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National Water-Quality Assessment Program
Source Water-Quality Assessment

Percent Recoveries of Anthropogenic Organic Compounds With and Without the Addition of Ascorbic Acid to Preserve Finished-Water Samples Containing Free Chlorine, 2004–10

Open-File Report 2011–1295

U.S. Department of the Interior
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KEN SALAZAR, Secretary

U.S. Geological Survey
Marcia K. McNutt, Director

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Foreword

The U.S. Geological Survey (USGS) is committed to providing the Nation with reliable scientific information that helps to enhance and protect the overall quality of life and that facilitates effective management of water, biological, energy, and mineral resources (http://www.usgs.gov/). Information on the Nation's water resources is critical to ensuring long-term availability of water that is safe for drinking and recreation and is suitable for industry, irrigation, and fish and wildlife. Population growth and increasing demands for water make the availability of that water, measured in terms of quantity and quality, even more essential to the long-term sustainability of our communities and ecosystems.

The USGS implemented the National Water-Quality Assessment (NAWQA) Program in 1991 to support national, regional, State, and local information needs and decisions related to water-quality management and policy (http://water.usgs.gov/nawqa). The NAWQA Program is designed to answer: What is the quality of our Nation's streams and groundwater? How are conditions changing over time? How do natural features and human activities affect the quality of streams and groundwater, and where are those effects most pronounced? By combining information on water chemistry, physical characteristics, stream habitat, and aquatic life, the NAWQA Program aims to provide science-based insights for current and emerging water issues and priorities. From 1991 to 2001, the NAWQA Program completed interdisciplinary assessments and established a baseline understanding of water-quality conditions in 51 of the Nation's river basins and aquifers, referred to as Study Units (http://water.usgs.gov/nawqa/studies/study_units.html).

National and regional assessments are ongoing in the second decade (2001–2012) of the NAWQA Program as 42 of the 51 Study Units are selectively reassessed. These assessments extend the findings in the Study Units by determining water-quality status and trends at sites that have been consistently monitored for more than a decade, and filling critical gaps in characterizing the quality of surface water and groundwater. For example, increased emphasis has been placed on assessing the quality of source water and finished water associated with many of the Nation's largest community water systems. During the second decade, NAWQA is addressing five national priority topics that build an understanding of how natural features and human activities affect water quality, and establish links between sources of contaminants, the transport of those contaminants through the hydrologic system, and the potential effects of contaminants on humans and aquatic ecosystems. Included are studies on the fate of agricultural chemicals, effects of urbanization on stream ecosystems, bioaccumulation of mercury in stream ecosystems, effects of nutrient enrichment on aquatic ecosystems, and transport of contaminants to public-supply wells. In addition, national syntheses of information on pesticides, volatile organic compounds (VOCs), nutrients, trace elements, and aquatic ecology are continuing.

The USGS aims to disseminate credible, timely, and relevant science information to address practical and effective water-resource management and strategies that protect and restore water quality. We hope this NAWQA publication will provide you with insights and information to meet your needs, and will foster increased citizen awareness and involvement in the protection and restoration of our Nation's waters.

The USGS recognizes that a national assessment by a single program cannot address all water-resource issues of interest. External coordination at all levels is critical for cost-effective management, regulation, and conservation of our Nation's water resources. The NAWQA Program, therefore, depends on advice and information from other agencies—Federal, State, regional, interstate, Tribal, and local—as well as nongovernmental organizations, industry, academia, and other stakeholder groups. Your assistance and suggestions are greatly appreciated.

William H. Werkheiser
USGS Associate Director for Water

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Conversion Factors

SI to Inch/Pound

Multiply	By	To obtain
	Volume	
liter (L)	33.82	ounce, fluid (fl. oz)
liter (L)	2.113	pint (pt)
liter (L)	1.057	quart (qt)
liter (L)	0.2642	gallon (gal)
liter (L)	61.02	cubic inch (in^3)

Horizontal coordinate information is referenced to the North American Datum of 1983 (NAD 83).

Concentrations of chemical constituents in water are given either in milligrams per liter (mg/L) or micrograms per liter (µg/L).

Study Unit Abbreviations and Acronyms

ACAD	Acadian-Pontchartrain Drainages
ACFB	Apalachicola-Chattahoochee-Flint River Basins
ALBE	Albemarle-Pamlico Drainage Basins
CAZB	Central Arizona Basins
CCYK	Central Columbia Plateau/Yakima River Basin
CNBR	Central Nebraska Basins
CONN	Connecticut, Housatonic, and Thames River Basins
DELR	Delaware River Basin
EIWA	Eastern Iowa Basins
GAFL	Georgia-Florida Coastal Plain
GRSL	Great Salt Lake Basins
HDSN	Hudson River Basin
HPGW	High Plains Regional Groundwater Study
LERI	Lake Erie-Lake St. Clair Drainages
LINJ	Long Island-New Jersey Coastal Drainages
LIRB	Lower Illinois River Basin
LTEN	Lower Tennessee River Basin
MISE	Mississippi Embayment
MOBL	Mobile River Basin
NECB	New England Coastal Basins
NVBR	Nevada Basin and Range
OZRK	Ozark Plateaus
PODL	Potomac River Basin and Delmarva Peninsula
PUGT	Puget Sound Basin
RIOG	Rio Grande Valley
SACR	Sacramento River Basin
SANA	Santa Ana Basin
SANJ	San Joaquin-Tulare Basins
SANT	Santee River Basin and Coastal Drainages
SCTX	South-Central Texas
SOFL	Southern Florida Drainages
SPLT	South Platte River Basin
TRIN	Trinity River Basin
UCOL	Upper Colorado River Basin
UIRB	Upper Illinois River Basin
UMIS	Upper Mississippi River Basin
USNK	Upper Snake River Basin
UTEN	Upper Tennessee River Basin
WHMI	White and Great and Little Miami River Basins
WILL	Willamette Basin
WMIC	Western Lake Michigan Drainages
YELL	Yellowstone River Basin

AOC	anthropogenic organic compound
CASRN	Chemical Abstracts Service Registry number
GC/MS	gas chromatography-mass spectrometry
NAWQA	National Water-Quality Assessment
NWQL	National Water Quality Laboratory
SWQA	Source Water-Quality Assessment
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
VOC	volatile organic compound

Definitions

Term	Definition
Analyte	The substance being qualified and quantified in the analysis.
Field matrix-spike sample	A sample spiked (fortified) in the field with a known concentration of selected compounds. Used to assess the degradation of compounds in a sample.
Finished water	The water that is treated and ready to be delivered to consumers. Finished water is collected before the water enters the distribution system.
Nonquenched finished-water matrix-spike sample	A finished-water sample of groundwater or surface water that is spiked (fortified) in the field or laboratory (depending on the analytical schedule) with a known concentration of selected compounds and to which a dechlorination reagent has not been added.
Percent recovery	The result of a measured concentration in a water sample that, when compared to the theoretical concentration, is expressed as a percentage of its theoretical concentration.
Quenched finished-water matrix-spike sample	A finished-water sample of groundwater or surface water that is spiked (fortified) in the field or laboratory (depending on the analytical schedule) with a known concentration of selected compounds and to which a dechlorination reagent, in this report ascorbic acid, has been added.
Source water	The raw (ambient) water collected at the supply well prior to water treatment (for groundwater) or the raw (ambient) water collected from the river near the intake (for surface water).
Theoretical concentration	A calculated concentration based on the known mass of chemical constituents that are added to a known volume of water.

Percent Recoveries of Anthropogenic Organic Compounds With and Without the Addition of Ascorbic Acid to Preserve Finished-Water Samples Containing Free Chlorine, 2004–10

By Joshua F. Valder, Gregory C. Delzer, David A. Bender, and Curtis V. Price

Abstract

This report presents finished-water matrix-spike recoveries of 270 anthropogenic organic compounds with and without the addition of ascorbic acid to preserve water samples containing free chlorine. Percent recoveries were calculated using analytical results from a study conducted during 2004–10 for the National Water-Quality Assessment (NAWQA) Program of the U.S. Geological Survey (USGS). The study was intended to characterize the effect of quenching on finished-water matrix-spike recoveries and to better understand the potential oxidation and transformation of 270 anthropogenic organic compounds. The anthropogenic organic compounds studied include those on analytical schedules 1433, 2003, 2033, 2060, 2020, and 4024 of the USGS National Water Quality Laboratory. Three types of samples were collected from 34 NAWQA locations across the Nation: (1) quenched finished-water samples (not spiked), (2) quenched finished-water matrix-spike samples, and (3) nonquenched finished-water matrix-spike samples. Percent recoveries of anthropogenic organic compounds in quenched and nonquenched finished-water matrix-spike samples are presented. Comparisons of percent recoveries between quenched and nonquenched spiked samples can be used to show how quenching affects finished-water samples. A maximum of 18 surface-water and 34 groundwater quenched finished-water matrix-spike samples paired with nonquenched finished-water matrix-spike samples were analyzed. Percent recoveries for the study are presented in two ways: (1) finished-water matrix-spike samples supplied by surface-water or groundwater, and (2) by use (or source) group category for surface-water and groundwater supplies. Graphical representations of percent recoveries for the quenched and nonquenched finished-water matrix-spike samples also are presented.

Introduction

The chlorination of drinking water serves to destroy or deactivate disease-producing microorganisms. Robert Koch, in 1881, was the first to illustrate through laboratory techniques that the addition of chlorine to waters will arrest microbiological activity (Crittenden and others, 2005). In 1902, the first drinking-water supply was chlorinated, and by 1941, about 85 percent of the water supplies in the United States were treated by chlorine disinfection.

Many organic compounds, such as the organophosphate pesticides, are unstable and degrade in the presence of free chlorine (Winslow and others, 2001). For example, diazinion, an organophosphate insecticide, has been shown to degrade in the presence of free chlorine (Aizawa and others, 1994). In addition, fipronil, a pesticide commonly used as an insecticide (Budavari, 1996), also has been shown to degrade or transform in waters containing free chlorine.

Most U.S. Environmental Protection Agency (USEPA) methods for determination of organic compounds in drinking water include the optional use of a dechlorination reagent (U.S. Environmental Protection Agency, 2006). Most analytical methods used by the U.S. Geological Survey (USGS) National Water Quality Laboratory (NWQL) do not use dechlorination reagents because most water samples collected for USGS studies are untreated source water and do not contain free chlorine. However, samples collected as part of the USGS National Water-Quality Assessment (NAWQA) Program's Source Water-Quality Assessment (SWQA) component, which monitors source (untreated) water and finished (treated) water of selected community water systems, include finished-water samples containing free chlorine. In addition, other studies conducted by the USGS also may include samples of wastewater effluent or samples downstream from wastewater effluent discharges, both of which likely contain free chlorine.

The USEPA has published results of a dechlorination procedure for method 526 (Winslow and others, 2001) that uses ascorbic acid and a pH 7 buffer of tris-(hydroxymethyl) amino methane or tris hydrochloride in an effort to preserve chemicals that are known to degrade or potentially could degrade in the presence of free chlorine. The addition of ascorbic acid reduces the free and combined chlorine by oxidizing the ascorbic acid to form dehydroascorbic acid (Winslow and others, 2001). Because free chlorine is known to cause degradation of some compounds monitored by SWQAs, a need existed to dechlorinate (preserve) finished-water samples in order to accurately represent analyte concentrations at the location and time that the sample was collected (finished water prior to distribution).

The study design and percent recovery results of a laboratory study that focused on anthropogenic organic compounds (AOCs) with and without the addition of ascorbic acid to preserve water samples containing free chlorine, along with some initial paired finished-water matrix-spike samples, were published by Valder and others (2008). This report updates the paired finished-water matrix-spike percent recovery results from Valder and others (2008). The paired finished-water matrix-spike study, which began in 2004 and ended in 2010, was conducted for the NAWQA Program and was designed to characterize the effect of quenching on finished-water matrix-spike recoveries and to better understand the potential oxidation and transformation of 270 AOCs.

Purpose and Scope

The primary purpose of this report is to present updated percent recoveries of 270 AOCs in finished-water samples collected during 2004–10 and preserved with (quenched) and without (nonquenched) the addition of ascorbic acid. The study consisted of quenched finished-water matrix-spike samples paired with nonquenched finished-water matrix-spike samples. The maximum numbers of quenched finished-water matrix-spike samples that were paired with nonquenched finished-water matrix-spike samples were 18 and 34 for finished water derived from surface-water and groundwater supplies, respectively. These paired data can be used to characterize the effect of quenching on finished-water matrix-spike recoveries and also to gain additional insight on oxidation and transformation of each of the compounds analyzed. A secondary purpose of this report is to present updated recoveries of AOCs in unpaired finished-water matrix-spike samples.

This report updates the field study results presented by Valder and others (2008). This updated version of the study does not address any additional updates or modifications to the laboratory results presented by Valder and others (2008). Information regarding the laboratory study design and percent recoveries of AOCs with and without the addition of ascorbic acid to preserve water samples containing free chlorine is presented by Valder and others (2008).

Acknowledgments

Many people have assisted with the development, design, and testing associated with this study. In particular, the authors gratefully appreciate the help of NWQL and NAWQA Program personnel for the analyses and collection and processing of samples. In addition, Duane Wydoski and Cassandra Brenner (USGS) are acknowledged for their assistance in data verification, documentation, and retrieval. Janet Carter and Jessica Hopple (USGS) are acknowledged for their review of this document.

Study Methods

Common field and analytical procedures were used in processing field matrix-spike samples and determining concentrations of AOCs used to calculate percent recoveries. Six separate analytical schedules were used by the NWQL to quantify AOC concentrations (schedules 1433, 2003, 2020, 2033, 2060, and 4024). The study was designed to characterize the effect of quenching on field matrix-spike recoveries and to better understand the potential oxidation and transformation of AOCs. Although a total of 276 AOCs were analyzed (Carter and others, 2010), recoveries of 8 of these compounds are not reported herein due to known or suspected contamination issues: benzophenone, bisphenol A, chlorothalonil, deethyl-deisopropyl-atrazine, isophorone, para-nonylphenol total (mixture of isomers), 3-ketocarbofuran, and pentachlorophenol. Additionally, recoveries of two compounds not reported by Valder and others (2008) are included herein: 2,4-D methyl ester and fonofos oxygen analog (table 1–1 in appendix 1).

Finished-water matrix-spike samples were collected at 34 locations across the United States (fig. 1). Finished-water samples derived from surface-water and groundwater supplies were spiked at 15 and 19 locations, respectively (table 1, fig. 1). The spiked samples were intended to be processed in duplicate, wherein one sample would be quenched and the other would not be quenched. However, in some cases, some finished-water matrix-spike samples that were processed were quenched but not paired with a nonquenched sample, and similarly, some finished-water matrix-spike samples that were processed were nonquenched but not paired with a quenched sample (table 1–2 in appendix 1). The maximum numbers of paired samples (quenched finished-water matrix-spike samples paired with nonquenched finished-water matrix-spike samples) were 18 and 34 for finished water supplied by surface water and groundwater, respectively.

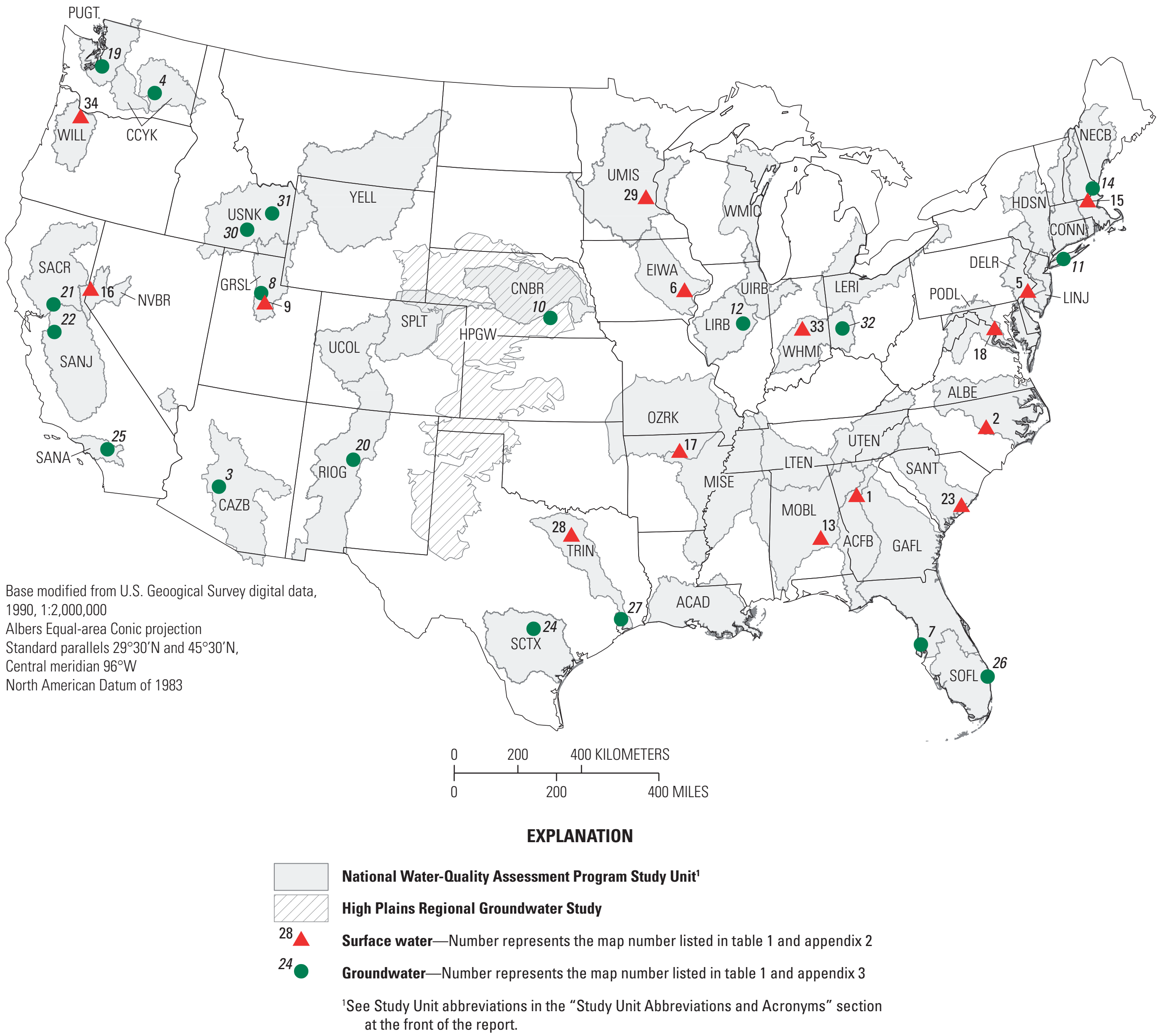

Figure 1. General location where finished-water matrix-spike samples were processed during 2004–10.

Table 1. Summary of locations and source of supply for finished-water matrix-spike samples processed during 2004–10.

