Final Report
of the
Contaminants of Emerging Concern Work Group
of the
New Jersey Department of Environmental Protection
Science Advisory Board

Executive Summary

Numerous chemicals, some of which may be a potential risk to human or environmental health, are used every day in New Jersey (NJ) for industrial, commercial and household purposes. Contaminants of Emerging Concern (CEC) are those that present a concern for both hazard and exposure. A number of these chemicals may find their way into the State's wastewater treatment facilities, receiving waters, aquifers and drinking water treatment facilities and other chemicals may be released to air or deposited in soils. CEC have raised concern around the world, as once released, these products pose a potential threat to biota and the environment. To address this issue specifically in New Jersey, the NJDEP Science Advisory Board (SAB) created the CEC work group which was asked to investigate this issue. Addressing the concerns about these contaminants has been an ongoing challenge to regulators and utilities because of the vast number of compounds, the rapid advances in analytical techniques resulting in very low detection limits, the relative scarcity of information regarding potential human and ecosystem health effects as well as new uses and applications of new or existing chemicals which may present new potential exposure routes impacting humans and other biota as well as the quality of our environment.

Considering the issues surrounding CECs, the CEC work group decided to develop a framework or methodology that can be used by NJDEP to identify and prioritize CECs particularly as they relate to NJ. The proposed framework includes 4 tiers:

Tier 1 - Initial Screen: Determine whether the compound is a potential CEC in NJ

Tier 2 - Preliminary Hazard & Exposure Assessment: Characterize the compound based on empirical or estimated hazard and exposure information to develop a prioritization for conducting risk assessments

Tier 3 - Risk Assessment: Conduct both human and ecological risk assessments to determine whether a CEC candidate is a significant risk that merits consideration on the NJ CEC prioritization list

Tier 4 - Risk Management: Develop recommendations for mitigating risk of chemicals identified as high risk concerns

The major focus of the framework is the Preliminary Hazard & Exposure Assessment in Tier 2 which provides a methodology for prioritizing the numerous compounds that are in use or have been found in the environment and for determining whether a compound warrants a Risk Assessment under Tier 3. Two powerful tools would be used to perform the hazard and exposure assessments. The hazard assessment would be conducted using a platform called **METIS** (Metanomics Information System) developed by DuPont. **METIS** is a chemical informatics platform that provides a screening level view of potential environmental fate and effects, human health concerns, and societal perception concerns. The exposure assessment would be conducted using a platform called **PRoTEGE** (Prioritization and Ranking of Toxic Exposures with GIS extension) that was developed by the Computational Chemodynamics Laboratory of EOHSI. **PRoTEGE** facilitates screening level exposure calculations at multiple tiers, utilizing available data including chemical production volumes, intrinsic properties, chemical usage, environmental concentrations, etc. The current **PRoTEGE** tool only includes evaluation of human exposure, but it can be easily adjusted to include eco-exposure. Our recommendation includes merging the **METIS** and **PRoTEGE** systems, which would provide NJ DEP with the leading state of the art system for rapidly evaluating the hazard and exposure potential of potential CECs. By doing so, this will place NJDEP in the forefront of state and national regulatory agencies for addressing CECs on a large scale.

Based on the output from these tools, the compound would be categorized either as a high concern (3), moderate concern (2), or low concern (1). A prioritization score would be calculated by multiplying the hazard rating by the exposure rating. Compounds with a high score would be further analyzed under Tier 3, while all other compounds (with lower scores) would be further analyzed at a later date or be placed on a list of compounds that would be monitored and watched.

The proposed framework will provide NJDEP with a robust, transparent, and science-based methodology for managing CECs in NJ. A critical element of the framework is the merging of the **METIS** and **PRoTEGE** systems. This work is necessary for the framework to be a useable tool.