



Project Summary

Toxicity Reduction Evaluation: Case Histories at High Point and Fayetteville, North Carolina

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This research focused on investigation of two important elements of the toxicity reduction evaluation (TRE) protocol proposed by the U.S. Environmental Protection Agency (EPA): (1) toxicity identification evaluation (TIE) and (2) toxicity source evaluation (TSE). The specific objectives of this research were to challenge the TIE protocol with target compounds to determine whether toxic agents could be properly classified, apply the TIE and TSE protocols to two case studies (High Point and Fayetteville, NC) where pass-through toxicity was highly variable, and investigate the potential for return activated sludge to desorb acutely toxic compounds.

Testing of the TIE Phase I protocol with five target compounds showed that false positive and false negative removals of toxicity can occur. Elution of the C18 solid phase extraction (SPE) column with methanol/water fractions (TIE Phase II) showed that a single toxic compound is eluted in several fractions. Only a weak relationship was found between the polarity of compounds and the elution fractions they appeared in. Identification of the sources or nature of acutely toxic compounds when events were sporadic was not solved in the High Point study. Modifications were made to the refractory toxicity assessment (RTA) protocol to simplify its use. Also, the RTA protocol was modified to use chronic toxicity as the end-point rather than acute toxicity. Four TIEs at the Fayetteville, NC facility showed that passage of samples

through a C18 SPE column completely eliminated acute toxicity. Other tests implied that ammonia contributed toxicity, but the presence of toxicants other than ammonia was indicated by removal of toxicants by the C18 column. In three TIEs, most of the toxic substances appeared in the 80% to 85% methanol fractions from the C18 column. RTA tests suggested that five industries potentially contributed toxic substances to the waste stream. Return activated sludge was not found to be more toxic than whole effluent in the case histories examined. However, a sample from another treatment facility indicated concentration and release of toxic agents by biomass. The TIE Phase I protocol can provide the proper direction for further narrowing of potential toxicants but more data are needed with mixtures of target compounds to show reliability. The RTA protocol should be streamlined to make it more practical to apply. The development of "real-time" measures of aquatic toxicity is essential if sporadic sources of toxic compounds are to be eliminated.

This Project Summary was developed by EPA's Risk Reduction Engineering Laboratory, Cincinnati, OH, to announce key findings of the research project that is fully documented in a separate report of the same title (See Project Report ordering information at back).

Introduction

Effluent biomonitoring is the cornerstone of water-quality-based permitting of wastewater discharges as mandated by



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Richard A. Dobbs is the EPA Project Officer (see below).

The complete report, entitled "Toxicity Reduction Evaluation: Case Histories at High Point and Fayetteville, NC," (Order No. PB92-222 231/AS; Cost: \$26.00, subject to change) will be available only from:

National Technical Information Service

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The EPA Project Officer can be contacted at:

Risk Reduction Engineering Laboratory

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