Map number (shown on figure 1)	Source of finished water	State	Source Water-Quality Assessment study (NAWQA Study Unit identifier)	Principal aquifer system or river used as source of supply for spiked finished-water samples
1	Surface water	Georgia	Apalachicola-Chattahoochee-Flint River Basins (ACFB)	Chattahoochee River, Georgia.
2	Surface water	North Carolina	Albemarle-Pamlico Drainage Basins (ALBE)	Neuse River, North Carolina.
3	Groundwater	Arizona	Central Arizona Basins (CAZB)	Basin and Range basin-fill aquifers.
4	Groundwater	Washington	Central Columbia Plateau/Yakima River Basin (CCYK)	Columbia Plateau basin-fill and basaltic-rock aquifers.
5	Surface water	Pennsylvania	Delaware River Basin (DELR)	Schuylkill River, Pennsylvania.
6	Surface water	Iowa	Eastern Iowa Basins (EIWA)	Iowa River, Iowa.
7	Groundwater	Florida	Georgia-Florida Coastal Plain (GAFL)	Floridan aquifer system.
8	Groundwater	Utah	Great Salt Lake Basins (GRSL)	Basin and Range basin-fill aquifers.
9	Surface water	Utah	Great Salt Lake Basins (GRSL)	Provo River, Utah.
10	Groundwater	Nebraska	High Plains Regional Groundwater Study (HPGW)	High Plains aquifer.
11	Groundwater	New York	Long Island-New Jersey Coastal Drainages (LINJ)	Northern Atlantic Coastal Plain aquifer system.
12	Groundwater	Illinois	Lower Illinois River Basin (LIRB)	Sand and gravel aquifers (glaciated regions).
13	Surface water	Alabama	Mobile River Basin (MOBL)	Tallapoosa River, Alabama.
14	Groundwater	New Hampshire	New England Coastal Basins (NECB)	New England crystalline-rock aquifers.
15	Surface water	Massachusetts	New England Coastal Basins (NECB)	Merrimack River, Massachusetts.
16	Surface water	Nevada	Nevada Basin and Range (NVBR)	Truckee River, Nevada.
17	Surface water	Arkansas	Ozark Plateaus (OZRK)	White River, Arkansas.
18	Surface water	Maryland	Potomac River Basin and Delmarva Peninsula (PODL)	Potomac River, Maryland.
19	Groundwater	Washington	Puget Sound Basin (PUGT)	Puget Sound aquifer system.
20	Groundwater	New Mexico	Rio Grande Valley (RIOG)	Rio Grande aquifer system.
21	Groundwater	California	Sacramento River Basin (SACR)	Central Valley aquifer system.
22	Groundwater	California	San Joaquin-Tulare Basins (SANJ)	Central Valley aquifer system.
23	Surface water	South Carolina	Santee River Basin and Coastal Drainages (SANT)	Back River, South Carolina.
24	Groundwater	Texas	South-Central Texas (SCTX)	Edwards-Trinity aquifer system.
25	Groundwater	California	Santa Ana Basin (SANA)	California Coastal Basin aquifers.
26	Groundwater	Florida	Southern Florida Drainages (SOFL)	Surficial aquifer system / Biscayne aquifer.
27	Groundwater	Texas	Trinity River Basin (TRIN)	Coastal Lowlands aquifer system.
28	Surface water	Texas	Trinity River Basin (TRIN)	Elm Fork Trinity River, Texas.
29	Surface water	Minnesota	Upper Mississippi River Basin (UMIS)	Mississippi River, Minnesota.
30	Groundwater	Idaho	Upper Snake River Basin (USNK)	Snake River Plain basin-fill and basaltic-rock aquifers.
31	Groundwater	Idaho	Upper Snake River Basin (USNK)	Snake River Plain basin-fill and basaltic-rock aquifers.
32	Groundwater	Ohio	White and Great and Little Miami River Basins (WHMI)	Glacial deposits aquifer system.
33	Surface water	Indiana	White and Great and Little Miami River Basins (WHMI)	White River, Indiana.
34	Surface water	Oregon	Willamette Basin (WILL)	Clackamas River, Oregon.

Field and Analytical Procedures

Three types of finished-water samples were collected at Study Unit sites. All three sample types were to be collected after all treatment processes were completed and prior to distribution of finished water. The first sample was to be a quenched finished-water sample (not spiked) used only to characterize the quality of finished water prior to distribution, and for percent recovery calculations. The second sample collected was a quenched finished-water matrix-spike sample, and the third was a nonquenched finished-water matrix-spike sample. The samples for the study were collected by multiple field crews using established USGS protocols (U.S. Geological Survey, variously dated) and analyzed at the NWQL. All samples were spiked at the NWQL with the exception of the pesticide samples (schedules 2003, 2033, and 2060), which were spiked in the field. Samples were spiked using certified spike solutions with known concentrations of the target analytes and spiked with a specific spike solution volume to achieve specific theoretical concentrations of analytes in the spike samples. The percent recoveries for quenched finished-water matrix-spike samples and nonquenched finished-water matrix-spike samples are presented in this report.

Analytical schedules include two volatile organic compound (VOC) schedules (2020 and 4024), three pesticide schedules (2060 and either 2003 or 2033), and one schedule (1433) for compounds associated with wastewater effluent. A detailed list of the compounds analyzed during the study is included in table 1–1 in appendix 1. As shown in table 1–1, some AOCs were analyzed using more than one schedule. During the study, NWQL schedule 2003 was replaced by analytical schedule 2033, which contains the same compounds as on schedule 2003 plus 19 additional pesticides. Specific information for each schedule is described by Zaugg and others (1995), Lindley and others (1996), Sandstrom and others (2001), and Madsen and others (2003) for schedules 2003 and 2033; Connor and others (1998) for schedule 2020; Furlong and others (2001) for schedule 2060; Zaugg and others (2002) for schedule 1433; and Rose and Sandstrom (2003) for schedule 4024. These methods include analytical techniques using gas chromatography-mass spectrometry (GC/MS) and high-performance liquid chromatography-mass spectrometry.

Samples collected for VOC analysis using schedules 2020 and 4024 were unfiltered and chilled upon collection. Samples collected for schedule 2020 analysis also were preserved using 1:1 hydrochloric acid to achieve a pH less than 2. Samples for analysis of pesticides and other semivolatile compounds as part of schedules 2003/2033, 2060, and 1433 were filtered in the field through a 0.7-micron baked-glass fiber filter and chilled. These samples were extracted at the NWQL on solid-phase extraction cartridges to concentrate the analytes from the filtered samples. Solid-phase extraction cartridges were then eluted with a solvent, and the extracts were analyzed by GC/MS (Zaugg and others, 1995, 2002; Lindley and others, 1996; Furlong and others, 2001; Sandstrom and others, 2001; Madsen and others, 2003).

Determination of Percent Recovery

Data are presented as a percentage of mass recovered (percent recovery) based on unspiked finished-water concentration data and finished-water matrix-spike concentration data. In order to calculate a percent recovery, a quenched finished-water environmental sample must be paired with either a quenched or nonquenched finished-water matrix-spike sample. In all cases, the finished-water environmental sample was assumed to be quenched. In most cases, ascertaining the finished-water matrix-spike sample type was readily available. If the finished-water matrix-spike sample type was not readily determined to be quenched or nonquenched, an exhaustive review of the data and supporting documentation was conducted including, in part, contacting the NWQL, reviewing Analytical Services Request forms, reviewing the National Water Information System message to the laboratory (NWIS M2LAB) data code (U.S. Geological Survey, 2011), review of previously published data included in Valder and others (2008) to identify those compounds that almost always degrade in the presence of free chlorine, and identifying compounds that almost always are formed in the presence of free chlorine (trihalomethanes), and regression analysis. Percent recoveries were not calculated for samples that could not be characterized as being quenched or nonquenched.

Percent recoveries were calculated using the analytical results of the AOCs. For samples, if the remark code of a compound was a “less than” (<), the compound was considered not detected in the sample, and the reported concentration was censored to 0. If a compound was detected at a concentration less than the lowest calibration standard, the concentration was estimated (Connor and others, 1998) and used “as is,” similar to the concentrations that were not “less thans” or estimated (Childress and others, 1999).

Percent recovery was calculated by using the following equations:

$$Percent\ recovery = \frac{(C_{spiked} - C_{sample})100}{C_{theoretical}} \quad (1)$$

and

$$C_{theoretical} = \frac{(C_{solution} \times V_{amount})}{V_{sample}} \quad (2)$$

where

C_{spiked} = the measured concentration in the spiked sample, in micrograms per liter;
C_{sample} = the measured concentration in the unspiked sample, in micrograms per liter;
$C_{theoretical}$ = the theoretical concentration of the sample, in micrograms per liter;
$C_{solution}$ = the concentration of the spiked solution, in micrograms per milliliter;
V_{amount} = the amount of spike added, in milliliters; and
V_{sample} = the spiked sample volume, in liters.

In cases where sample volumes, sample concentrations, spike volumes, or theoretical spike concentrations were not available, the NWQL was contacted and the relevant information was supplied.

Percent Recovery of Finished-Water Matrix-Spike Samples

The study was designed to characterize the effect of quenching on finished-water matrix-spike recoveries and to better understand the potential oxidation and transformation of 270 AOCs (table 1–1 in appendix 1). The percent recoveries were calculated for analytical data from each of the 34 Study Unit locations and separated into two categories: finished water derived from surface-water supplies and finished water derived from groundwater supplies. Graphical plots relate the median percent recoveries for all quenched finished-water matrix-spike samples to all nonquenched finished-water matrix-spike samples as shown in figures 2 and 3 for surface-water supplies and groundwater supplies, respectively.

The AOCs reported for SWQA studies were categorized into the following 14 compound groups on the basis of their primary use or source (table 2): (1) defoliant; (2) disinfection by-products; (3) fumigant-related compounds; (4) fungicides and fungicide degradates; (5) gasoline hydrocarbons, oxygenates, and oxygenate degradates; (6) herbicides and herbicide degradates; (7) insecticides and insecticide degradates; (8) manufacturing additives; (9) organic synthesis compounds; (10) pavement- and combustion-derived compounds; (11) personal-care and domestic-use products; (12) plant- or

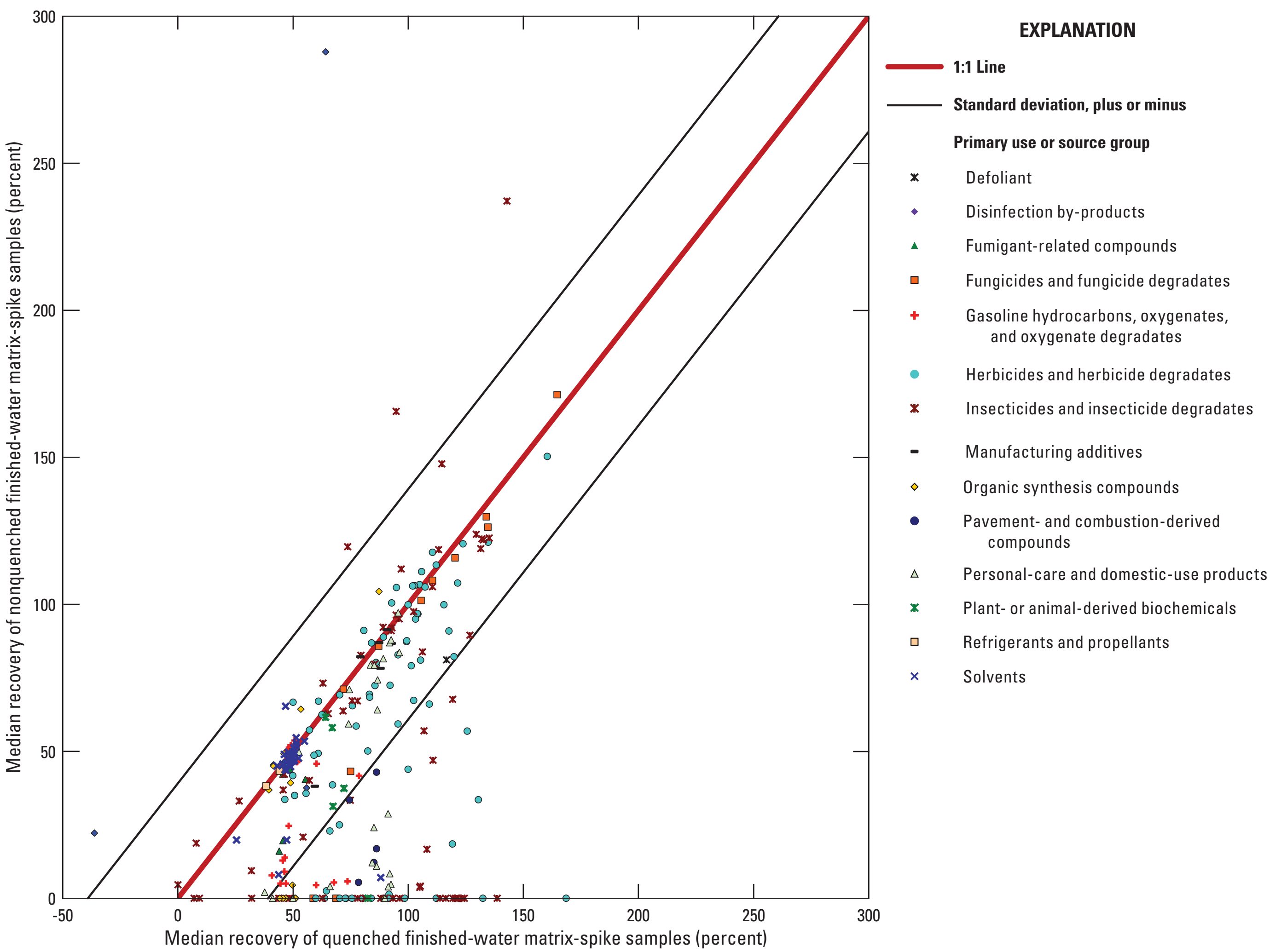

Figure 2. Relation between median percent recoveries of individual anthropogenic organic compounds for nonquenched finished-water matrix-spike samples and quenched finished-water matrix-spike samples for surface-water supplies, 2004–10.

animal-derived biochemicals; (13) refrigerants and propellants; and (14) solvents.

Percent recovery data for the compounds monitored during 2004–10 in paired and unpaired matrix-spike samples are presented in appendix 2 for the surface-water supplies and in appendix 3 for the groundwater supplies. The percent recoveries are presented in two formats: (1) a Microsoft Excel spreadsheet and (2) a tab-delimitated text file. The percent recoveries are presented for the quenched finished-water matrix-spike samples and the nonquenched finished-water matrix-spike samples separated by primary use or source groups as defined previously. The percent recoveries for AOCs in each of the 14 use groups are presented in a single worksheet within Excel and as a single tab-delimitated text file.

Data in appendixes 2 and 3 are presented in a similar order. First, the finished-water sample type indicates whether the sample is a quenched finished-water matrix-spike sample (blue text) or a nonquenched finished-water matrix-spike sample (green text), followed by the map number (fig. 1) and the Study Unit identifier (table 1). The percent recoveries in appendixes 2 and 3 are shown as rounded values to the nearest hundredth. The recoveries are presented as derived from calculations based on concentration data received from the NWQL.

Percent recoveries for all matrix-spike samples from each of the surface-water and groundwater sites are graphically represented for individual compounds by use group in appendixes 4 and 5, respectively. The median percent recoveries for the quenched finished-water matrix-spike samples and the nonquenched finished-water matrix-spike samples also are included in each plot in appendixes 4 and 5.

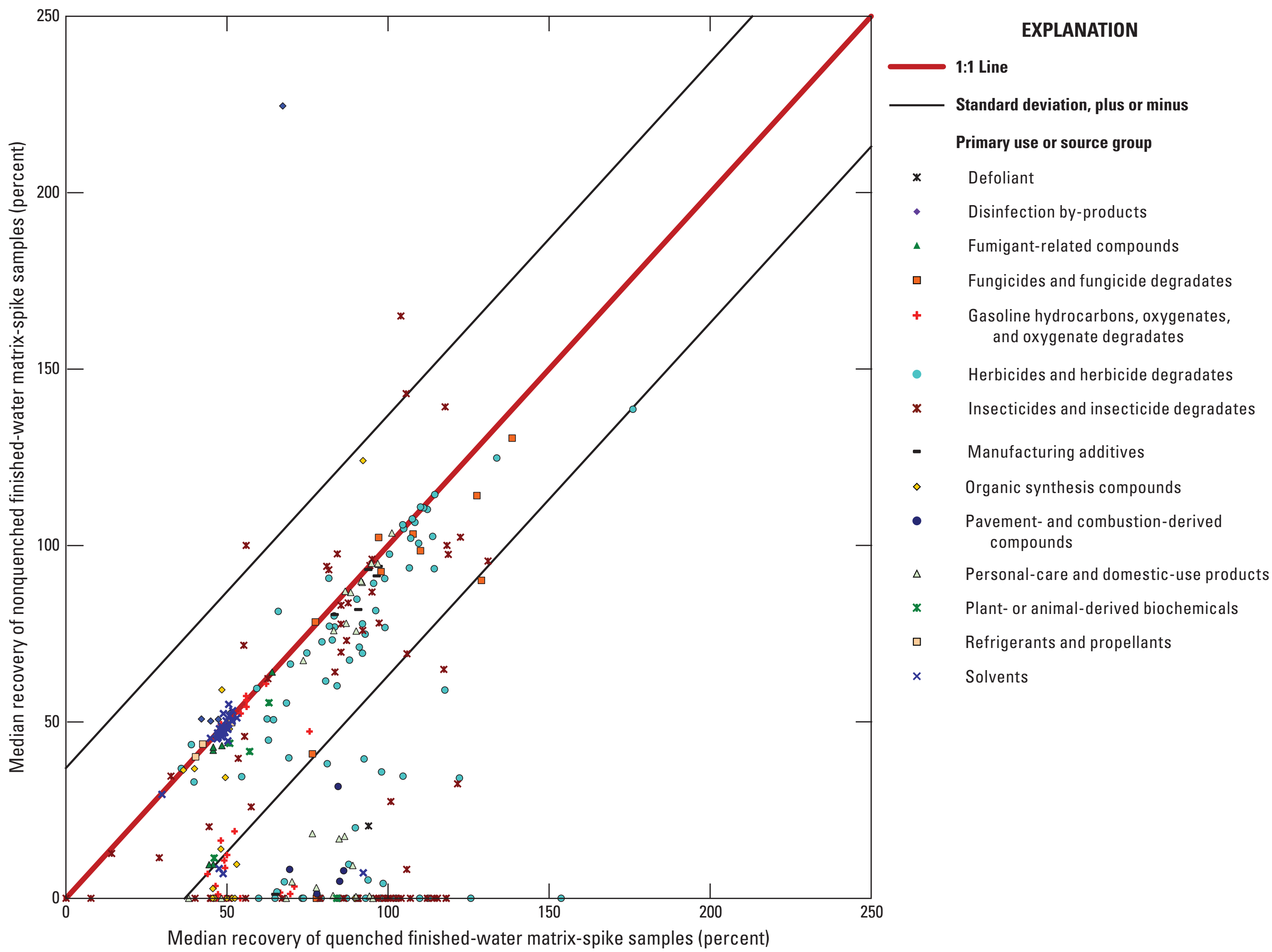

Figure 3. Relation between median percent recoveries of individual anthropogenic organic compounds for nonquenched finished-water matrix-spike samples and quenched finished-water matrix-spike samples for groundwater supplies, 2004–10.

Table 2. Primary use or source groups for compounds analyzed for groundwater and surface-water Source Water-Quality Assessment studies.

Primary use or source group	Description	Number of compounds in group for samples analyzed
Defoliant	A chemical designed to remove the foliage (leaves) of plants.	1
Disinfection by-products	Trihalomethanes, (poly)haloacetic acids and other compounds that are produced from the transformation of organic compounds during the disinfection of water and waste water through chlorination, ozonation, or other chemical methods.	4
Fumigant-related compounds	Chemicals that may be present in commercial fumigant products, which produce a gas, vapor, fumes, or smoke intended to destroy, repel, or control unwanted organisms such as insects, bacteria, or rodents. These include fumigant active ingredients, as well as their degradates and their manufacturing by-products.	9
Fungicides and fungicide degradates	Pesticides that are used to kill unwanted fungi.	9
Gasoline hydrocarbons, oxygenates, and oxygenate degradates	Gasoline hydrocarbons are straight, branched, and (or) cyclic organic compounds that are highly volatile, contain only carbon and hydrogen atoms, and are common ingredients in gasoline and other petroleum products. Among these compounds, BTEX compounds are among those present in the greatest proportions in gasoline. Oxygenates such as *tert*-butyl methyl ether (MTBE) are compounds that contain only carbon, hydrogen, and oxygen atoms and are commonly added to gasoline to improve the efficiency of combustion. Oxygenate degradates are formed during the production, storage, release, or use of gasoline oxygenates or following their release into the environment.	27
Herbicides and herbicide degradates	Pesticides designed to kill unwanted plants (herbicides) and compounds produced from the transformation of the parent herbicide following application (degradates).	69
Insecticides and insecticide degradates	Pesticides designed to kill unwanted insects (insecticides) and compounds produced from the transformation of the parent insecticide following application (degradates).	58
Manufacturing additives	Compounds used in commercial formulations of chemical products in order to improve the effectiveness of the product, including plasticizers (to increase the flexibility of plastics), fire retardants, corrosion inhibitors, and pesticide adjuvants.	6
Organic synthesis compounds	Chemicals that are used as precursors in the manufacture of other organic compounds. Chloroethylene (vinyl chloride), for example, is an organic synthesis compound used to produce polyvinyl chloride (PVC) plastics.	18
Pavement- and combustion-derived compounds	Organic substances, such as polynuclear aromatic hydrocarbons (PAHs), that are derived from either (1) the materials used to construct and seal parking lots and other paved surfaces, or (2) the combustion of other non-halogenated organic compounds, most commonly gasoline, oil, coal, and other fossil fuels.	5
Personal-care and domestic-use products	Compounds that are present in commercial products sold for personal or residential use, such as fragrances, pharmaceuticals, insect repellants, dyes, detergents, disinfectants, shampoos, and chemicals used in fire extinguishers.	24
Plant- or animal-derived biochemicals	Naturally occurring compounds that are produced by plants or animals, either through direct biosynthesis or through the metabolic alteration of compounds ingested or taken up from other sources. These compounds are predominantly unsaturated solid alcohols of the steroid group naturally occurring in fatty tissues of plants and animals and present in animal fecal material.	5
Refrigerants and propellants	Volatile compounds that are used for commercial or domestic refrigeration, as blowing agents in the manufacture of packaging and other highly porous materials, or for dispensing other substances from spray cans and other aerosol delivery devices.	3
Solvents	Compounds that are used to dissolve other substances. Two of the more common solvents are trichloroethene (TCE) and perchloroethene (PCE).	32
	Total number of compounds	**270**

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Appendixes

Appendix 1. Supplemental Data Tables

Table 1–1. Compounds analyzed, Chemical Abstracts Service Registry number (CASRN), drinking-water benchmark, primary use or source group, and analytical schedule used to analyze each compound.

