Center for Computational Toxicology and Exposure

SSWR BOSC – Water Treatment and Infrastructure
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, Rusty Thomas, Director
Center for Computational Toxicology and Exposure

Center Mission and Goals

Mission: *Support Agency decisions by providing solutions-driven research to rapidly evaluate the potential human health and environmental risks due to exposures to environmental stressors and ensure the integrity of the freshwater environment and its capacity to support human well-being*

Research Goals and Areas of Focus:

- Reduce the time required to thoroughly test chemicals and other emerging materials for human health and ecological toxicity from years to months
- Expand our understanding of quantitative human and ecological exposures for thousands of chemical substances and emerging materials
- Develop comprehensive information systems that contains relevant actionable chemical safety and ecological data with the software tools to integrate them for a range of human health and environmental decisions
- Reduce the time required to characterize freshwater ecosystems and project the future state of ecological condition and ecosystem services from decades to years
- Demonstrate translation of CCTE data, models, and tools into regulatory decisions by EPA Program Offices, EPA Regions, and States to protect human health and the environment

Involvement in SSWR

Unique Capabilities to Support SSWR Work:

- 90’ Research Vessel Lake Explorer II (https://archive.epa.gov/med/med_archive_04/web/html/rv_lake_explorer_ii.html) (Duluth)
- Slocum G3 shallow-water glider with phycocyanin and LISST sensors (Duluth)
- State-of-the-art aquatic organism exposure and testing facilities which houses 12 species of fish, invertebrates and amphibians (Duluth)
- Liquid handling robotics to support rapid chemical screening and omic analysis (Duluth and Cincinnati)
- Bioinformatics team (Cincinnati and RTP)
- Advanced analytical instrumentation for PFAS work (Duluth)
- Outreach and Training

Role of CCTE in SSWR:

- CCTE is conducting research throughout SSWR with large investments in aquatic life criteria development, collecting Great Lakes data to inform the National Aquatic Resource Survey, assessing nutrient-related stressors including Harmful Algal Blooms, developing and evaluating *in-vitro* and *in-vivo* assays for chemicals of high priority and evaluating chemicals found in biosolids
- CCTE’s involvement is reflected in both SSWR leadership and PI involvement
    - CCTE leads 2 Outputs and 4 Products for SSWR with several others contributing

SSWR Research Area 7

Drinking Water/Distribution Systems

- Decreasing Uncertainty in Regulatory Decision Making
  - Provide updated information on:
    - the impact of multi-route and multi-contaminant exposures on internal dose and toxicity
    - the relative importance of the oral, dermal and inhalation routes of exposure for high priority contaminants
    - the impact of susceptibility factors on dosimetry and toxicity
    - improved assessment methods for detection and quantification of priority pathogens
- Filling Key Knowledge Gaps to Support and Enhance Regulatory Decisions for Chemical and Microbial Water Contaminants
  - Provides methods and statistical analysis linking occurrence and toxicity data and information that will aid OW, Regional Partners and States in their efforts to meet EPA regulatory responsibilities under both the CCL and the 6-Year DBP Rule mandates of the Safe Drinking Water Act Amendments.
- Example upcoming sub-products:
  - Comparative *in-vitro* toxicity of priority drinking water DBPs with differing metabolism-dependent outcomes in metabolically competent cells
  - Genotoxicity of bromodichloromethane in human bladder
  - Brominated trihalomethanes metabolizing capabilities in human bladder cells and relevance for human bladder carcinogenesis

SSWR Research Area 9

Wastewater/Water Reuse

- Effects-based Methods for Assessing Chemical Contaminants in Wastewater and Reclaimed Water
  - Develop effects-based methods that can be used to rapidly and selectively screen waters for possible physiological effects. Methods will include Whole Effluent Toxicity (WET) tests, bioassays, and targeted toxicity assays to detect known and unknown chemical contaminants in wastewater and reclaimed water in support of OW, Regional, State and utility needs.
- Example upcoming subproducts:
  - An evaluation of the stability of gene expression signatures in field studies
  - Effluent test validation with Daphnia magna and mussels
  - ORD test methodology for effluent testing with Daphnia magna and mussels
  - Using gene expression profiling to minimize toxicological hazards and identify optimal treatment methods for produced water
  - Exposure, Hazard, and Toxicokinetic Data for Chemicals in Biosolids

United States Environmental Protection Agency

Thank You and We Look Forward to Your Feedback!