, effluent, and sewage sludge) to accomplish the following:

(i)   study the occurrence and fate of traditional and emerging constituents in wastewater process streams;
(ii)   study the performance of WWTPs in removing problematic constituents;
(iii) estimate nationwide inventories of chemical loading and environmental release via effluent discharge and land-application of sewage sludge;
(iv)   screen for and prioritize persistent, bioaccumulative and toxic contaminants for risk assessment;
(v)   monitor public health status at the community level by tracking health-specific biomarkers; and to
(vi)   estimate human exposure to bioaccumulative compounds in the sewershed using digested sewage sludge as a proxy for human adipose tissue.

This sampling campaign is part of an ongoing effort at the Center for Environmental Security at the Biodesign Institute of Arizona State University (ASU) to increase our knowledge of wastewater composition and the performance of treatment infrastructure in the U.S. and worldwide. This work is being conducted in collabodation with the U.S. EPA and with funding from the National Institute of Environmental Health Sciences. Efforts already have resulted in a large repository of wastewater specimens (influent, effluent, sewage sludge) from more than 160 WWTPs nationwide, known as the Human Health Observatory (*H2O*) and National Sewage Sludge Repository (NSSR). Examples of wastewater constituents of particular interest to this study are pharmaceuticals and personal care products (PPCPs), perfluorinated compounds, brominated flame retardants, hormones and mimics, microplastics, as well as valuable wastewater components, such as P, N, metals, and rare earth elements.

We invite municipalities to participate in our ongoing (2015), multi-year, nationwide WWTP survey by:

(i)   joining a large network of WWTPs by contributing samples to this nationwide sampling campaign;
(ii)   receiving in return, analytical results from our study at no charge, to better understand and manage the performance of their treatment facilities (custom analyses can be done on a fee-for-service basis); and
(iii) participating repeatedly in sampling campaigns to establish a longitudinal dataset of chemical loading, sewage sludge composition, and WWTP performance.

The sampling frequency is once a year. We request 24-h composite samples of approximately 2 L each of wastewater influent, effluent and sewage sludge (~2000 g). This can be done either by using a programmed auto-sampler (preferred option) or by collecting samples frequently over time and mixing equal amount of samples manually in the HDPE shipping containers. If desired, analytical data for individual WWTPs will be **de-identified** and/or **composited** to obscure the origin of participating treatment works, and for archiving purposes.

Nationwide study findings will be analyzed and results published in the peer-reviewed literature. Information gleaned from this study will include, but is not limited to, the following: chemical use and disposal of chemicals in the U.S.; performance of public treatment works for constituent removal; health status assessment of population served by participating WWTPs; sustainability status of U.S. cities; and determination of the effectiveness and need for revision of environmental policy frameworks and regulations. In addition, data may be used to guide pollution prevention decisions and inform policy decisions in green chemistry and safer consumer products.

For additional information, please send an email (halden@asu.edu) to: Rolf Halden, PhD, PE,
Professor & Director, Center for Environmental Security, Biodesign Institute at Arizona State University