[HBSL, Health-Based Screening Level; MCL, Maximum Contaminant Level; NA, not available; X, compound included on analytical schedule; --, compound not included on analytical schedule; —, no information is available]

Compound	CASRN[1]	Drinking-water benchmark	Primary use or source	Analytical schedule(s) used to analyze compound					
				2020	4024	2003	2033	2060	1433
1,1,1,2-Tetrachloro-ethane	630–20–6	HBSL	Solvent	X	--	--	--	--	--
1,1,1-Trichloroethane	71–55–6	MCL	Solvent	X	--	--	--	--	--
1,1,2,2-Tetrachloro-ethane	79–34–5	HBSL	Solvent	X	--	--	--	--	--
1,1,2-Trichloroethane	79–00–5	MCL	Solvent	X	--	--	--	--	--
1,1,2-Trichlorotrifluo-roethane	76–13–1	HBSL	Refrigerant and propellant	X	--	--	--	--	--
1,1-Dichloroethane	75–34–3	NA	Solvent	X	--	--	--	--	--
1,1-Dichloroethylene	75–35–4	MCL	Solvent	X	--	--	--	--	--
1,1-Dichloropropene	563–58–6	NA	Organic synthesis compound	X	--	--	--	--	--
1,2,3,4-Tetramethyl-benzene	488–23–3	NA	Gasoline hydrocarbon, oxygenate, and oxygenate degradate	X	--	--	--	--	--
1,2,3,5-Tetramethyl-benzene	527–53–7	NA	Gasoline hydrocarbon, oxygenate, and oxygenate degradate	X	--	--	--	--	--
1,2,3-Trichlorobenzene	87–61–6	NA	Organic synthesis compound	X	--	--	--	--	--
1,2,3-Trichloropropane	96–18–4	HBSL	Organic synthesis compound	X	--	--	--	--	--
1,2,3-Trimethylben-zene	526–73–8	NA	Gasoline hydrocarbon, oxygenate, and oxygenate degradate	X	--	--	--	--	--
1,2,4-Trichlorobenzene	120–82–1	MCL	Solvent	X	--	--	--	--	--
1,2,4-Trimethylben-zene	95–63–6	NA	Gasoline hydrocarbon, oxygenate, and oxygenate degradate	X	--	--	--	--	--
1,2-Dibromo-3-chloro-propane	96–12–8	MCL	Fumigant-related compound	X	--	--	--	--	--
1,2-Dibromoethane	106–93–4	MCL	Fumigant-related compound	X	--	--	--	--	--
1,2-Dichlorobenzene	95–50–1	MCL	Solvent	X	--	--	--	--	--
1,2-Dichloroethane	107–06–2	MCL	Solvent	X	--	--	--	--	--
1,2-Dichloropropane	78–87–5	MCL	Fumigant-related compound	X	--	--	--	--	--
1,3,5-Trimethylben-zene	108–67–8	NA	Gasoline hydrocarbon, oxygenate, and oxygenate degradate	X	--	--	--	--	--
1,3-Dichlorobenzene	541–73–1	HBSL	Solvent	X	--	--	--	--	--
1,3-Dichloropropane	142–28–9	NA	Fumigant-related compound	X	--	--	--	--	--
1,4-Dichlorobenzene	106–46–7	MCL	Fumigant-related compound	X	--	--	--	--	X
1-Methylnaphthalene	90–12–0	NA	Gasoline hydrocarbon, oxygenate, and oxygenate degradate	--	--	--	--	--	X

Table 1–1. Compounds analyzed, Chemical Abstracts Service Registry number (CASRN), drinking-water benchmark, primary use or source group, and analytical schedule used to analyze each compound.—Continued

[HBSL, Health-Based Screening Level; MCL, Maximum Contaminant Level; NA, not available; X, compound included on analytical schedule; --, compound not included on analytical schedule; —, no information is available]

Compound	CASRN[1]	Drinking-water benchmark	Primary use or source	Analytical schedule(s) used to analyze compound					
				2020	4024	2003	2033	2060	1433
1-Naphthol	90–15–3	NA	Insecticide and insecticide degradate	--	--	X	X	--	--
2,2-Dichloropropane	594–20–7	NA	Fumigant-related compound	X	--	--	--	--	--
2,4-D	94–75–7	MCL	Herbicide and herbicide degradate	--	--	--	--	X	--
2,4-D methyl ester	1928–38–7	NA	Herbicide and herbicide degradate	--	--	--	--	X	--
2,4-D plus 2,4-D methyl ester	—	NA	Herbicide and herbicide degradate	--	--	--	--	X	--
2,4-DB	94–82–6	HBSL	Herbicide and herbicide degradate	--	--	--	--	X	--
2,6-Diethylaniline	579–66–8	NA	Herbicide and herbicide degradate	--	--	X	X	--	--
2,6-Dimethylnaphthalene	581–42–0	NA	Gasoline hydrocarbon, oxygenate, and oxygenate degradate	--	--	--	--	--	X
2-Butanone	78–93–3	HBSL	Solvent	X	--	--	--	--	--
2-Chloro-2,6-diethyl-acetanilide	6967–29–9	NA	Herbicide and herbicide degradate	--	--	X	X	--	--
2-Chloro-4-isopropyl-amino-6-amino-*s*-triazine (CIAT)	6190–65–4	NA	Herbicide and herbicide degradate	--	--	X	X	X	--
2-Chloro-6-ethyl-amino-4-amino-*s*-triazine (CEAT)	1007–28–9	NA	Herbicide and herbicide degradate	--	--	--	--	X	--
2-Chlorotoluene	95–49–8	HBSL	Solvent	X	--	--	--	--	--
2-Ethyl-6-methylaniline	24549–06–2	NA	Herbicide and herbicide degradate	--	--	X	X	--	--
2-Hexanone	591–78–6	NA	Solvent	X	--	--	--	--	--
2-Hydroxy-4-isopropylamino-6-ethyl-amino-*s*-triazine (OIET)	2163–68–0	HBSL	Herbicide and herbicide degradate	--	--	--	--	X	--
2-Methylnaphthalene	91–57–6	HBSL	Gasoline hydrocarbon, oxygenate, and oxygenate degradate	--	--	--	--	--	X
3(4-Chlorophenyl)-1-methyl urea	5352–88–5	NA	Herbicide and herbicide degradate	--	--	--	--	X	--
3,4-Dichloroaniline	95–76–1	NA	Herbicide and herbicide degradate	--	--	X	X	--	--
3,5-Dichloroaniline	626–43–7	NA	Fungicide	--	--	--	X	--	--

Table 1–1. Compounds analyzed, Chemical Abstracts Service Registry number (CASRN), drinking-water benchmark, primary use or source group, and analytical schedule used to analyze each compound.—Continued

[HBSL, Health-Based Screening Level; MCL, Maximum Contaminant Level; NA, not available; X, compound included on analytical schedule; --, compound not included on analytical schedule; —, no information is available]

Compound	CASRN[1]	Drinking-water benchmark	Primary use or source	Analytical schedule(s) used to analyze compound					
				2020	4024	2003	2033	2060	1433
3-*beta*-Coprostanol	360–68–9	NA	Plant- or animal-derived biochemical	--	--	--	--	--	X
3-Chloropropene	107–05–1	NA	Organic synthesis compound	X	--	--	--	--	--
3-Hydroxycarbofuran	16655–82–6	NA	Insecticide and insecticide degradate	--	--	--	--	X	--
3-Methyl-1(H)-indole (Skatole)	83–34–1	NA	Plant- or animal-derived biochemical	--	--	--	--	--	X
3-*tert*-Butyl-4-hydroxy anisole (BHA)	25013–16–5	NA	Personal-care and domestic-use product	--	--	--	--	--	X
4-Chloro-2-methyl-phenol	1570–64–5	NA	Herbicide and herbicide degradate	--	--	X	X	--	--
4-Chlorotoluene	106–43–4	HBSL	Solvent	X	--	--	--	--	--
4-Cumylphenol	599–64–4	NA	Personal-care and domestic-use product	--	--	--	--	--	X
4-Isopropyl-1-methyl-benzene	99–87–6	NA	Gasoline hydrocarbon, oxygenate, and oxygenate degradate	X	--	--	--	--	--
4-Methyl-2-pentanone	108–10–1	NA	Solvent	X	--	--	--	--	--
4-*n*-Octylphenol	1806–26–4	NA	Personal-care and domestic-use product	--	--	--	--	--	X
4-Nonylphenol diethoxylate (sum of all isomers) (NP2EO)	26027–38–2	NA	Personal-care and domestic-use product	--	--	--	--	--	X
4-*tert*-Octylphenol	140–66–9	NA	Personal-care and domestic-use product	--	--	--	--	--	X
4-*tert*-Octylphenol diethoxylate (OP2EO)	2315–61–9	NA	Personal-care and domestic-use product	--	--	--	--	--	X
4-*tert*-Octylphenol monoethoxylate (OP1EO)	2315–67–5	NA	Personal-care and domestic-use product	--	--	--	--	--	X
5-Methyl-1H-benzo-triazole	136–85–6	NA	Manufacturing additive	--	--	--	--	--	X
Acetochlor	34256–82–1	HBSL	Herbicide and herbicide degradate	--	--	X	X	--	--
Acetone	67–64–1	HBSL	Solvent	X	X	--	--	--	--
Acetophenone	98–86–2	HBSL	Personal-care and domestic-use product	--	--	--	--	--	X
Acetyl hexamethyl tetrahydronaphtha-lene (AHTN)	21145–77–7	NA	Personal-care and domestic-use product	--	--	--	--	--	X
Acifluorfen	50594–66–6	HBSL	Herbicide and herbicide degradate	--	--	--	--	X	--
Acrylonitrile	107–13–1	HBSL	Organic synthesis compound	X	--	--	--	--	--

Table 1–1. Compounds analyzed, Chemical Abstracts Service Registry number (CASRN), drinking-water benchmark, primary use or source group, and analytical schedule used to analyze each compound.—Continued

[HBSL, Health-Based Screening Level; MCL, Maximum Contaminant Level; NA, not available; X, compound included on analytical schedule; --, compound not included on analytical schedule; —, no information is available]

Compound	CASRN[1]	Drinking-water benchmark	Primary use or source	Analytical schedule(s) used to analyze compound					
				2020	4024	2003	2033	2060	1433
Alachlor	15972–60–8	MCL	Herbicide and herbicide degradate	--	--	X	X	--	--
Aldicarb	116–06–3	HBSL	Insecticide and insecticide degradate	--	--	--	--	X	--
Aldicarb sulfone	1646–88–4	HBSL	Insecticide and insecticide degradate	--	--	--	--	X	--
Aldicarb sulfoxide	1646–87–3	HBSL	Insecticide and insecticide degradate	--	--	--	--	X	--
alpha-Endosulfan	959–98–8	HBSL	Insecticide and insecticide degradate	--	--	--	X	--	--
Anthracene	120–12–7	HBSL	Pavement- and combustion-derived compound	--	--	--	--	--	X
Anthraquinone	84–65–1	NA	Organic synthesis compound	--	--	--	--	--	X
Atrazine	1912–24–9	MCL	Herbicide and herbicide degradate	--	--	X	X	X	--
Azinphos-methyl	86–50–0	HBSL	Insecticide and insecticide degradate	--	--	X	X	--	--
Azinphos-methyl-oxon	961–22–8	NA	Insecticide and insecticide degradate	--	--	X	X	--	--
Bendiocarb	22781–23–3	HBSL	Insecticide and insecticide degradate	--	--	--	--	X	--
Benfluralin	1861–40–1	HBSL	Herbicide and herbicide degradate	--	--	X	X	--	--
Benomyl	17804–35–2	HBSL	Fungicide	--	--	--	--	X	--
Bensulfuron-methyl	83055–99–6	HBSL	Herbicide and herbicide degradate	--	--	--	--	X	--
Bentazon	25057–89–0	HBSL	Herbicide and herbicide degradate	--	--	--	--	X	--
Benzene	71–43–2	MCL	Gasoline hydrocarbon, oxygenate, and oxygenate degradate	X	--	--	--	--	--
Benzo[*a*]pyrene	50–32–8	MCL	Pavement- and combustion-derived compound	--	--	--	--	--	X
beta-Sitosterol	83–46–5	NA	Plant- or animal-derived biochemical	--	--	--	--	--	X
beta-Stigmastanol	19466–47–8	NA	Plant- or animal-derived biochemical	--	--	--	--	--	X
Bromacil	314–40–9	HBSL	Herbicide and herbicide degradate	--	--	--	--	X	X
Bromobenzene	108–86–1	NA	Solvent	X	--	--	--	--	--
Bromochloromethane	74–97–5	HBSL	Personal-care and domestic-use product	X	--	--	--	--	--
Bromodichloromethane	75–27–4	MCL	Disinfection by-product	X	--	--	--	--	--
Bromoethene	593–60–2	NA	Organic synthesis compound	X	--	--	--	--	--

Table 1–1. Compounds analyzed, Chemical Abstracts Service Registry number (CASRN), drinking-water benchmark, primary use or source group, and analytical schedule used to analyze each compound.—Continued

[HBSL, Health-Based Screening Level; MCL, Maximum Contaminant Level; NA, not available; X, compound included on analytical schedule; --, compound not included on analytical schedule; —, no information is available]

Compound	CASRN[1]	Drinking-water benchmark	Primary use or source	Analytical schedule(s) used to analyze compound					
				2020	4024	2003	2033	2060	1433
Bromoform	75–25–2	MCL	Disinfection by-product	X	--	--	--	--	X
Bromomethane	74–83–9	HBSL	Fumigant-related compound	X	--	--	--	--	--
Bromoxynil	1689–84–5	HBSL	Herbicide and herbicide degradate	--	--	--	--	X	--
Butylbenzene	104–51–8	NA	Gasoline hydrocarbon, oxygenate, and oxygenate degradate	X	--	--	--	--	--
Caffeine	58–08–2	NA	Personal-care and domestic-use product	--	--	--	--	X	X
Camphor	76–22–2	NA	Personal-care and domestic-use product	--	--	--	--	--	X
Carbaryl	63–25–2	HBSL	Insecticide and insecticide degradate	--	--	X	X	X	X
Carbazole	86–74–8	NA	Organic synthesis compound	--	--	--	--	--	X
Carbofuran	1563–66–2	MCL	Insecticide and insecticide degradate	--	--	--	X	X	--
Carbon disulfide	75–15–0	HBSL	Organic synthesis compound	X	--	--	--	--	--
Chloramben, methyl ester	7286–84–2	NA	Herbicide and herbicide degradate	--	--	--	--	X	--
Chlorimuron-ethyl	90982–32–4	HBSL	Herbicide and herbicide degradate	--	--	--	--	X	--
Chlorobenzene	108–90–7	MCL	Solvent	X	--	--	--	--	--
Chloroethane	75–00–3	NA	Solvent	X	--	--	--	--	--
Chloroform	67–66–3	MCL	Disinfection by-product	X	--	--	--	--	--
Chloromethane	74–87–3	HBSL	Organic synthesis compound	X	--	--	--	--	--
Chlorpyrifos	2921–88–2	HBSL	Insecticide and insecticide degradate	--	--	X	X	--	X
Chlorpyrifos, oxygen analog	5598–15–2	NA	Insecticide and insecticide degradate	--	--	X	X	--	--
Cholesterol	57–88–5	NA	Plant- or animal-derived biochemical	--	--	--	--	--	X
cis-1,2-Dichloro-ethylene	156–59–2	MCL	Solvent	X	--	--	--	--	--
cis-1,3-Dichloropro-pene	10061–01–5	HBSL	Fumigant-related compound	X	--	--	--	--	--
cis-Permethrin	61949–76–6	NA	Insecticide and insecticide degradate	--	--	X	X	--	--
cis-Propiconazole	60207–90–1	HBSL	Fungicide	--	--	--	X	--	--
Clopyralid	1702–17–6	NA	Herbicide and herbicide degradate	--	--	--	--	X	--
Cotinine	486–56–6	NA	Personal-care and domestic-use product	--	--	--	--	--	X
Cyanazine	21725–46–2	HBSL	Herbicide and herbicide degradate	--	--	--	X	--	--

Table 1–1. Compounds analyzed, Chemical Abstracts Service Registry number (CASRN), drinking-water benchmark, primary use or source group, and analytical schedule used to analyze each compound.—Continued

[HBSL, Health-Based Screening Level; MCL, Maximum Contaminant Level; NA, not available; X, compound included on analytical schedule; --, compound not included on analytical schedule; —, no information is available]

Compound	CASRN[1]	Drinking-water benchmark	Primary use or source	Analytical schedule(s) used to analyze compound					
				2020	4024	2003	2033	2060	1433
Cycloate	1134–23–2	HBSL	Herbicide and herbicide degradate	--	--	--	--	X	--
Cyfluthrin	68359–37–5	HBSL	Insecticide and insecticide degradate	--	--	X	X	--	--
Cypermethrin	52315–07–8	HBSL	Insecticide and insecticide degradate	--	--	X	X	--	--
Dacthal	1861–32–1	HBSL	Herbicide and herbicide degradate	--	--	X	X	--	--
Dacthal monoacid	887–54–7	NA	Herbicide and herbicide degradate	--	--	--	--	X	--
Desulfinylfipronil	—	NA	Insecticide and insecticide degradate	--	--	X	X	--	--
Desulfinylfipronil amide	—	NA	Insecticide and insecticide degradate	--	--	X	X	--	--
Diazinon	333–41–5	HBSL	Insecticide and insecticide degradate	--	--	X	X	--	X
Diazoxon	962–58–3	NA	Insecticide and insecticide degradate	--	--	X	X	--	--
Dibromochloromethane	124–48–1	MCL	Disinfection by-product	X	--	--	--	--	--
Dibromomethane	74–95–3	NA	Solvent	X	--	--	--	--	--
Dicamba	1918–00–9	HBSL	Herbicide and herbicide degradate	--	--	--	--	X	--
Dichlorodifluoromethane	75–71–8	HBSL	Refrigerant and propellant	X	--	--	--	--	--
Dichloromethane	75–09–2	MCL	Solvent	X	--	--	--	--	--
Dichlorprop	120–36–5	HBSL	Herbicide and herbicide degradate	--	--	--	--	X	--
Dichlorvos	62–73–7	HBSL	Insecticide and insecticide degradate	--	--	X	X	--	--
Dicrotophos	141–66–2	HBSL	Insecticide and insecticide degradate	--	--	X	X	--	--
Dieldrin	60–57–1	HBSL	Insecticide and insecticide degradate	--	--	X	X	--	--
Diethyl ether	60–29–7	HBSL	Solvent	X	--	--	--	--	--
Diisopropyl ether	108–20–3	NA	Gasoline hydrocarbon, oxygenate, and oxygenate degradate	X	X	--	--	--	--
Dimethoate	60–51–5	HBSL	Insecticide and insecticide degradate	--	--	X	X	--	--
Dinoseb	88–85–7	MCL	Herbicide and herbicide degradate	--	--	--	--	X	--
Diphenamid	957–51–7	HBSL	Herbicide and herbicide degradate	--	--	--	--	X	--

Table 1–1. Compounds analyzed, Chemical Abstracts Service Registry number (CASRN), drinking-water benchmark, primary use or source group, and analytical schedule used to analyze each compound.—Continued

[HBSL, Health-Based Screening Level; MCL, Maximum Contaminant Level; NA, not available; X, compound included on analytical schedule; --, compound not included on analytical schedule; —, no information is available]

