National Water-Quality Assessment Program—Source Water-Quality Assessments

In 2002, the National Water-Quality Assessment (NAWQA) Program of the U.S. Geological Survey (USGS) implemented Source Water-Quality Assessments (SWQAs) to characterize the quality of selected rivers and aquifers used as a source of supply to community water systems in the United States. These assessments are intended to complement drinking-water monitoring required by Federal, State, and local programs, which focus primarily on post-treatment compliance monitoring.

Purpose

The primary objective of SWQAs is to determine the occurrence of about 280 primarily unregulated anthropogenic organic compounds in source water used by community water systems. Source water is the raw (ambient) water collected at a supply well or surface-water intake prior to water treatment used to produce finished water. A secondary objective is to understand occurrence patterns in source water and determine if these patterns also occur in finished water prior to distribution.

The NAWQA Program is planning as many as 30 surface-water and 30 ground-water assessments through 2013 (fig. 1). The findings are not intended to comprehensively portray the quality of our Nation's source waters owing to the relatively small number of water supplies studied. They are, however, intended to improve understanding of ambient resource conditions in a drinking-water-supply context.

Approach

Monthly samples of source water and finished water are collected in each of the surface-water assessments to characterize seasonal variability. Additional samples are collected during hydrologic events or other critical times when water-quality conditions may change quickly and (or) when large concentrations are most likely to occur. Samples from 15 high-production wells supplying community water systems and the associated finished water are collected in each of the ground-water assessments. Specific information on assessment design and analytical methods are available in Carter and others (2007).

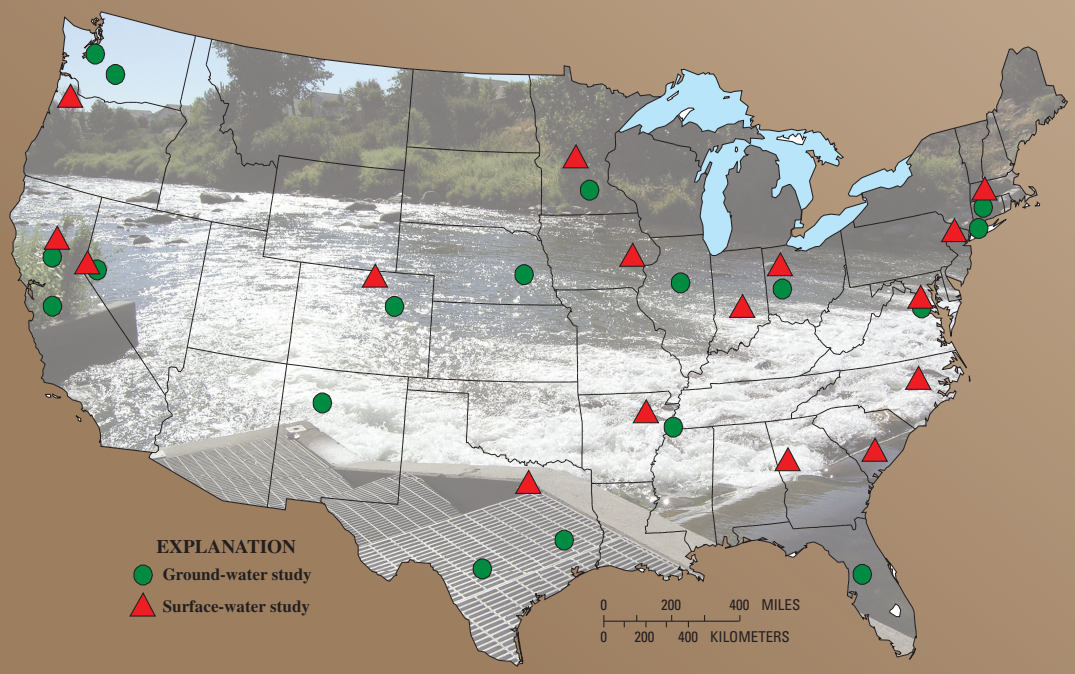

Figure 1. Location of Source Water-Quality Assessments, 2002–07. Additional studies are planned to be completed through 2013.

ROLE OF SWQAs

Collaboration with and complementing work of other Federal, State, and local organizations are important components of SWQAs. Unique characteristics of these assessments, which provide additional information and understanding to other monitoring activities, include:

- ✔ Data on a diverse suite of organic compounds with potential human-health concerns that are not commonly measured in compliance or regulatory programs
- ✔ The ability to expand the list of compounds monitored to include additional emerging contaminants as analytical methods are approved by USGS
- ✔ Low-level analytical methods to gain a more complete understanding of contaminant occurrence in source water and finished water
- ✔ A common sampling approach and laboratory to minimize sample contamination and reduce analytical variability.

Communications

USGS findings can be presented at briefings, in reports and journal articles, and at scientific conferences, and can be reported on a local and national basis. Sampling locations of river intakes and supply wells are not disclosed in reports to meet USGS policy and source-water security purposes under the U.S. Government's Homeland Security activities. Participating community water systems, however, do receive USGS results, may use and distribute the data as they choose, and are encouraged to serve as coauthors of publications as appropriate.

Much of the data obtained through these efforts are not directly comparable to data used in Consumer Confidence Reports (CCRs) (*http://www.epa.gov/safewater/ccr/index.html*), which are communicated to the public by water utilities. The lack of comparability relates to differences in sampling objectives, design, and analytical methodologies, including (1) samples from USGS assessments are collected from both source water and finished water; (2) many of the compounds analyzed are unregulated and not monitored by community water systems; and (3) USGS laboratory reporting levels generally are considerably lower than those used in CCRs and for compliance monitoring customarily reported to State and Federal drinking-water agencies.

ANTHROPOGENIC ORGANIC COMPOUNDS

Anthropogenic organic compounds are man-made or man-caused chemicals that contain carbon and other elements and have various uses. The primary use or source groups for the approximately 280 compounds analyzed in water samples for SWQAs are:

- Disinfection by-products
- Fumigant-related compounds
- Fungicides
- Gasoline hydrocarbons, oxygenates, and oxygenate degradates
- Herbicides and herbicide degradates
- Insecticides and insecticide degradates
- Manufacturing additives
- Organic synthesis compounds
- Pavement- and combustion-derived compounds
- Personal-care and domestic-use products
- Plant- or animal-derived biochemicals
- Refrigerants and propellants
- Solvents

Additional information about the primary use or source groups and a list of the compounds analyzed in water samples are available in Carter and others (2007).

Reference

Carter, J.M., Delzer, G.C., Kingsbury, J.A., and Hopple, J.A., 2007, Concentration data for anthropogenic organic compounds in ground water, surface water, and finished water of selected community water systems in the United States, 2002–05: U.S. Geological Survey Data Series 268, accessed July 30, 2007, at *http://pubs.usgs.gov/ds/2007/268/*.

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Information regarding the National Water-Quality Assessment Program is available at *http://water.usgs.gov/nawqa/*.

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