

## Response to Comment on "Pharmaceuticals, Hormones, and Other Organic Wastewater Contaminants in U.S. Streams, 1999–2000: A National Reconnaissance"

We concur with the response of Eckel to our recent publication in this Journal (1). As the author notes, the topic of emerging contaminants is currently receiving extensive media coverage and scientific notice, but there are earlier reports that foreshadow this current interest. Eckel's comment regarding the detection of pharmaceuticals and other organic wastewater contaminants (OWC) at a Superfund landfill site (2) is well taken, as other reports confirm the presence of such compounds at waste-disposal and landfill sites (3). In fact, literature from more than 20 years ago documented the occurrence of OWCs in the environment (4–7). A significant difference between these reports and our study is that we have systematically documented the frequent presence and low concentrations of a broad suite of OWCs in a wide variety of streams across the United States.

The importance of examining existing data from full-scan GC/MS analysis-populated data sets, with confirmation by determining retention indices or analysis of authentic standards, also is pertinent as this approach would identify compounds actually present rather than those thought to be present based on usage or projected environmental loadings. However, this approach also has limitations. Only those compounds that are amenable to GC/MS are likely to be identified. Many of the constituents determined in our study, including a number of pharmaceuticals and most of the antibiotics, are not amenable to GC/MS and were determined by HPLC/MS. Unlike GC/MS, standard reference libraries of full-scan spectra are not available for HPLC/MS data. Also, the lower sensitivity of full-scan GC/MS would have resulted in higher detection levels than the selected-ion monitoring GC/MS and HPLC/MS methods used in our study. Lower detection levels were critical to determining organic wastewater contaminants at the expected ambient concentrations. Within these limitations, the data mining approach advocated by Eckel's complements the approach taken in our study, and both approaches are likely to contribute to our ongoing research on the topic of emerging contaminants and by that of others.

### Literature Cited

- (1) Kolpin, D. W.; Furlong, E. T.; Meyer, M. T.; Thurman, E. M.; Zaugg, S. D.; Barber, L. B.; Buxton, H. T. *Environ. Sci. Technol.* **2002**, *36*, 1202–1211.
- (2) Eckel, W. P.; Ross, B.; Isensee, R. K. *Ground Water* **1993**, *31*, 801–804.
- (3) Turner, K. S.; Hardy, M. A.; Tapper, R. J. *Open-File Rep.—U.S. Geol. Surv.* **1993**, No. 92-153.
- (4) Garrison, A. W.; Pope, J. D.; Allen, F. R. In *Identification and Analysis of Organic Pollutants in Water*; Keith, C. H., Ed.; Ann Arbor Science Publishers: Ann Arbor, MI, 1976; Chapter 30, pp 517–556.
- (5) Hignite, C.; Azarnoff, D. L. *Life Sci.* **1977**, *20*, 337–342.
- (6) Tabak, H. H.; Bloomhuff, R. N.; Bunch, R. L. *Dev. Ind. Microbiol.* **1981**, *22*, 497–519.
- (7) Yamagishi, T.; Miyazaki, T.; Horii, S.; Kaneko, S. *Bull. Environ. Contam. Toxicol.* **1981**, *26*, 656–662.

### Dana W. Kolpin\*

U.S. Geological Survey  
400 South Clinton Street  
Box 1230  
Iowa City, Iowa 52244

### Edward T. Furlong

U.S. Geological Survey  
Box 25046, MS 407  
Denver, Colorado 80225-0046

### Michael T. Meyer

U.S. Geological Survey  
4500 SW 40th Avenue  
Ocala, Florida 34474

### E. Michael Thurman

U.S. Geological Survey  
4821 Quail Crest Place  
Lawrence, Kansas 66049

### Steven D. Zaugg

U.S. Geological Survey  
Box 25046, MS 407  
Denver, Colorado 80225-0046

### Larry B. Barber

U.S. Geological Survey  
3215 Marine Street  
Boulder, Colorado 80303

### Herbert T. Buxton

U.S. Geological Survey  
810 Bear Tavern Road  
West Trenton, New Jersey 08628  
ES0201350