Compound	CASRN[1]	Drinking-water benchmark	Primary use or source	Analytical schedule(s) used to analyze compound					
				2020	4024	2003	2033	2060	1433
Disulfoton	298–04–4	HBSL	Insecticide and insecticide degradate	--	--	--	X	--	--
Disulfoton sulfone	2497–06–5	NA	Insecticide and insecticide degradate	--	--	--	X	--	--
Diuron	330–54–1	HBSL	Herbicide and herbicide degradate	--	--	--	--	X	--
d-Limonene	5989–27–5	NA	Personal-care and domestic-use product	--	--	--	--	--	X
Endosulfan sulfate	1031–07–8	NA	Insecticide and insecticide degradate	--	--	--	X	--	--
EPTC	759–94–4	HBSL	Herbicide and herbicide degradate	--	--	--	X	--	--
Ethion	563–12–2	HBSL	Insecticide and insecticide degradate	--	--	X	X	--	--
Ethion monoxon	17356–42–2	NA	Insecticide and insecticide degradate	--	--	X	X	--	--
Ethoprophos	13194–48–4	HBSL	Insecticide and insecticide degradate	--	--	--	X	--	--
Ethyl methacrylate	97–63–2	NA	Organic synthesis compound	X	--	--	--	--	--
Ethyl *tert*-butyl ether	637–92–3	NA	Gasoline hydrocarbon, oxygenate, and oxygenate degradate	X	X	--	--	--	--
Ethylbenzene	100–41–4	MCL	Gasoline hydrocarbon, oxygenate, and oxygenate degradate	X	--	--	--	--	--
Fenamiphos	22224–92–6	HBSL	Insecticide and insecticide degradate	--	--	X	X	--	--
Fenamiphos sulfone	31972–44–8	NA	Insecticide and insecticide degradate	--	--	X	X	--	--
Fenamiphos sulfoxide	31972–43–7	NA	Insecticide and insecticide degradate	--	--	X	X	--	--
Fenuron	101–42–8	NA	Herbicide and herbicide degradate	--	--	--	--	X	--
Fipronil	120068–37–3	NA	Insecticide and insecticide degradate	--	--	X	X	--	--
Fipronil sulfide	120067–83–6	NA	Insecticide and insecticide degradate	--	--	X	X	--	--
Fipronil sulfone	120068–36–2	NA	Insecticide and insecticide degradate	--	--	X	X	--	--
Flumetsulam	98967–40–9	HBSL	Herbicide and herbicide degradate	--	--	--	--	X	--
Fluometuron	2164–17–2	HBSL	Herbicide and herbicide degradate	--	--	--	--	X	--
Fluoranthene	206–44–0	HBSL	Pavement- and combustion-derived compound	--	--	--	--	--	X

Table 1–1. Compounds analyzed, Chemical Abstracts Service Registry number (CASRN), drinking-water benchmark, primary use or source group, and analytical schedule used to analyze each compound.—Continued

[HBSL, Health-Based Screening Level; MCL, Maximum Contaminant Level; NA, not available; X, compound included on analytical schedule; --, compound not included on analytical schedule; —, no information is available]

Compound	CASRN[1]	Drinking-water benchmark	Primary use or source	Analytical schedule(s) used to analyze compound					
				2020	4024	2003	2033	2060	1433
Fonofos	944–22–9	HBSL	Insecticide and insecticide degradate	--	--	X	X	--	--
Fonofos oxygen analog	944–21–8	NA	Insecticide and insecticide degradate	--	--	X	--	--	--
Hexachlorobutadiene	87–68–3	HBSL	Organic synthesis compound	X	--	--	--	--	--
Hexachloroethane	67–72–1	HBSL	Solvent	X	--	--	--	--	--
Hexahydrohexamethyl-cyclopentabenzo-pyran (HHCB)	1222–05–5	NA	Personal-care and domestic-use product	--	--	--	--	--	X
Hexazinone	51235–04–2	HBSL	Herbicide and herbicide degradate	--	--	X	X	--	--
Imazaquin	81335–37–7	HBSL	Herbicide and herbicide degradate	--	--	--	--	X	--
Imazethapyr	81335–77–5	HBSL	Herbicide and herbicide degradate	--	--	--	--	X	--
Imidacloprid	138261–41–3	NA	Insecticide and insecticide degradate	--	--	--	--	X	--
Indole	120–72–9	NA	Personal-care and domestic-use product	--	--	--	--	--	X
Iprodione	36734–19–7	HBSL	Fungicide	--	--	X	X	--	--
Isoborneol	124–76–5	NA	Personal-care and domestic-use product	--	--	--	--	--	X
Isofenphos	25311–71–1	HBSL	Insecticide and insecticide degradate	--	--	X	X	--	--
Isopropylbenzene	98–82–8	HBSL	Gasoline hydrocarbon, oxygenate, and oxygenate degradate	X	--	--	--	--	X
Isoquinoline	119–65–3	NA	Personal-care and domestic-use product	--	--	--	--	--	X
lambda-Cyhalothrin	91465–08–6	HBSL	Insecticide and insecticide degradate	--	--	--	X	--	--
Linuron	330–55–2	HBSL	Herbicide and herbicide degradate	--	--	--	--	X	--
m- and *p*-Xylene	108–38–3; 106–42–3	MCL	Gasoline hydrocarbon, oxygenate, and oxygenate degradate	X	--	--	--	--	--
Malaoxon	1634–78–2	NA	Insecticide and insecticide degradate	--	--	X	X	--	--
Malathion	121–75–5	HBSL	Insecticide and insecticide degradate	--	--	X	X	--	--
MCPA	94–74–6	HBSL	Herbicide and herbicide degradate	--	--	--	--	X	--
MCPB	94–81–5	HBSL	Herbicide and herbicide degradate	--	--	--	--	X	--

Table 1–1. Compounds analyzed, Chemical Abstracts Service Registry number (CASRN), drinking-water benchmark, primary use or source group, and analytical schedule used to analyze each compound.—Continued

[HBSL, Health-Based Screening Level; MCL, Maximum Contaminant Level; NA, not available; X, compound included on analytical schedule; --, compound not included on analytical schedule; —, no information is available]

Compound	CASRN[1]	Drinking-water benchmark	Primary use or source	Analytical schedule(s) used to analyze compound					
				2020	4024	2003	2033	2060	1433
Menthol	89–78–1	NA	Personal-care and domestic-use product	--	--	--	--	--	X
Metalaxyl	57837–19–1	HBSL	Fungicide	--	--	X	X	X	X
Methidathion	950–37–8	HBSL	Insecticide and insecticide degradate	--	--	X	X	--	--
Methiocarb	2032–65–7	HBSL	Insecticide and insecticide degradate	--	--	--	--	X	--
Methomyl	16752–77–5	HBSL	Insecticide and insecticide degradate	--	--	--	--	X	--
Methyl acetate	79–20–9	NA	Solvent	--	X	--	--	--	--
Methyl acrylate	96–33–3	NA	Organic synthesis compound	X	--	--	--	--	--
Methyl acrylonitrile	126–98–7	HBSL	Organic synthesis compound	X	--	--	--	--	--
Methyl iodide	74–88–4	NA	Organic synthesis compound	X	--	--	--	--	--
Methyl methacrylate	80–62–6	HBSL	Organic synthesis compound	X	--	--	--	--	--
Methyl salicylate	119–36–8	HBSL	Personal-care and domestic-use product	--	--	--	--	--	X
Metolachlor	51218–45–2	HBSL	Herbicide and herbicide degradate	--	--	X	X	--	X
Metribuzin	21087–64–9	HBSL	Herbicide and herbicide degradate	--	--	X	X	--	--
Metsulfuron methyl	74223–64–6	HBSL	Herbicide and herbicide degradate	--	--	--	--	X	--
Molinate	2212–67–1	HBSL	Herbicide and herbicide degradate	--	--	--	X	--	--
Myclobutanil	88671–89–0	HBSL	Fungicide	--	--	X	X	--	--
N,N-diethyl-*meta*-toluamide (DEET)	134–62–3	NA	Personal-care and domestic-use product	--	--	--	--	--	X
Naphthalene	91–20–3	HBSL	Gasoline hydrocarbon, oxygenate, and oxygenate degradate	X	--	--	--	--	X
Neburon	555–37–3	NA	Herbicide and herbicide degradate	--	--	--	--	X	--
Nicosulfuron	111991–09–4	HBSL	Herbicide and herbicide degradate	--	--	--	--	X	--
Norflurazon	27314–13–2	HBSL	Herbicide and herbicide degradate	--	--	--	--	X	--
n-Propylbenzene	103–65–1	NA	Solvent	X	--	--	--	--	--
o-Ethyl toluene	611–14–3	NA	Gasoline hydrocarbon, oxygenate, and oxygenate degradate	X	--	--	--	--	--
Oryzalin	19044–88–3	HBSL	Herbicide and herbicide degradate	--	--	--	--	X	--
Oxamyl	23135–22–0	MCL	Insecticide and insecticide degradate	--	--	--	--	X	--

Table 1–1. Compounds analyzed, Chemical Abstracts Service Registry number (CASRN), drinking-water benchmark, primary use or source group, and analytical schedule used to analyze each compound.—Continued

[HBSL, Health-Based Screening Level; MCL, Maximum Contaminant Level; NA, not available; X, compound included on analytical schedule; --, compound not included on analytical schedule; —, no information is available]

Compound	CASRN[1]	Drinking-water benchmark	Primary use or source	Analytical schedule(s) used to analyze compound					
				2020	4024	2003	2033	2060	1433
Oxyfluorfen	42874–03–3	HBSL	Herbicide and herbicide degradate	--	--	--	X	--	--
o-Xylene	95–47–6	MCL/HBSL	Gasoline hydrocarbon, oxygenate, and oxygenate degradate	X	--	--	--	--	--
Paraoxon-methyl	950–35–6	NA	Insecticide and insecticide degradate	--	--	X	X	--	--
Parathion-methyl	298–00–0	HBSL	Insecticide and insecticide degradate	--	--	X	X	--	--
p-Cresol	106–44–5	NA	Solvent	--	--	--	--	--	X
Pendimethalin	40487–42–1	HBSL	Herbicide and herbicide degradate	--	--	X	X	--	--
Phenanthrene	85–01–8	NA	Pavement- and combustion-derived compound	--	--	--	--	--	X
Phenol	108–95–2	HBSL	Personal-care and domestic-use product	--	--	--	--	--	X
Phorate	298–02–2	HBSL	Insecticide and insecticide degradate	--	--	X	X	--	--
Phorate oxygen analog	2600–69–3	NA	Insecticide and insecticide degradate	--	--	X	X	--	--
Phosmet	732–11–6	HBSL	Insecticide and insecticide degradate	--	--	X	X	--	--
Phosmet oxon	3735–33–9	NA	Insecticide and insecticide degradate	--	--	X	X	--	--
Picloram	1918–02–1	MCL	Herbicide and herbicide degradate	--	--	--	--	X	--
Prometon	1610–18–0	HBSL	Herbicide and herbicide degradate	--	--	X	X	--	X
Prometryn	7287–19–6	HBSL	Herbicide and herbicide degradate	--	--	X	X	--	--
Propanil	709–98–8	HBSL	Herbicide and herbicide degradate	--	--	--	X	--	--
Propargite	2312–35–8	HBSL	Insecticide and insecticide degradate	--	--	--	X	--	--
Propham	122–42–9	HBSL	Herbicide and herbicide degradate	--	--	--	--	X	--
Propiconazole	60207–90–1	HBSL	Fungicide	--	--	--	--	X	--
Propoxur	114–26–1	HBSL	Insecticide and insecticide degradate	--	--	--	--	X	--
Propyzamide	23950–58–5	HBSL	Herbicide and herbicide degradate	--	--	X	X	--	--
Pyrene	129–00–0	HBSL	Pavement- and combustion-derived compound	--	--	--	--	--	X

Table 1–1. Compounds analyzed, Chemical Abstracts Service Registry number (CASRN), drinking-water benchmark, primary use or source group, and analytical schedule used to analyze each compound.—Continued

[HBSL, Health-Based Screening Level; MCL, Maximum Contaminant Level; NA, not available; X, compound included on analytical schedule; --, compound not included on analytical schedule; —, no information is available]

Compound	CASRN[1]	Drinking-water benchmark	Primary use or source	Analytical schedule(s) used to analyze compound					
				2020	4024	2003	2033	2060	1433
sec-Butylbenzene	135–98–8	NA	Gasoline hydrocarbon, oxygenate, and oxygenate degradate	X	--	--	--	--	--
Siduron	1982–49–6	HBSL	Herbicide and herbicide degradate	--	--	--	--	X	--
Simazine	122–34–9	MCL	Herbicide and herbicide degradate	--	--	X	X	--	--
Styrene	100–42–5	MCL	Gasoline hydrocarbon, oxygenate, and oxygenate degradate	X	--	--	--	--	--
Sulfometuron-methyl	74222–97–2	HBSL	Herbicide and herbicide degradate	--	--	--	--	X	--
Tebuconazole	107534–96–3	NA	Fungicide	--	--	--	X	--	--
Tebuthiuron	34014–18–1	HBSL	Herbicide and herbicide degradate	--	--	X	X	X	--
Tefluthrin	79538–32–2	HBSL	Insecticide and insecticide degradate	--	--	--	X	--	--
Terbacil	5902–51–2	HBSL	Herbicide and herbicide degradate	--	--	--	--	X	--
Terbufos	13071–79–9	HBSL	Insecticide and insecticide degradate	--	--	X	X	--	--
Terbufos oxygen analog sulfone	56070–15–6	NA	Insecticide and insecticide degradate	--	--	X	X	--	--
Terbuthylazine	5915–41–3	HBSL	Herbicide and herbicide degradate	--	--	X	X	--	--
tert-Amyl alcohol	75–85–4	NA	Gasoline hydrocarbon, oxygenate, and oxygenate degradate	--	X	--	--	--	--
tert-Butyl alcohol	75–65–0	NA	Gasoline hydrocarbon, oxygenate, and oxygenate degradate	--	X	--	--	--	--
tert-Butyl methyl ether (MTBE)	1634–04–4	NA	Gasoline hydrocarbon, oxygenate, and oxygenate degradate	X	X	--	--	--	--
tert-Butylbenzene	98–06–6	NA	Gasoline hydrocarbon, oxygenate, and oxygenate degradate	X	--	--	--	--	--
tert-Pentyl methyl ether	994–05–8	NA	Gasoline hydrocarbon, oxygenate, and oxygenate degradate	X	X	--	--	--	--
Tetrachloroethylene	127–18–4	MCL	Solvent	X	--	--	--	--	X
Tetrachloromethane	56–23–5	MCL	Solvent	X	--	--	--	--	--
Tetrahydrofuran	109–99–9	NA	Solvent	X	--	--	--	--	--

Table 1–1. Compounds analyzed, Chemical Abstracts Service Registry number (CASRN), drinking-water benchmark, primary use or source group, and analytical schedule used to analyze each compound.—Continued

[HBSL, Health-Based Screening Level; MCL, Maximum Contaminant Level; NA, not available; X, compound included on analytical schedule; --, compound not included on analytical schedule; —, no information is available]

Compound	CASRN[1]	Drinking-water benchmark	Primary use or source	Analytical schedule(s) used to analyze compound					
				2020	4024	2003	2033	2060	1433
Thiobencarb	28249–77–6	HBSL	Herbicide and herbicide degradate	--	--	--	X	--	--
Toluene	108–88–3	MCL	Gasoline hydrocarbon, oxygenate, and oxygenate degradate	X	--	--	--	--	--
trans-1,2-Dichloro-ethylene	156–60–5	MCL	Solvent	X	--	--	--	--	--
trans-1,3-Dichloro-propene	10061–02–6	HBSL	Fumigant-related compound	X	--	--	--	--	--
trans-1,4-Dichloro-2-butene	110–57–6	NA	Organic synthesis compound	X	--	--	--	--	--
trans-Propiconazole	60207–90–1	HBSL	Fungicide	--	--	--	X	--	--
Tribufos	78–48–8	HBSL	Defoliant	--	--	X	X	--	--
Tributyl phosphate	126–73–8	NA	Manufacturing additive	--	--	--	--	--	X
Trichloroethylene	79–01–6	MCL	Solvent	X	--	--	--	--	--
Trichlorofluorometh-ane	75–69–4	HBSL	Refrigerant and propellant	X	--	--	--	--	--
Triclopyr	55335–06–3	HBSL	Herbicide and herbicide degradate	--	--	--	--	X	--
Triclosan	3380–34–5	NA	Personal-care and domestic-use product	--	--	--	--	--	X
Triethyl citrate (ethyl citrate)	77–93–0	NA	Personal-care and domestic-use product	--	--	--	--	--	X
Trifluralin	1582–09–8	HBSL	Herbicide and herbicide degradate	--	--	X	X	--	--
Triphenyl phosphate	115–86–6	NA	Manufacturing additive	--	--	--	--	--	X
Tris(2-butoxyethyl) phosphate	78–51–3	NA	Manufacturing additive	--	--	--	--	--	X
Tris(2-chloroethyl) phosphate	115–96–8	NA	Manufacturing additive	--	--	--	--	--	X
Tris(dichlorisopropyl) phosphate	13674–87–8	NA	Manufacturing additive	--	--	--	--	--	X
Vinyl chloride	75–01–4	MCL	Organic synthesis compound	X	--	--	--	--	--

[1]This report contains Chemical Abstracts Service Registry numbers (CASRN), which is a Registered Trademark of the American Chemical Society. A CASRN is a numeric identifier that can contain up to nine digits, divided by dashes into three parts. For example, 67–66–3 is the CASRN for chloroform. The online database provides a source for the latest registry number information: *http://www.cas.org/*. Chemical Abstracts Service recommends the verification of the CASRNs through CAS Client Services[SM].

Table 1–2. Summary of paired and unpaired quenched and nonquenched finished-water matrix-spike samples by source of supply and primary use or source group.

[USGS, U.S. Geological Survey; PCODE, parameter code; --, no data]

USGS schedule	USGS PCODE	USGS method	Compound name	Surface water: Paired quenched and non-quenched finished-water matrix-spike samples	Surface water: Unpaired quenched finished-water matrix-spike samples	Surface water: Unpaired non-quenched finished-water matrix-spike samples	Groundwater: Paired quenched and non-quenched finished-water matrix-spike samples	Groundwater: Unpaired quenched finished-water matrix-spike samples	Groundwater: Unpaired non-quenched finished-water matrix-spike samples
Defoliant									
2003/2033	61610	GCM39	Tribufos	7	3	1	16	2	--
Disinfection by-products									
1433	34288	GCM37	Bromoform	10	6	--	12	6	3
2020	32101	GCM66	Bromodichloromethane	9	5	--	15	3	--
2020	32104	GCM66	Bromoform	9	5	--	15	3	--
2020	32106	GCM66	Chloroform	9	5	--	15	3	--
2020	32105	GCM66	Dibromochloromethane	9	5	--	15	3	--
Fumigant-related compounds									
1433	34572	GCM37	1,4-Dichlorobenzene	10	6	--	12	6	3
2020	82625	GCM66	1,2-Dibromo-3-chloropropane	9	5	--	15	3	--
2020	77651	GCM66	1,2-Dibromoethane	9	5	--	15	3	--
2020	34541	GCM66	1,2-Dichloropropane	9	5	--	15	3	--
2020	77173	GCM66	1,3-Dichloropropane	9	5	--	15	3	--
2020	34571	GCM66	1,4-Dichlorobenzene	9	5	--	15	3	--
2020	77170	GCM66	2,2-Dichloropropane	9	5	--	15	3	--
2020	34413	GCM66	Bromomethane	9	5	--	15	3	--
2020	34704	GCM66	*cis*-1,3-Dichloropropene	9	5	--	15	3	--
2020	34699	GCM66	*trans*-1,3-Dichloropropene	9	5	--	15	3	--
Fungicides									
1433	50359	GCM37	Metalaxyl	2	--	--	3	1	--
2033	61627	GCM39	3,5-Dichloroaniline	7	3	1	16	2	--
2033	79846	GCM40	*cis*-Propiconazole	7	2	1	14	2	--
2033	62852	GCM14	Tebuconazole	7	3	1	16	2	--
2033	79847	GCM40	*trans*-Propiconazole	7	3	1	16	2	--
2060	50300	LCM29	Benomyl	7	13	2	15	5	3
2060	50359	LCM29	Metalaxyl	7	13	2	15	5	3
2060	50471	LCM29	Propiconazole	7	13	2	15	5	3
2003/2033	61593	GCM39	Iprodione	10	5	1	18	3	1
2003/2033	61596	GCM39	Metalaxyl	10	5	1	18	3	1
2003/2033	61599	GCM39	Myclobutanil	10	5	1	18	3	1

Table 1–2. Summary of paired and unpaired quenched and nonquenched finished-water matrix-spike samples by source of supply and primary use or source group.—Continued

[USGS, U.S. Geological Survey; PCODE, parameter code; --, no data]

USGS schedule	USGS PCODE	USGS method	Compound name	Surface water: Paired quenched and non-quenched finished-water matrix-spike samples	Surface water: Unpaired quenched finished-water matrix-spike samples	Surface water: Unpaired non-quenched finished-water matrix-spike samples	Groundwater: Paired quenched and non-quenched finished-water matrix-spike samples	Groundwater: Unpaired quenched finished-water matrix-spike samples	Groundwater: Unpaired non-quenched finished-water matrix-spike samples
Gasoline hydrocarbons, oxygenates, and oxygenate degradates									
1433	62054	GCM37	1-Methylnaphthalene	9	7	--	6	12	3
1433	62055	GCM37	2,6-Dimethylnaphthalene	9	7	--	7	11	3
1433	62056	GCM37	2-Methylnaphthalene	9	7	--	5	13	3
1433	62078	GCM37	Isopropylbenzene	10	6	--	12	6	3
1433	34443	GCM37	Naphthalene	9	7	--	7	11	3
2020	49999	GCM66	1,2,3,4-Tetramethylbenzene	9	5	--	15	3	--
2020	50000	GCM66	1,2,3,5-Tetramethylbenzene	9	5	--	15	3	--
2020	77221	GCM66	1,2,3-Trimethylbenzene	9	5	--	15	3	--
2020	77222	GCM66	1,2,4-Trimethylbenzene	9	5	--	15	3	--
2020	77226	GCM66	1,3,5-Trimethylbenzene	9	5	--	15	3	--
2020	77356	GCM66	4-Isopropyl-1-methylbenzene	9	5	--	15	3	--
2020	34030	GCM66	Benzene	9	5	--	15	3	--
2020	77342	GCM66	Butylbenzene	9	5	--	15	3	--
2020	81577	GCM66	Diisopropyl ether	9	5	--	15	3	--
2020	50004	GCM66	Ethyl *tert*-butyl ether	9	5	--	15	3	--
2020	34371	GCM66	Ethylbenzene	9	5	--	15	3	--
2020	77223	GCM66	Isopropylbenzene	9	5	--	15	3	--
2020	85795	GCM66	*m*- and *p*-Xylene	9	5	--	15	3	--
2020	34696	GCM66	Naphthalene	9	5	--	15	3	--
2020	77220	GCM66	*o*-Ethyl toluene	9	5	--	15	3	--
2020	77135	GCM66	*o*-Xylene	9	5	--	15	3	--
2020	77350	GCM66	*sec*-Butylbenzene	9	5	--	15	3	--
2020	77128	GCM66	Styrene	9	5	--	15	3	--
2020	78032	GCM66	*tert*-Butyl methyl ether	9	5	--	15	3	--
2020	77353	GCM66	*tert*-Butylbenzene	9	5	--	15	3	--
2020	50005	GCM66	*tert*-Pentyl methyl ether	9	5	--	15	3	--
2020	34010	GCM66	Toluene	9	5	--	14	2	--
4024	81577	GCM60	Diisopropyl ether	1	--	--	1	--	--
4024	50004	GCM60	Ethyl *tert*-butyl ether	1	--	--	1	--	--
4024	77073	GCM60	*tert*-Amyl alcohol	5	2	--	9	3	--

Table 1–2. Summary of paired and unpaired quenched and nonquenched finished-water matrix-spike samples by source of supply and primary use or source group.—Continued

[USGS, U.S. Geological Survey; PCODE, parameter code; --, no data]

USGS schedule	USGS PCODE	USGS method	Compound name	Surface water: Paired quenched and non-quenched finished-water matrix-spike samples	Surface water: Unpaired quenched finished-water matrix-spike samples	Surface water: Unpaired non-quenched finished-water matrix-spike samples	Groundwater: Paired quenched and non-quenched finished-water matrix-spike samples	Groundwater: Unpaired quenched finished-water matrix-spike samples	Groundwater: Unpaired non-quenched finished-water matrix-spike samples
Gasoline hydrocarbons, oxygenates, and oxygenate degradates—Continued									
4024	77035	GCM60	*tert*-Butyl alcohol	5	2	--	9	3	--
4024	78032	GCM60	*tert*-Butyl methyl ether (MTBE)	1	--	--	1	--	--
4024	50005	GCM60	*tert*-Pentyl methyl ether	1	--	--	1	--	--
Herbicides and herbicide degradates									
1433	4029	GCM37	Bromacil	2	--	--	1	3	--
1433	39415	GCM37	Metolachlor	2	--	--	2	1	--
1433	4037	GCM37	Prometon	2	--	--	2	1	--
2033	4041	GCM35	Cyanazine	7	3	1	16	2	--
2033	82668	GCM35	EPTC	7	3	1	16	2	--
2033	82671	GCM35	Molinate	7	3	1	16	2	--
2033	61600	GCM39	Oxyfluorfen	7	3	1	16	2	--
2033	82679	GCM35	Propanil	7	3	1	16	2	--
2033	82681	GCM35	Thiobencarb	7	3	1	16	2	--
2060	39732	LCM29	2,4-D	7	13	2	15	4	3
2060	50470	LCM29	2,4-D methyl ester	3	6	--	6	3	3
2060	66496	CAL13	2,4-D plus 2,4-D methyl ester	4	6	2	9	1	--
2060	38746	LCM29	2,4-DB	7	13	2	15	4	3
2060	4040	LCM29	2-Chloro-4-isopropyl-amino-6-amino-*s*-triazine (CIAT)	2	--	--	2	2	--
2060	4038	LCM29	2-Chloro-6-ethyl-amino-4-amino-*s*-triazine (CEAT)	7	13	2	14	5	4
2060	50355	LCM29	2-Hydroxy-4-isopro-pylamino-6-ethyl-amino-*s*-triazine (OIET)	5	8	2	13	2	2
2060	61692	LCM29	3(4-Chlorophenyl)-1-methyl urea	7	13	2	15	5	3
2060	49315	LCM29	Acifluorfen	7	13	2	15	4	3
2060	39632	LCM29	Atrazine	2	--	--	2	2	--
2060	61693	LCM29	Bensulfuron-methyl	7	13	2	15	5	3
2060	38711	LCM29	Bentazon	7	13	2	15	4	3
2060	4029	LCM29	Bromacil	7	13	2	15	5	3

Table 1–2. Summary of paired and unpaired quenched and nonquenched finished-water matrix-spike samples by source of supply and primary use or source group.—Continued

[USGS, U.S. Geological Survey; PCODE, parameter code; --, no data]

				Surface water			Groundwater		
USGS schedule	USGS PCODE	USGS method	Compound name	Paired quenched and non-quenched finished-water matrix-spike samples	Unpaired quenched finished-water matrix-spike samples	Unpaired non-quenched finished-water matrix-spike samples	Paired quenched and non-quenched finished-water matrix-spike samples	Unpaired quenched finished-water matrix-spike samples	Unpaired non-quenched finished-water matrix-spike samples
			Herbicides and herbicide degradates—Continued						
2060	49311	LCM29	Bromoxynil	7	13	2	15	4	3
2060	61188	LCM29	Chloramben, methyl ester	7	12	2	15	5	3
2060	50306	LCM29	Chlorimuron-ethyl	7	13	2	15	5	3
2060	49305	LCM29	Clopyralid	7	12	2	15	4	3
2060	4031	LCM29	Cycloate	7	13	2	15	5	3
2060	49304	LCM29	Dacthal monoacid	7	13	2	15	4	3
2060	38442	LCM29	Dicamba	7	12	2	15	4	3
2060	49302	LCM29	Dichlorprop	7	13	2	15	4	3
2060	49301	LCM29	Dinoseb	7	13	2	15	4	3
2060	4033	LCM29	Diphenamid	7	13	2	15	5	3
2060	49300	LCM29	Diuron	7	13	2	15	5	3
2060	49297	LCM29	Fenuron	7	13	2	15	5	3
2060	61694	LCM29	Flumetsulam	7	13	2	15	5	3
2060	38811	LCM29	Fluometuron	7	13	2	15	5	3
2060	50356	LCM29	Imazaquin	7	13	2	15	5	3
2060	50407	LCM29	Imazethapyr	7	13	2	14	5	4
2060	38478	LCM29	Linuron	7	13	2	15	5	3
2060	38482	LCM29	MCPA	7	13	2	15	4	3
2060	38487	LCM29	MCPB	7	13	2	15	4	3
2060	61697	LCM29	Metsulfuron methyl	6	13	2	15	5	3
2060	49294	LCM29	Neburon	7	13	2	15	5	3
2060	50364	LCM29	Nicosulfuron	7	13	2	15	5	3
2060	49293	LCM29	Norflurazon	7	13	2	15	5	3
2060	49292	LCM29	Oryzalin	7	13	2	15	5	3
2060	49291	LCM29	Picloram	6	12	2	14	4	3
2060	49236	LCM29	Propham	7	13	2	15	5	3
2060	38548	LCM29	Siduron	7	13	2	15	5	3
2060	50337	LCM29	Sulfometuron-methyl	7	13	2	15	5	3
2060	82670	LCM29	Tebuthiuron	2	--	--	2	2	--
2060	4032	LCM29	Terbacil	7	13	2	15	5	3
2060	49235	LCM29	Triclopyr	7	13	2	15	4	3
2003/2033	82660	GCM35	2,6-Diethylaniline	10	5	1	18	3	1

Table 1–2. Summary of paired and unpaired quenched and nonquenched finished-water matrix-spike samples by source of supply and primary use or source group.—Continued

[USGS, U.S. Geological Survey; PCODE, parameter code; --, no data]

USGS schedule	USGS PCODE	USGS method	Compound name	Surface water: Paired quenched and non-quenched finished-water matrix-spike samples	Surface water: Unpaired quenched finished-water matrix-spike samples	Surface water: Unpaired non-quenched finished-water matrix-spike samples	Groundwater: Paired quenched and non-quenched finished-water matrix-spike samples	Groundwater: Unpaired quenched finished-water matrix-spike samples	Groundwater: Unpaired non-quenched finished-water matrix-spike samples
Herbicides and herbicide degradates—Continued									
2003/2033	61618	GCM39	2-Chloro-2,6-diethyl-acetanilide	10	5	1	18	3	1
2003/2033	4040	GCM35	2-Chloro-4-isopropyl-amino-6-amino-*s*-triazine (CIAT)	10	5	1	18	3	1
2003/2033	61620	GCM39	2-Ethyl-6-methyl-aniline	10	5	1	18	3	1
2003/2033	61625	GCM39	3,4-Dichloroaniline	10	5	1	18	3	1
2003/2033	61633	GCM39	4-Chloro-2-methyl-phenol	10	5	1	18	3	1
2003/2033	49260	GCM33	Acetochlor	10	5	1	17	3	1
2003/2033	46342	GCM35	Alachlor	10	5	1	17	3	1
2003/2033	39632	GCM35	Atrazine	10	5	1	18	3	1
2003/2033	82673	GCM35	Benfluralin	10	5	1	18	3	1
2003/2033	82682	GCM35	Dacthal	10	5	1	18	3	1
2003/2033	4025	GCM39	Hexazinone	10	5	1	18	3	1
2003/2033	39415	GCM35	Metolachlor	10	5	1	17	3	1
2003/2033	82630	GCM35	Metribuzin	10	5	1	18	3	1
2003/2033	82683	GCM35	Pendimethalin	10	5	1	18	3	1
2003/2033	4037	GCM35	Prometon	10	5	1	18	3	1
2003/2033	4036	GCM39	Prometryn	10	5	1	18	3	1
2003/2033	82676	GCM35	Propyzamide	10	5	1	18	3	1
2003/2033	4035	GCM35	Simazine	10	5	1	18	3	1
2003/2033	82670	GCM35	Tebuthiuron	10	5	1	18	3	1
2003/2033	4022	GCM39	Terbuthylazine	10	5	1	18	3	1
2003/2033	82661	GCM35	Trifluralin	10	5	1	18	3	1
Insecticides and insecticide degradates									
1433	82680	GCM37	Carbaryl	2	--	--	--	3	--
1433	38933	GCM37	Chlorpyrifos	2	--	--	--	3	--
1433	39572	GCM37	Diazinon	2	--	--	--	3	--
2003	61649	GCM39	Fonofos oxygen analog	1	--	--	2	1	1
2033	34362	GCM39	*alpha*-Endosulfan	7	3	1	16	2	--
2033	82674	GCM35	Carbofuran	7	3	1	16	2	--
2033	82677	GCM35	Disulfoton	7	3	1	16	2	--
2033	61640	GCM39	Disulfoton sulfone	7	3	1	16	2	--

Table 1–2. Summary of paired and unpaired quenched and nonquenched finished-water matrix-spike samples by source of supply and primary use or source group.—Continued

[USGS, U.S. Geological Survey; PCODE, parameter code; --, no data]

USGS schedule	USGS PCODE	USGS method	Compound name	Surface water: Paired quenched and non-quenched finished-water matrix-spike samples	Surface water: Unpaired quenched finished-water matrix-spike samples	Surface water: Unpaired non-quenched finished-water matrix-spike samples	Groundwater: Paired quenched and non-quenched finished-water matrix-spike samples	Groundwater: Unpaired quenched finished-water matrix-spike samples	Groundwater: Unpaired non-quenched finished-water matrix-spike samples
Insecticides and insecticide degradates—Continued									
2033	61590	GCM39	Endosulfan sulfate	7	3	1	16	2	--
2033	82672	GCM35	Ethoprophos	7	3	1	16	2	--
2033	61595	GCM39	*lambda*-Cyhalothrin	7	3	1	16	2	--
2033	82685	GCM35	Propargite	7	3	1	16	2	--
2033	61606	GCM39	Tefluthrin	7	3	1	16	2	--
2060	49308	LCM29	3-Hydroxycarbofuran	7	12	2	15	5	3
2060	49312	LCM29	Aldicarb	7	12	2	14	5	4
2060	49313	LCM29	Aldicarb sulfone	7	12	2	15	5	3
2060	49314	LCM29	Aldicarb sulfoxide	7	12	2	14	5	3
2060	50299	LCM29	Bendiocarb	7	12	2	15	5	3
2060	49310	LCM29	Carbaryl	7	12	2	15	5	3
2060	49309	LCM29	Carbofuran	7	12	2	15	5	3
2060	61695	LCM29	Imidacloprid	7	13	2	15	5	3
2060	38501	LCM29	Methiocarb	7	13	2	15	5	3
2060	49296	LCM29	Methomyl	7	12	2	15	5	3
2060	38866	LCM29	Oxamyl	7	12	2	15	5	3
2060	38538	LCM29	Propoxur	7	12	2	15	5	3
2003/2033	49295	GCM39	1-Naphthol	10	5	1	18	3	1
2003/2033	82686	GCM35	Azinphos-methyl	10	5	1	18	3	1
2003/2033	61635	GCM39	Azinphos-methyl-oxon	10	5	1	18	3	1
2003/2033	82680	GCM35	Carbaryl	10	5	1	18	3	1
2003/2033	38933	GCM35	Chlorpyrifos	10	5	1	18	3	1
2003/2033	61636	GCM39	Chlorpyrifos, oxygen analog	10	5	1	16	3	1
2003/2033	82687	GCM35	*cis*-Permethrin	10	5	1	18	3	1
2003/2033	61585	GCM39	Cyfluthrin	10	5	1	18	3	1
2003/2033	61586	GCM39	Cypermethrin	10	5	1	18	3	1
2003/2033	62170	GCM29	Desulfinylfipronil	10	5	1	18	3	1
2003/2033	62169	GCM29	Desulfinylfipronil amide	10	5	1	18	3	1
2003/2033	39572	GCM35	Diazinon	10	5	1	18	3	1
2003/2033	61638	GCM14	Diazoxon	9	4	1	18	3	1
2003/2033	38775	GCM39	Dichlorvos	10	5	1	18	3	1
2003/2033	38454	GCM39	Dicrotophos	10	5	1	18	3	1

Table 1–2. Summary of paired and unpaired quenched and nonquenched finished-water matrix-spike samples by source of supply and primary use or source group.—Continued

[USGS, U.S. Geological Survey; PCODE, parameter code; --, no data]

USGS schedule	USGS PCODE	USGS method	Compound name	Surface water			Groundwater		
				Paired quenched and non-quenched finished-water matrix-spike samples	Unpaired quenched finished-water matrix-spike samples	Unpaired non-quenched finished-water matrix-spike samples	Paired quenched and non-quenched finished-water matrix-spike samples	Unpaired quenched finished-water matrix-spike samples	Unpaired non-quenched finished-water matrix-spike samples
Insecticides and insecticide degradates—Continued									
2003/2033	39381	GCM35	Dieldrin	10	5	1	18	3	1
2003/2033	82662	GCM40	Dimethoate	10	5	1	18	3	1
2003/2033	82346	GCM40	Ethion	10	5	1	18	3	1
2003/2033	61644	GCM39	Ethion monoxon	10	5	1	18	3	1
2003/2033	61591	GCM39	Fenamiphos	10	5	1	18	3	1
2003/2033	61645	GCM39	Fenamiphos sulfone	10	5	1	18	3	1
2003/2033	61646	GCM39	Fenamiphos sulfoxide	10	5	1	16	3	1
2003/2033	62166	GCM29	Fipronil	10	5	1	18	3	1
2003/2033	62167	GCM29	Fipronil sulfide	10	5	1	18	3	1
2003/2033	62168	GCM29	Fipronil sulfone	10	5	1	18	3	1
2003/2033	4095	GCM35	Fonofos	10	5	1	18	3	1
2003/2033	61594	GCM39	Isofenphos	10	5	1	18	3	1
2003/2033	61652	GCM39	Malaoxon	10	5	1	18	3	1
2003/2033	39532	GCM35	Malathion	10	5	1	18	3	1
2003/2033	61598	GCM39	Methidathion	10	5	1	18	3	1
2003/2033	61664	GCM39	Paraoxon-methyl	10	5	1	18	3	1
2003/2033	82667	GCM35	Parathion-methyl	10	5	1	18	3	1
2003/2033	82664	GCM35	Phorate	10	5	1	18	3	1
2003/2033	61666	GCM39	Phorate oxygen analog	10	5	1	18	3	1
2003/2033	61601	GCM39	Phosmet	9	3	1	15	3	1
2003/2033	61668	GCM39	Phosmet oxon	9	2	1	15	3	1
2003/2033	82675	GCM35	Terbufos	10	5	1	18	3	1
2003/2033	61674	GCM39	Terbufos oxygen analog sulfone	10	5	1	18	3	1
Manufacturing additives									
1433	62063	GCM37	5-Methyl-1H-benzotriazole	9	7	--	6	10	3
1433	62089	GCM37	Tributyl phosphate	10	6	--	12	6	3
1433	62092	GCM37	Triphenyl phosphate	10	6	--	12	6	3
1433	62093	GCM37	Tris(2-butoxyethyl) phosphate	10	6	--	12	6	3
1433	62087	GCM37	Tris(2-chloroethyl) phosphate	10	6	--	12	6	3
1433	62088	GCM37	Tris(dichlorisopropyl) phosphate	10	6	--	12	6	3

Table 1–2. Summary of paired and unpaired quenched and nonquenched finished-water matrix-spike samples by source of supply and primary use or source group.—Continued

[USGS, U.S. Geological Survey; PCODE, parameter code; --, no data]

USGS schedule	USGS PCODE	USGS method	Compound name	Surface water: Paired quenched and non-quenched finished-water matrix-spike samples	Surface water: Unpaired quenched finished-water matrix-spike samples	Surface water: Unpaired non-quenched finished-water matrix-spike samples	Groundwater: Paired quenched and non-quenched finished-water matrix-spike samples	Groundwater: Unpaired quenched finished-water matrix-spike samples	Groundwater: Unpaired non-quenched finished-water matrix-spike samples
Organic synthesis compounds									
1433	62066	GCM37	Anthraquinone	10	6	--	12	6	3
1433	62071	GCM37	Carbazole	9	7	--	6	12	3
2020	77168	GCM66	1,1-Dichloropropene	9	5	--	15	3	--
2020	77613	GCM66	1,2,3-Trichlorobenzene	9	5	--	15	3	--
2020	77443	GCM66	1,2,3-Trichloropropane	9	5	--	15	3	--
2020	78109	GCM66	3-Chloropropene	9	5	--	15	3	--
2020	34215	GCM66	Acrylonitrile	9	5	--	15	3	--
2020	50002	GCM66	Bromoethene	9	5	--	15	3	--
2020	77041	GCM66	Carbon disulfide	9	5	--	15	3	--
2020	34418	GCM66	Chloromethane	9	5	--	15	3	--
2020	73570	GCM66	Ethyl methacrylate	9	5	--	15	3	--
2020	39702	GCM66	Hexachlorobutadiene	9	5	--	15	3	--
2020	49991	GCM66	Methyl acrylate	9	5	--	15	3	--
2020	81593	GCM66	Methyl acrylonitrile	9	5	--	15	3	--
2020	77424	GCM66	Methyl iodide	9	5	--	15	3	--
2020	81597	GCM66	Methyl methacrylate	9	5	--	15	3	--
2020	73547	GCM66	*trans*-1,4-Dichloro-2-butene	9	5	--	15	3	--
2020	39175	GCM66	Vinyl chloride	9	5	--	15	3	--
Pavement- and combustion-derived compounds									
1433	34221	GCM37	Anthracene	9	7	--	8	10	3
1433	34248	GCM37	Benzo[*a*]pyrene	9	7	--	11	7	3
1433	34377	GCM37	Fluoranthene	9	7	--	10	8	3
1433	34462	GCM37	Phenanthrene	9	7	--	8	10	3
1433	34470	GCM37	Pyrene	9	7	--	10	8	3
Personal-care and domestic-use products									
1433	62059	GCM37	3-*tert*-Butyl-4-hydroxy anisole (BHA)	6	6	1	5	10	3
1433	62060	GCM37	4-Cumylphenol	8	7	1	7	11	3
1433	62061	GCM37	4-*n*-Octylphenol	8	7	1	8	10	3
1433	62083	GCM37	4-Nonylphenol diethoxylate (sum of all isomers) (NP2EO)	9	7	--	8	10	3
1433	62062	GCM37	4-*tert*-Octylphenol	8	7	1	5	13	3

Table 1–2. Summary of paired and unpaired quenched and nonquenched finished-water matrix-spike samples by source of supply and primary use or source group.—Continued

[USGS, U.S. Geological Survey; PCODE, parameter code; --, no data]

USGS schedule	USGS PCODE	USGS method	Compound name	Surface water			Groundwater		
				Paired quenched and non-quenched finished-water matrix-spike samples	Unpaired quenched finished-water matrix-spike samples	Unpaired non-quenched finished-water matrix-spike samples	Paired quenched and non-quenched finished-water matrix-spike samples	Unpaired quenched finished-water matrix-spike samples	Unpaired non-quenched finished-water matrix-spike samples
Personal-care and domestic-use products—Continued									
1433	61705	GCM37	4-*tert*-Octylphenol diethoxylate (OP2EO)	8	7	--	6	12	3
1433	61706	GCM37	4-*tert*-Octylphenol monoethoxylate (OP1EO)	9	7	--	7	11	3
1433	62064	GCM37	Acetophenone	10	6	--	12	6	3
1433	62065	GCM37	Acetyl hexamethyl tetrahydronaphthalene (AHTN)	10	6	--	12	6	3
1433	50305	GCM37	Caffeine	2	--	--	1	3	--
1433	62070	GCM37	Camphor	10	6	--	12	6	3
1433	62005	GCM37	Cotinine	10	6	--	12	6	3
1433	62073	GCM37	*d*-Limonene	9	7	--	5	13	3
1433	62075	GCM37	Hexahydrohexamethyl-cyclopentabenzo-pyran (HHCB)	10	6	--	12	6	3
1433	62076	GCM37	Indole	9	7	--	5	13	3
1433	62077	GCM37	Isoborneol	10	6	--	12	6	3
1433	62079	GCM37	Isoquinoline	10	6	--	11	7	3
1433	62080	GCM37	Menthol	10	6	--	12	6	3
1433	62081	GCM37	Methyl salicylate	9	7	--	5	13	3
1433	62082	GCM37	*N,N*-diethyl-*meta*-toluamide (DEET)	10	6	--	12	6	3
1433	34466	GCM37	Phenol	9	7	--	5	9	3
1433	62090	GCM37	Triclosan	8	7	1	8	10	3
1433	62091	GCM37	Triethyl citrate (ethyl citrate)	10	6	--	12	6	3
2020	77297	GCM66	Bromochloromethane	9	5	--	15	3	--
2060	50305	LCM29	Caffeine	7	13	2	15	5	3
Plant- or animal-derived biochemicals									
1433	62057	GCM37	3-*beta*-Coprostanol	10	6	--	12	6	3
1433	62058	GCM37	3-Methyl-1(H)-indole (Skatole)	8	7	1	5	13	3
1433	62068	GCM37	*beta*-Sitosterol	9	6	--	9	8	3
1433	62086	GCM37	*beta*-Stigmastanol	10	5	--	12	6	3
1433	62072	GCM37	Cholesterol	9	6	--	8	10	3

Table 1–2. Summary of paired and unpaired quenched and nonquenched finished-water matrix-spike samples by source of supply and primary use or source group.—Continued

[USGS, U.S. Geological Survey; PCODE, parameter code; --, no data]

USGS schedule	USGS PCODE	USGS method	Compound name	Surface water: Paired quenched and non-quenched finished-water matrix-spike samples	Surface water: Unpaired quenched finished-water matrix-spike samples	Surface water: Unpaired non-quenched finished-water matrix-spike samples	Groundwater: Paired quenched and non-quenched finished-water matrix-spike samples	Groundwater: Unpaired quenched finished-water matrix-spike samples	Groundwater: Unpaired non-quenched finished-water matrix-spike samples
			Refrigerants and propellants						
2020	77652	GCM66	1,1,2-Trichlorotri-fluoroethane	9	5	--	15	3	--
2020	34668	GCM66	Dichlorodifluoro-methane	9	5	--	15	3	--
2020	34488	GCM66	Trichlorofluoromethane	9	5	--	15	3	--
			Solvents						
1433	62084	GCM37	*p*-Cresol	9	7	--	7	11	3
1433	34476	GCM37	Tetrachloroethylene	10	6	--	12	6	3
2020	77562	GCM66	1,1,1,2-Tetrachloro-ethane	9	5	--	15	3	--
2020	34506	GCM66	1,1,1-Trichloroethane	9	5	--	15	3	--
2020	34516	GCM66	1,1,2,2-Tetrachloro-ethane	9	5	--	15	3	--
2020	34511	GCM66	1,1,2-Trichloroethane	9	5	--	15	3	--
2020	34496	GCM66	1,1-Dichloroethane	9	5	--	15	3	--
2020	34501	GCM66	1,1-Dichloroethylene	9	5	--	15	3	--
2020	34551	GCM66	1,2,4-Trichlorobenzene	9	5	--	15	3	--
2020	34536	GCM66	1,2-Dichlorobenzene	9	5	--	15	3	--
2020	32103	GCM66	1,2-Dichloroethane	9	5	--	15	3	--
2020	34566	GCM66	1,3-Dichlorobenzene	9	5	--	15	3	--
2020	81595	GCM66	2-Butanone	9	5	--	15	3	--
2020	77275	GCM66	2-Chlorotoluene	9	5	--	15	3	--
2020	77103	GCM66	2-Hexanone	9	5	--	15	3	--
2020	77277	GCM66	4-Chlorotoluene	9	5	--	15	3	--
2020	78133	GCM66	4-Methyl-2-pentanone	9	5	--	15	3	--
2020	81552	GCM66	Acetone	9	5	--	15	3	--
2020	81555	GCM66	Bromobenzene	9	5	--	15	3	--
2020	34301	GCM66	Chlorobenzene	9	5	--	15	3	--
2020	34311	GCM66	Chloroethane	9	5	--	15	3	--
2020	77093	GCM66	*cis*-1,2-Dichloroeth-ylene	9	5	--	15	3	--
2020	30217	GCM66	Dibromomethane	9	5	--	15	3	--
2020	34423	GCM66	Dichloromethane	9	5	--	15	3	--
2020	81576	GCM66	Diethyl ether	9	5	--	15	3	--
2020	34396	GCM66	Hexachloroethane	9	5	--	15	3	--

Table 1–2. Summary of paired and unpaired quenched and nonquenched finished-water matrix-spike samples by source of supply and primary use or source group.—Continued

[USGS, U.S. Geological Survey; PCODE, parameter code; --, no data]

USGS schedule	USGS PCODE	USGS method	Compound name	Surface water			Groundwater		
				Paired quenched and non-quenched finished-water matrix-spike samples	Unpaired quenched finished-water matrix-spike samples	Unpaired non-quenched finished-water matrix-spike samples	Paired quenched and non-quenched finished-water matrix-spike samples	Unpaired quenched finished-water matrix-spike samples	Unpaired non-quenched finished-water matrix-spike samples
Solvents—Continued									
2020	77224	GCM66	*n*-Propylbenzene	9	5	--	15	3	--
2020	34475	GCM66	Tetrachloroethylene	9	5	--	15	3	--
2020	32102	GCM66	Tetrachloromethane	9	5	--	15	3	--
2020	81607	GCM66	Tetrahydrofuran	9	5	--	15	3	--
2020	34546	GCM66	*trans*-1,2-Dichloroethylene	9	5	--	15	3	--
2020	39180	GCM66	Trichloroethylene	9	5	--	15	3	--
4024	81552	GCM60	Acetone	1	--	--	1	--	--
4024	77032	GCM60	Methyl acetate	5	2	--	9	3	--

Appendix 2. Percent Recovery of Anthropogenic Organic Compounds in Quenched and Nonquenched Finished-Water Matrix-Spike Samples from Surface-Water Supplies Collected during Source Water-Quality Assessment Sampling, 2004–10.

The Microsoft Excel Spreadsheet (*surface_water_Appendix2.xls*) contains an information worksheet (Documentation and acronyms) that describes the documentation and acronyms used in the data worksheet (Surface-water data) for appendix 2. The data worksheet contains percent recovery values for each compound by use (or source) group. Use groups presented in this worksheet are defoliant; disinfection by-products; fumigant-related compounds; fungicides and fungicide degradates; 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; and solvents. Tab-delimited text files also are available for the documentation and acronyms (*Appendix2_readme.txt*) and the percent recovery data (*surface_water_text_data.txt*) for appendix 2.

Appendix 3. Percent Recovery of Anthropogenic Organic Compounds in Quenched and Nonquenched Finished-Water Matrix-Spike Samples from Groundwater Supplies Collected during Source Water-Quality Assessment Sampling, 2004–10.

The Microsoft Excel Spreadsheet (*groundwater_Appendix3.xls*) contains an information worksheet (Documentation and acronyms) that describes the documentation and acronyms used in the data worksheet (Groundwater data) for appendix 3. The data worksheet contains percent recovery values for each compound by use (or source) group. Use groups presented in this worksheet are defoliant; disinfection by-products; fumigant-related compounds; fungicides and fungicide degradates; 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; and solvents. Tab-delimited text files also are available for the documentation and acronyms (*Appendix3_readme.txt*) and the percent recovery data (*groundwater_text_data.txt*) for appendix 3.

Appendix 4. Supplemental Graphs—Percent Recoveries for Quenched and Nonquenched Finished-Water Matrix-Spike Samples by Primary Use or Source Group, from Surface-Water Supplies, 2004–10.

Percent recoveries for quenched and nonquenched finished-water matrix-spike samples are graphically presented in this appendix as figures 4–1 through 4–14 by primary use or source group, from surface-water supplies, 2004–10. The numbers of quenched and nonquenched finished-water samples for each compound are presented in table 1–2 in appendix 1. The lines shown on the graphs in appendix 4 are for visual purposes and are intended to highlight differences in percent recoveries between quenched and nonquenched samples for each individual compound.

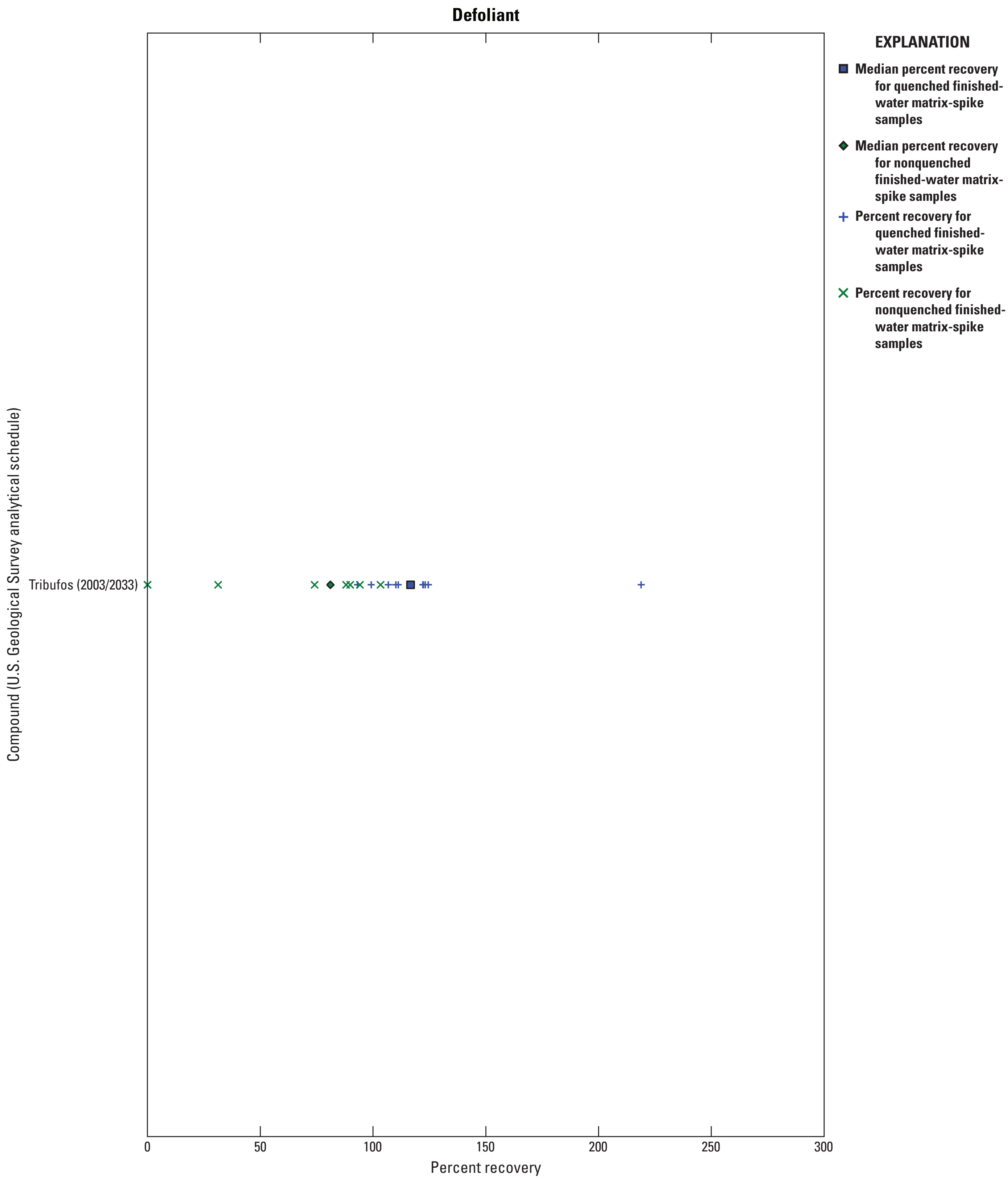


Figure 4–1. Percent recoveries for quenched and nonquenched finished-water matrix-spike samples from surface-water supplies, 2004–10, for the defoliant. The numbers of quenched and nonquenched finished-water samples for each compound are presented in table 1–2 in appendix 1.

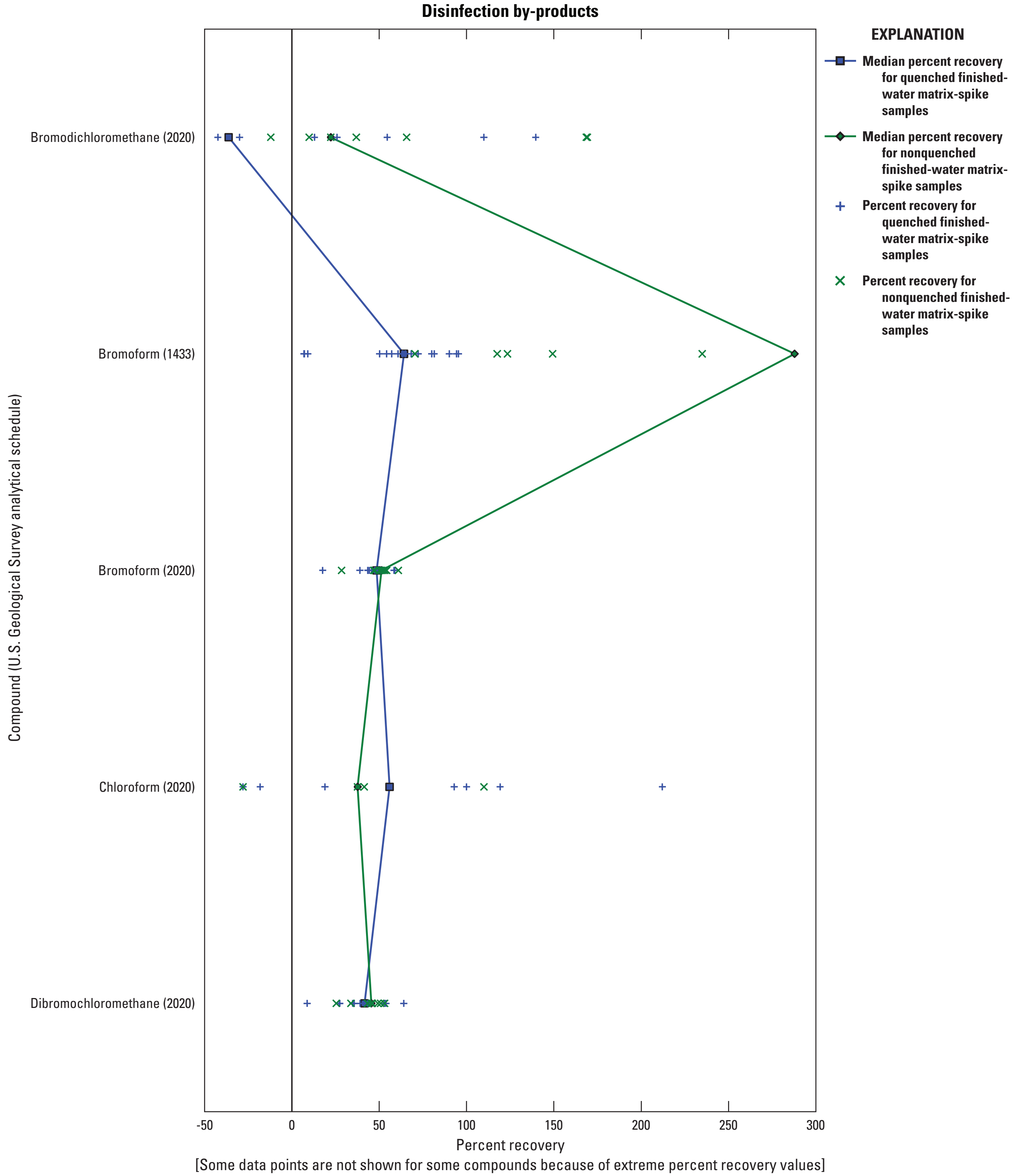


Figure 4–2. Percent recoveries for quenched and nonquenched finished-water matrix-spike samples from surface-water supplies, 2004–10, for disinfection by-products. The numbers of quenched and nonquenched finished-water samples for each compound are presented in table 1–2 in appendix 1. The lines shown on the graph are for visual purposes and are intended to highlight differences in percent recoveries between quenched and nonquenched samples for each individual compound.

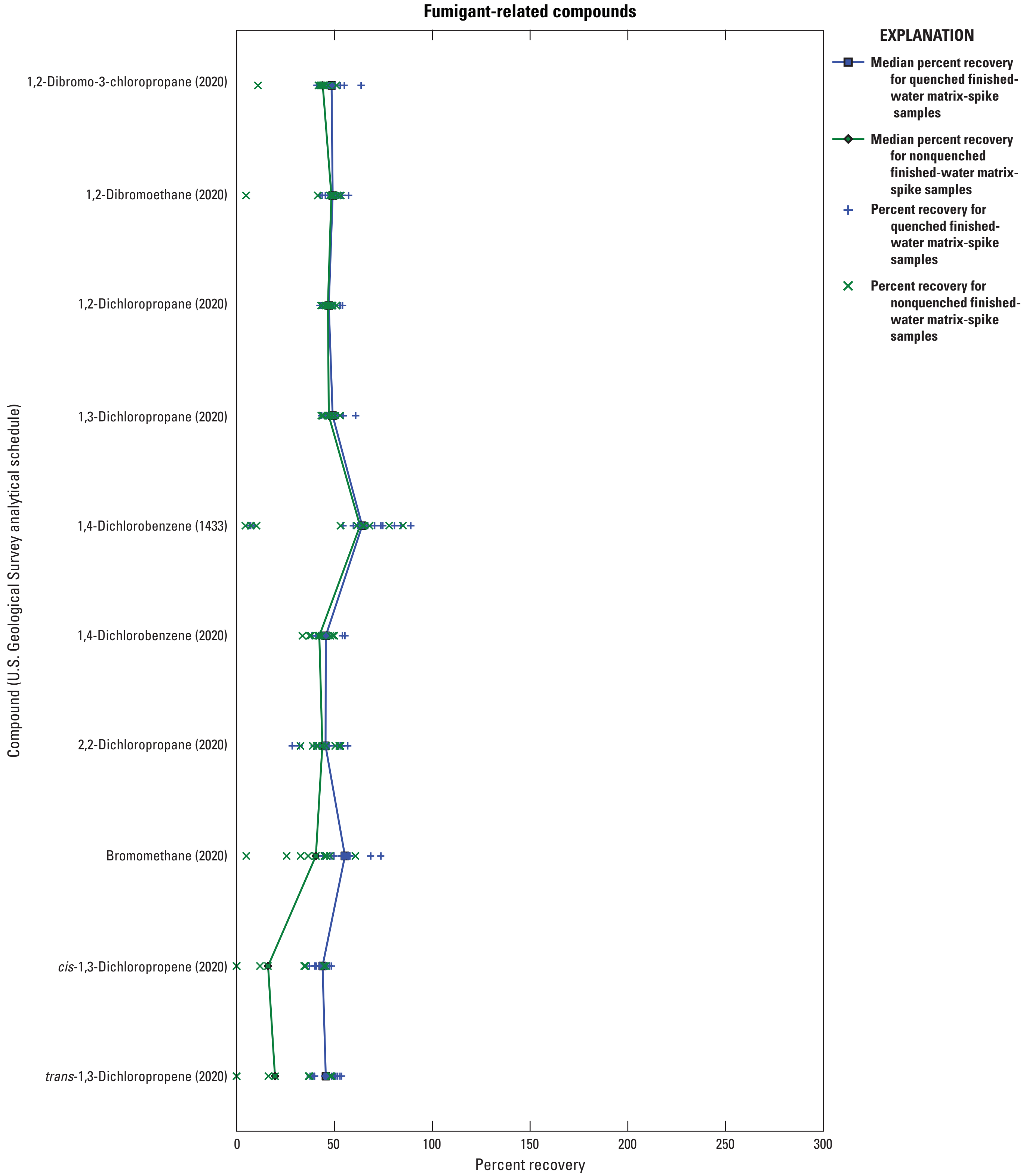


Figure 4–3. Percent recoveries for quenched and nonquenched finished-water matrix-spike samples from surface-water supplies, 2004–10, for fumigant-related compounds. The numbers of quenched and nonquenched finished-water samples for each compound are presented in table 1–2 in appendix 1. The lines shown on the graph are for visual purposes and are intended to highlight differences in percent recoveries between quenched and nonquenched samples for each individual compound.

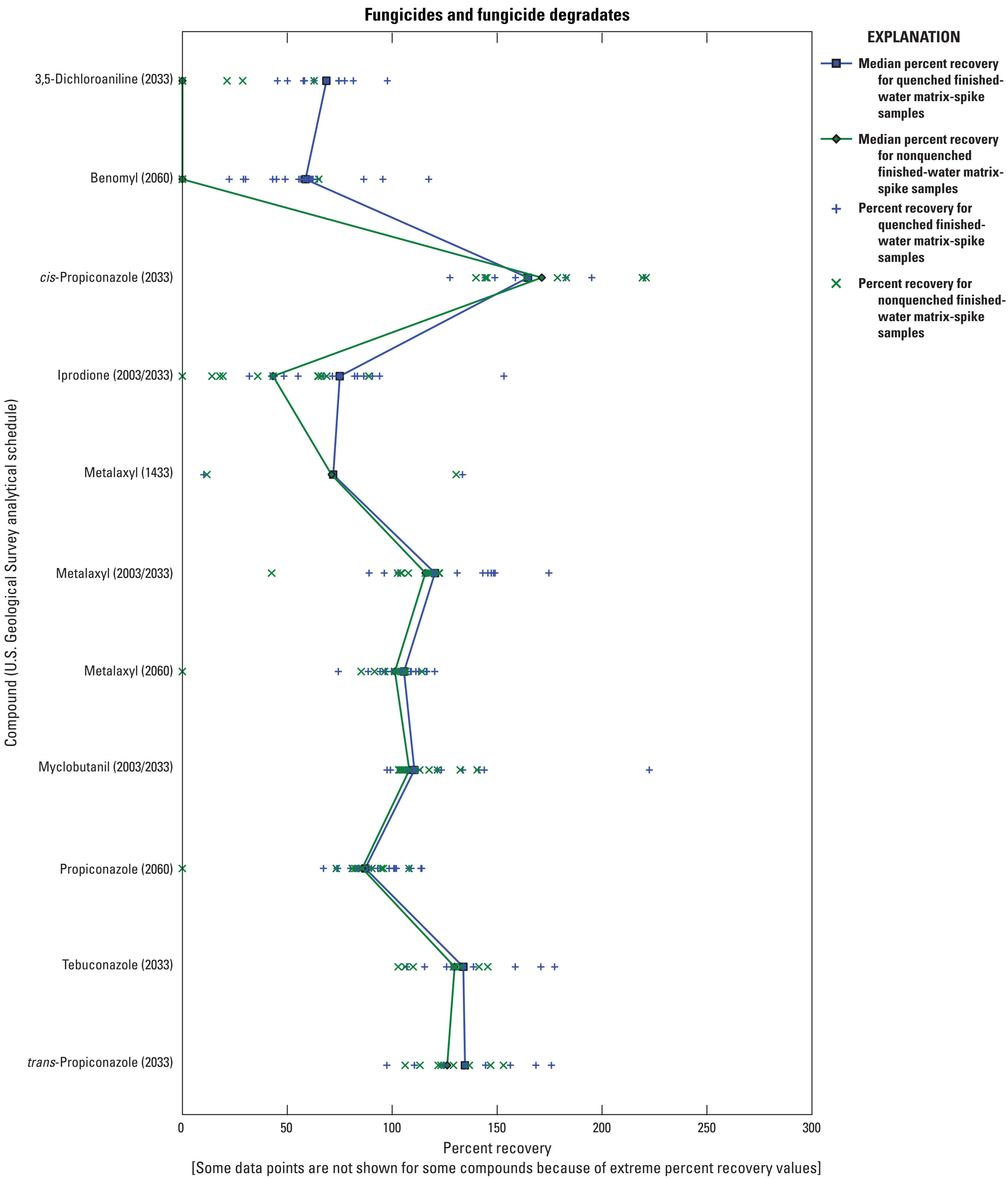


Figure 4–4. Percent recoveries for quenched and nonquenched finished-water matrix-spike samples from surface-water supplies, 2004–10, for fungicides and fungicide degradates. The numbers of quenched and nonquenched finished-water samples for each compound are presented in table 1–2 in appendix 1. The lines shown on the graph are for visual purposes and are intended to highlight differences in percent recoveries between quenched and nonquenched samples for each individual compound.

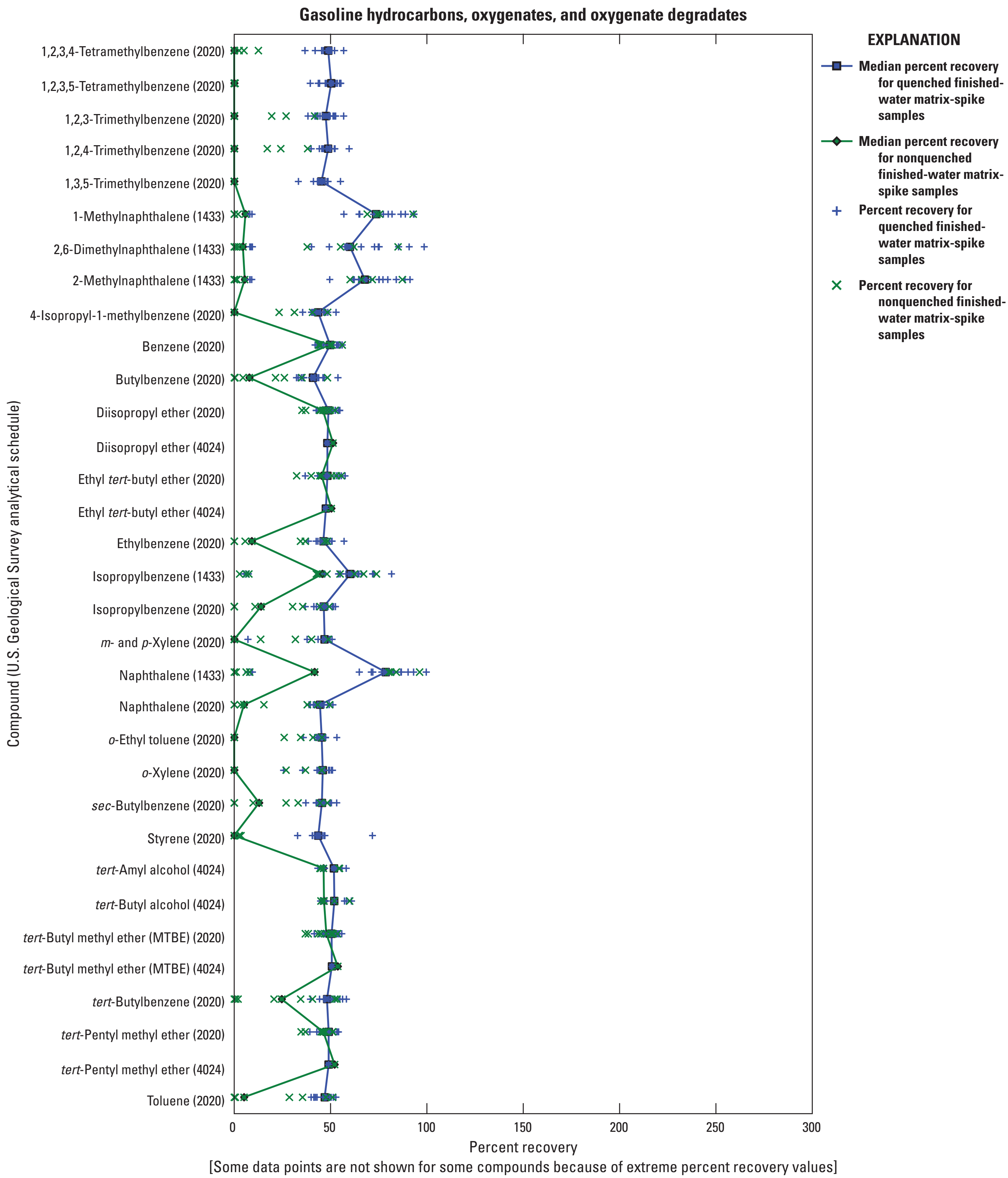


Figure 4–5. Percent recoveries for quenched and nonquenched finished-water matrix-spike samples from surface-water supplies, 2004–10, for gasoline hydrocarbons, oxygenates, and oxygenate degradates. The numbers of quenched and nonquenched finished-water samples for each compound are presented in table 1–2 in appendix 1. The lines shown on the graph are for visual purposes and are intended to highlight differences in percent recoveries between quenched and nonquenched samples for each individual compound.

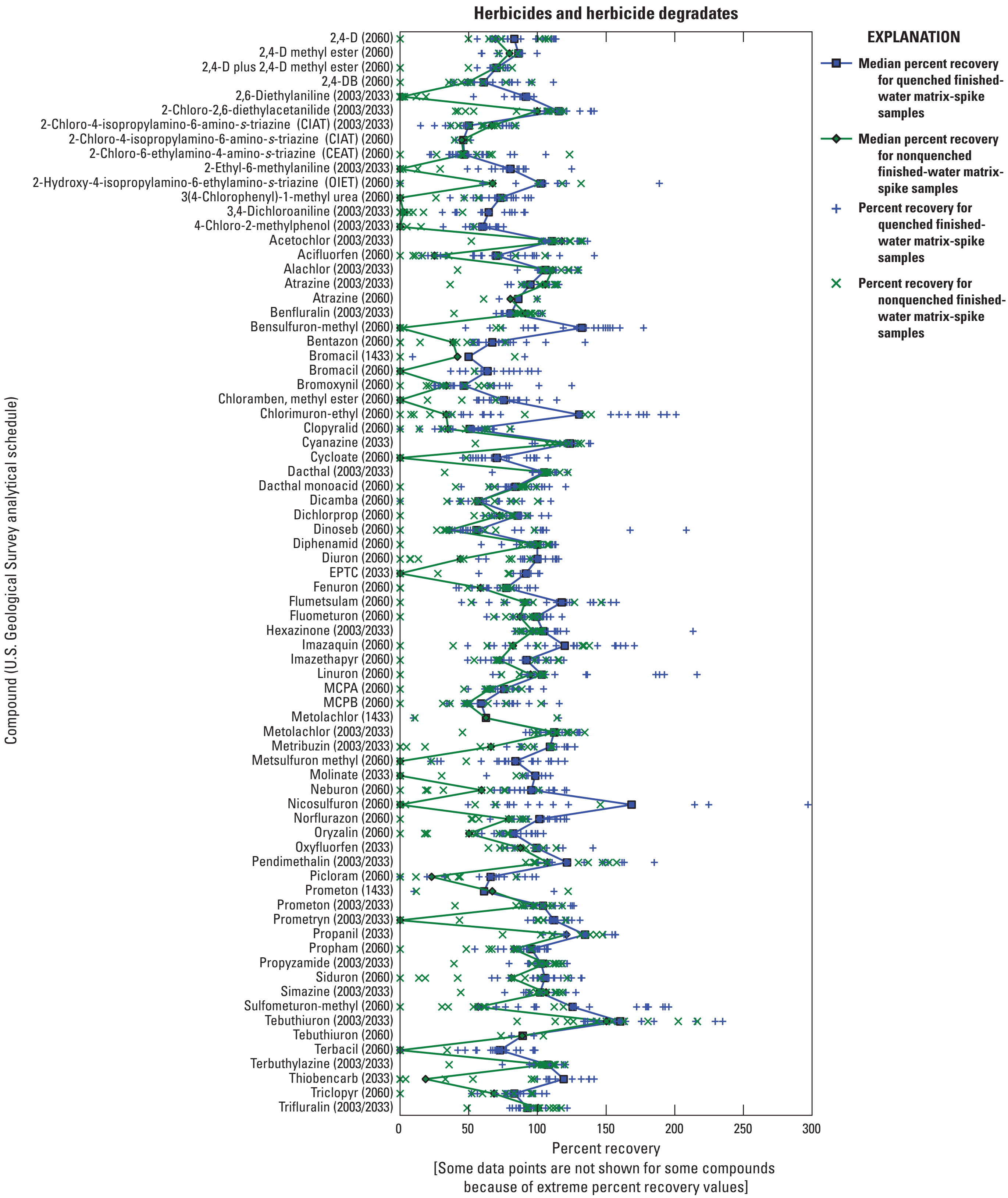


Figure 4–6. Percent recoveries for quenched and nonquenched finished-water matrix-spike samples from surface-water supplies, 2004–10, for herbicides and herbicide degradates. The numbers of quenched and nonquenched finished-water samples for each compound are presented in table 1–2 in appendix 1. The lines shown on the graph are for visual purposes and are intended to highlight differences in percent recoveries between quenched and nonquenched samples for each individual compound.

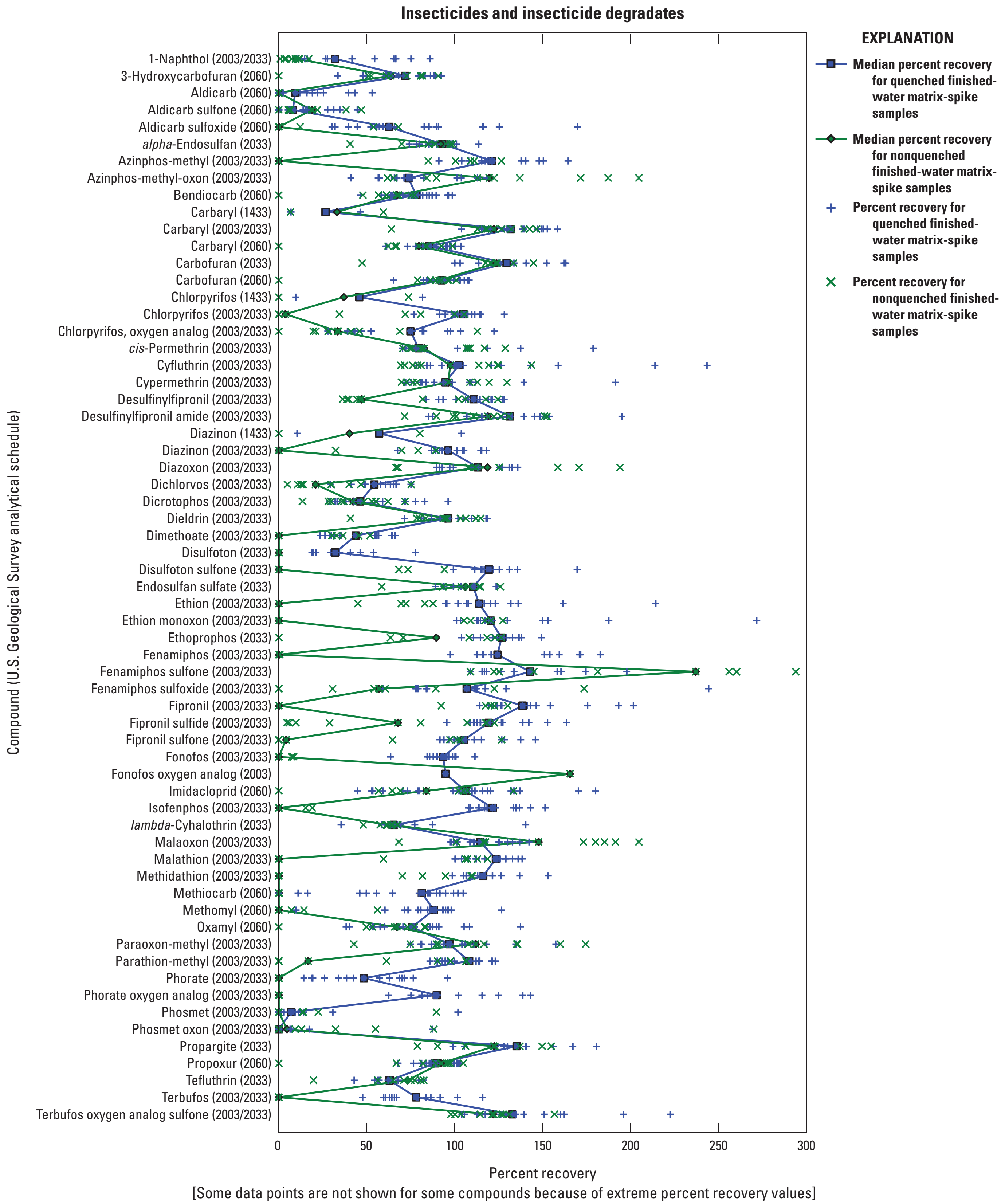


Figure 4–7. Percent recoveries for quenched and nonquenched finished-water matrix-spike samples from surface-water supplies, 2004–10, for insecticides and insecticide degradates. The numbers of quenched and nonquenched finished-water samples for each compound are presented in table 1–2 in appendix 1. The lines shown on the graph are for visual purposes and are intended to highlight differences in percent recoveries between quenched and nonquenched samples for each individual compound.

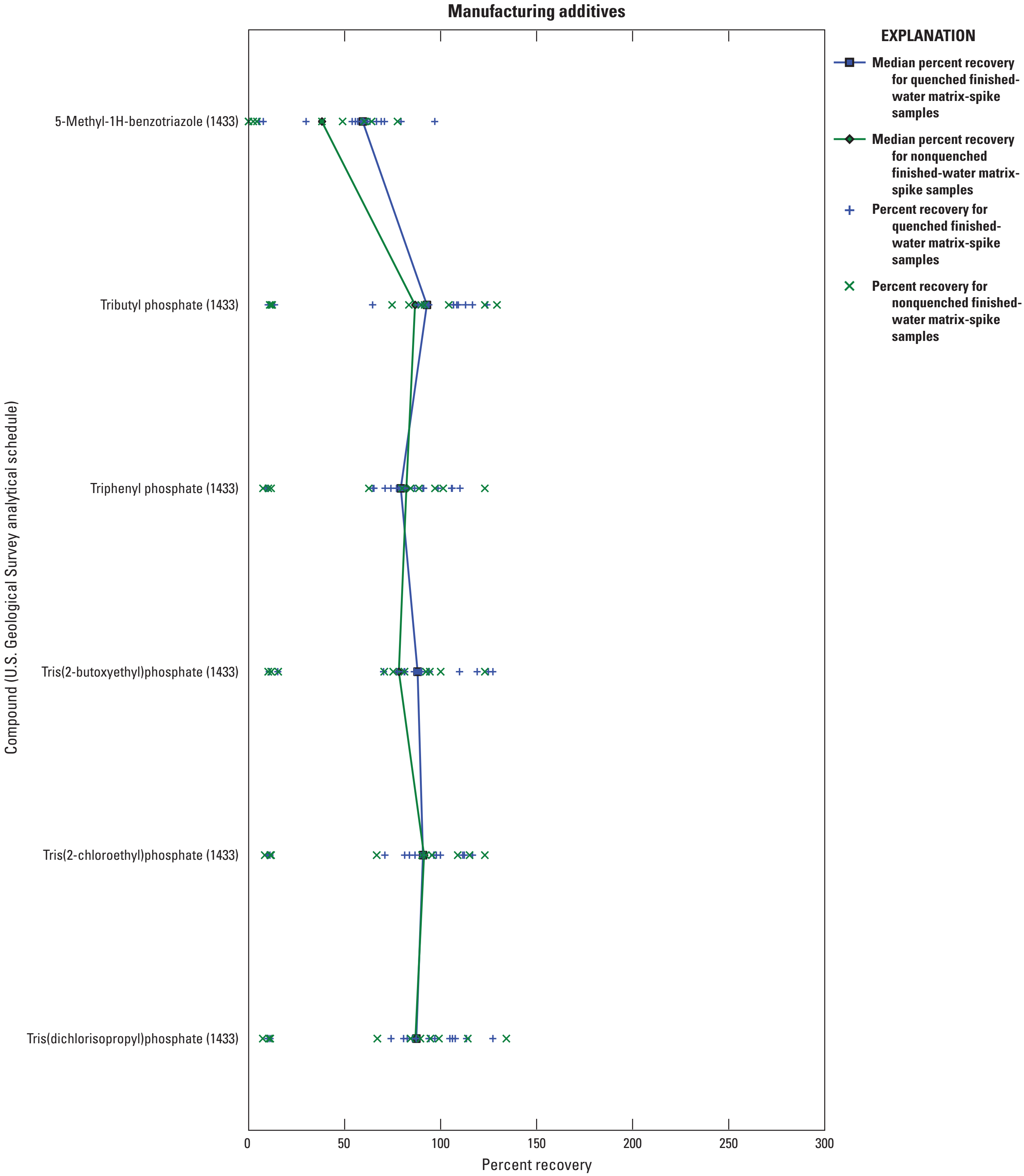


Figure 4–8. Percent recoveries for quenched and nonquenched finished-water matrix-spike samples from surface-water supplies, 2004–10, for manufacturing additives. The numbers of quenched and nonquenched finished-water samples for each compound are presented in table 1–2 in appendix 1. The lines shown on the graph are for visual purposes and are intended to highlight differences in percent recoveries between quenched and nonquenched samples for each individual compound.

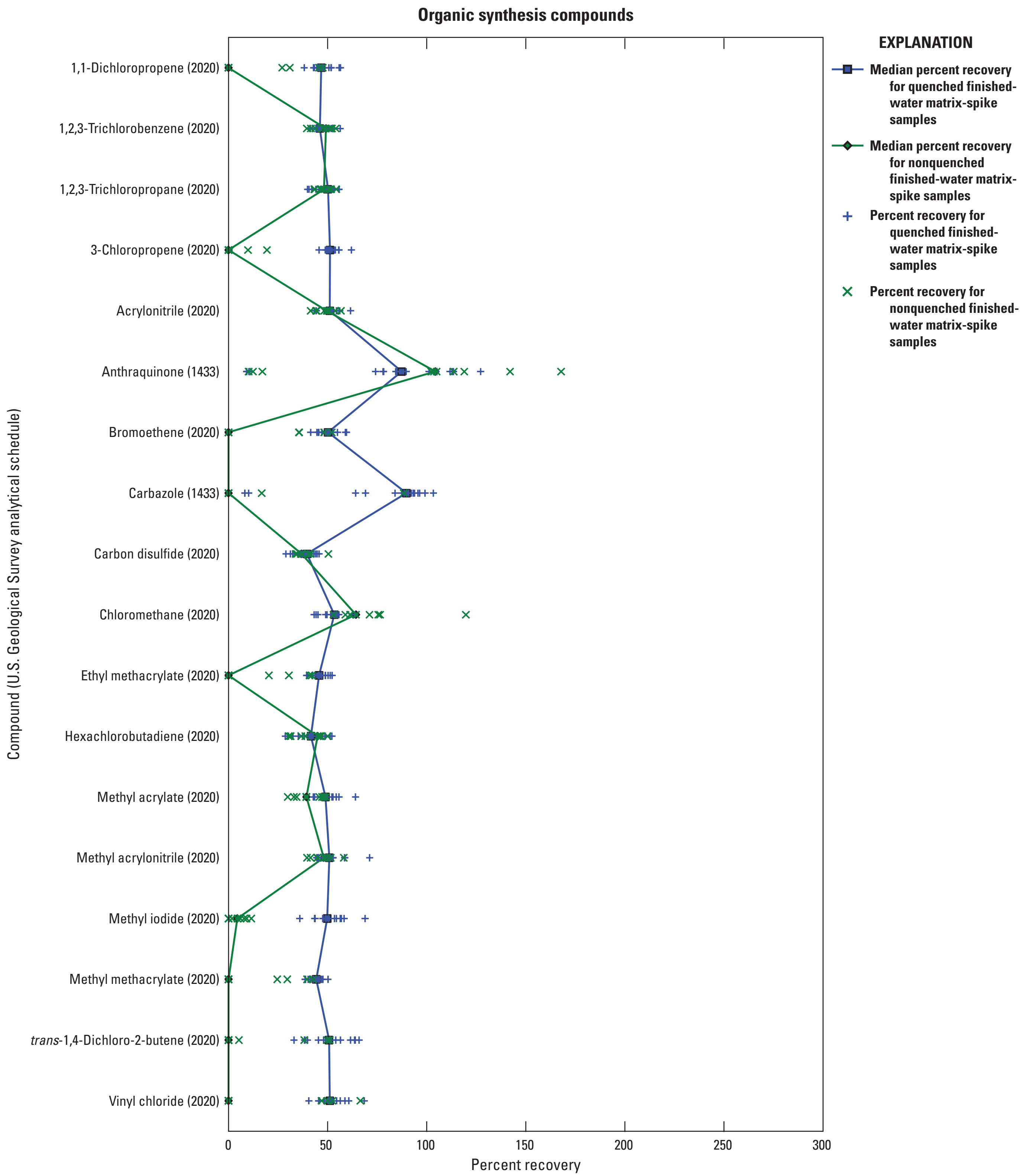


Figure 4–9. Percent recoveries for quenched and nonquenched finished-water matrix-spike samples from surface-water supplies, 2004–10, for organic synthesis compounds. The numbers of quenched and nonquenched finished-water samples for each compound are presented in table 1–2 in appendix 1. The lines shown on the graph are for visual purposes and are intended to highlight differences in percent recoveries between quenched and nonquenched samples for each individual compound.

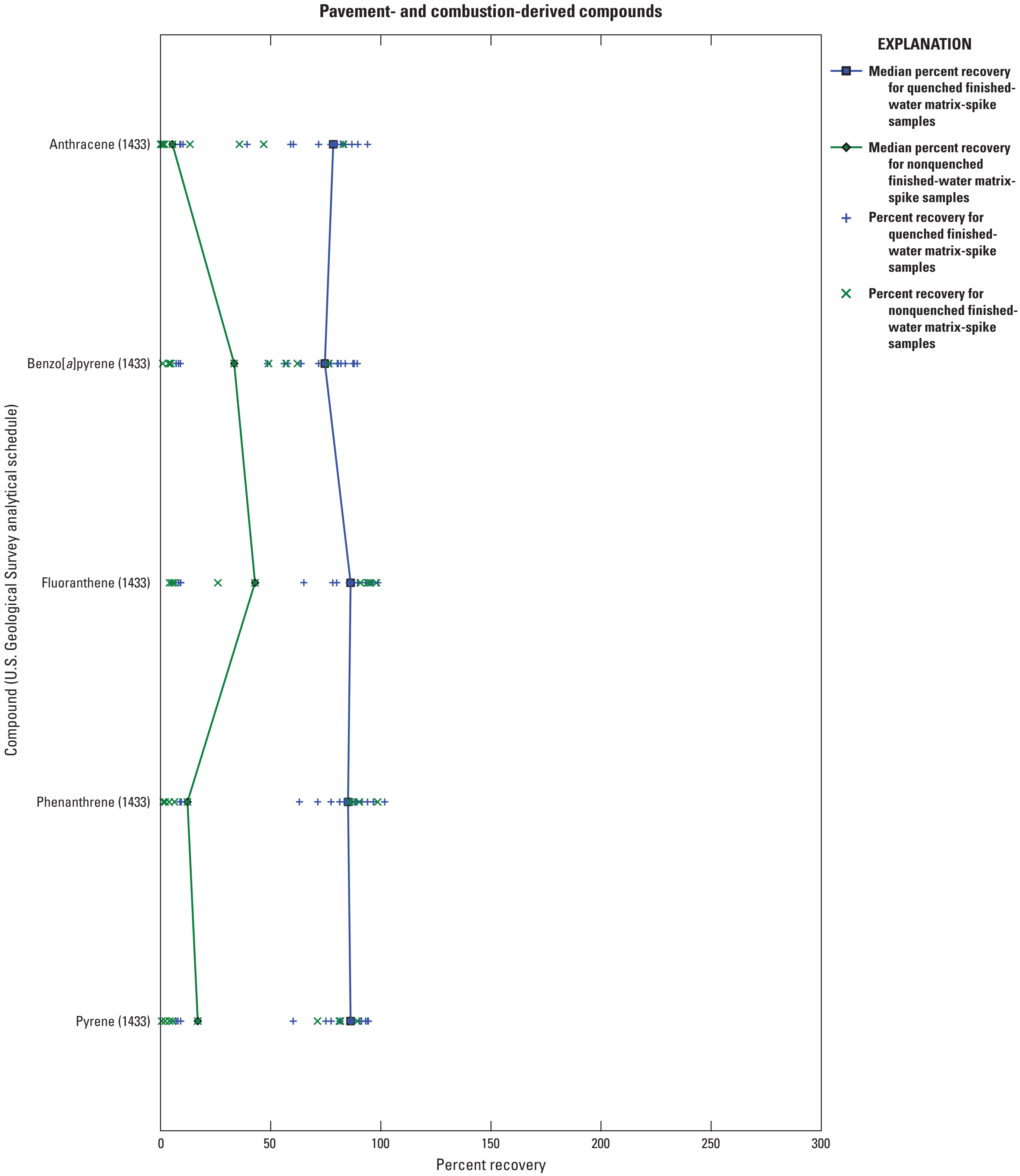


Figure 4–10. Percent recoveries for quenched and nonquenched finished-water matrix-spike samples from surface-water supplies, 2004–10, for pavement- and combustion-derived compounds. The numbers of quenched and nonquenched finished-water samples for each compound are presented in table 1–2 in appendix 1. The lines shown on the graph are for visual purposes and are intended to highlight differences in percent recoveries between quenched and nonquenched samples for each individual compound.

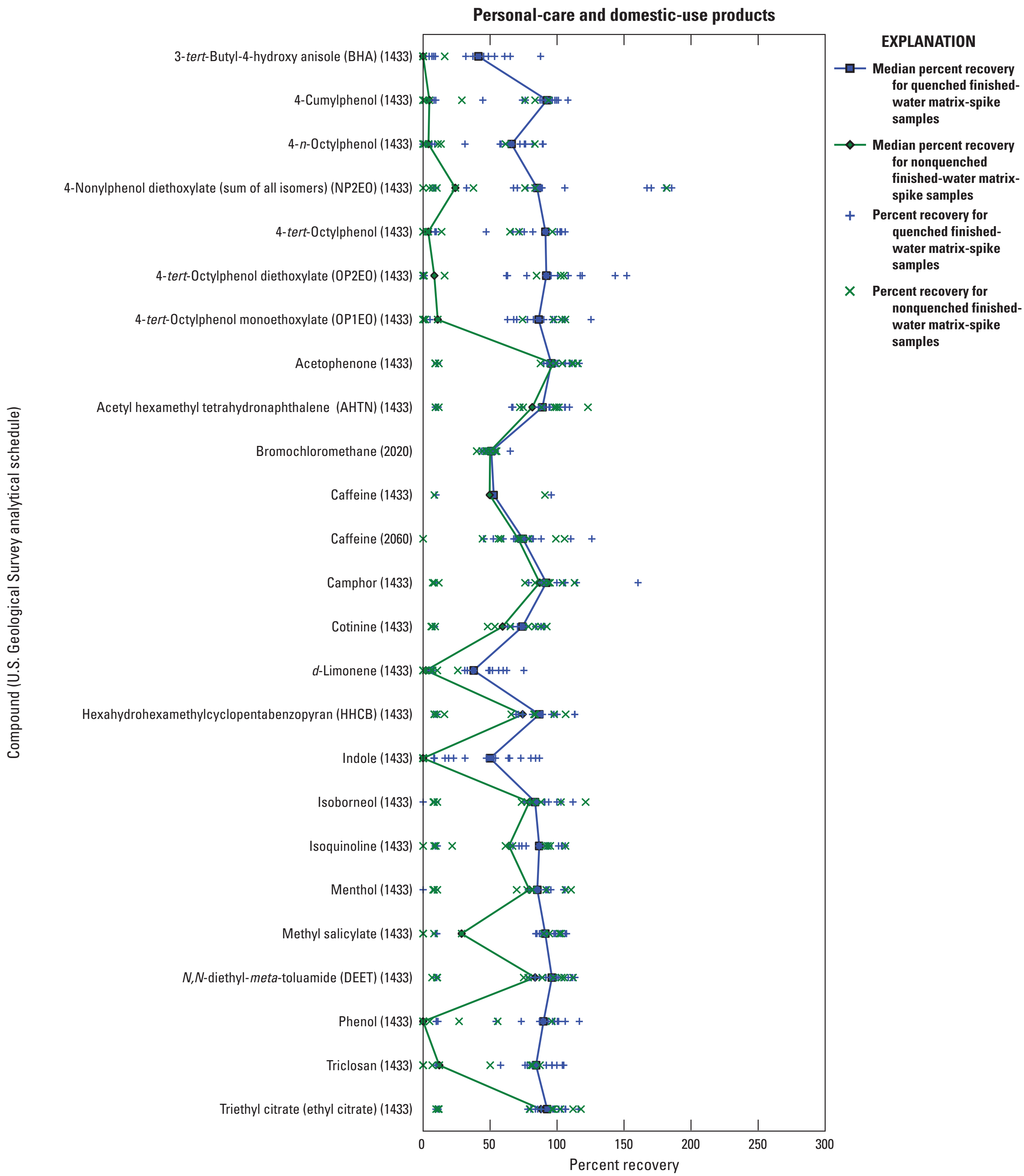


Figure 4–11. Percent recoveries for quenched and nonquenched finished-water matrix-spike samples from surface-water supplies, 2004–10, for personal-care and domestic-use products. The numbers of quenched and nonquenched finished-water samples for each compound are presented in table 1–2 in appendix 1. The lines shown on the graph are for visual purposes and are intended to highlight differences in percent recoveries between quenched and nonquenched samples for each individual compound.

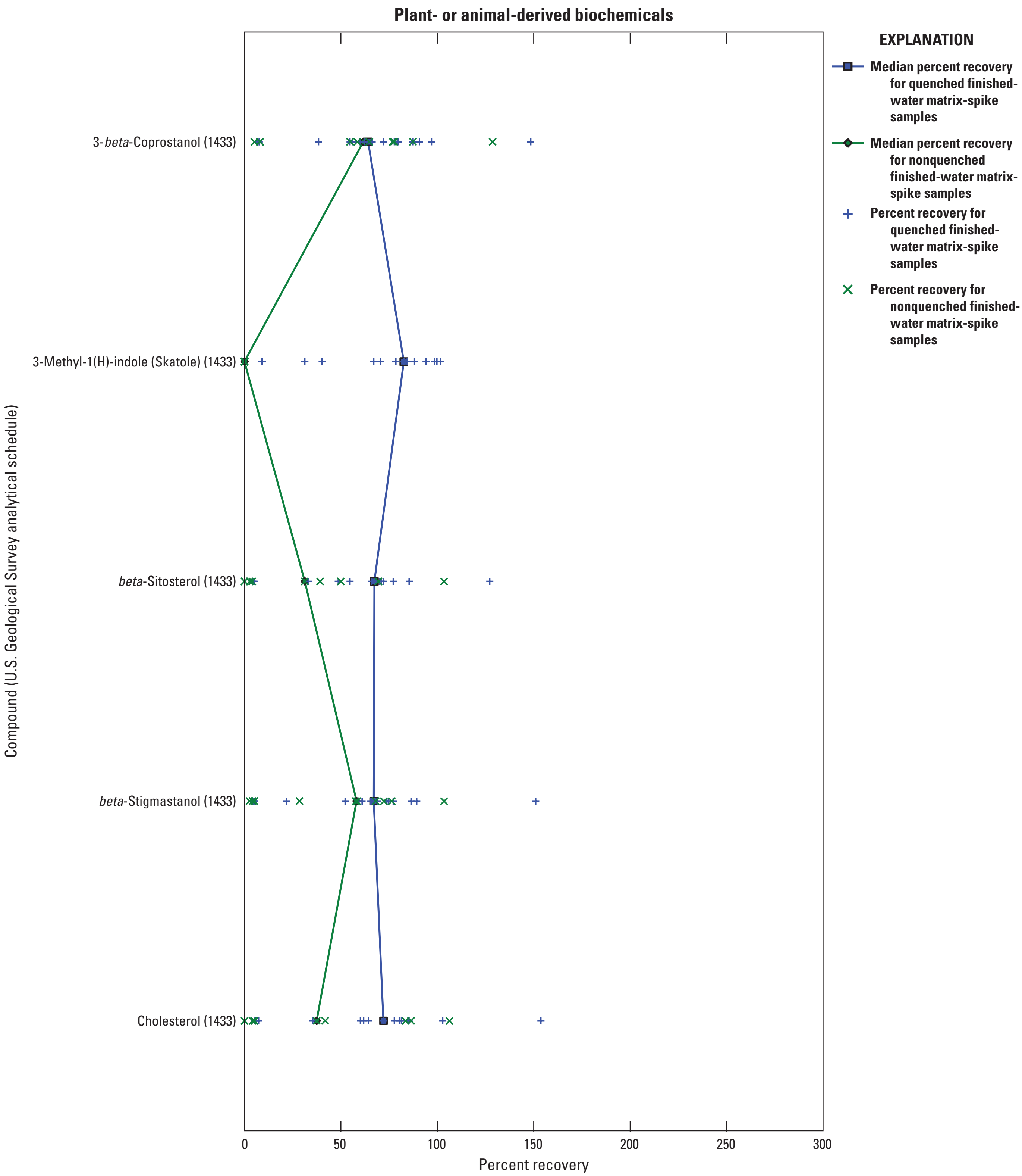


Figure 4–12. Percent recoveries for quenched and nonquenched finished-water matrix-spike samples from surface-water supplies, 2004–10, for plant- or animal-derived biochemicals. The numbers of quenched and nonquenched finished-water samples for each compound are presented in table 1–2 in appendix 1. The lines shown on the graph are for visual purposes and are intended to highlight differences in percent recoveries between quenched and nonquenched samples for each individual compound.

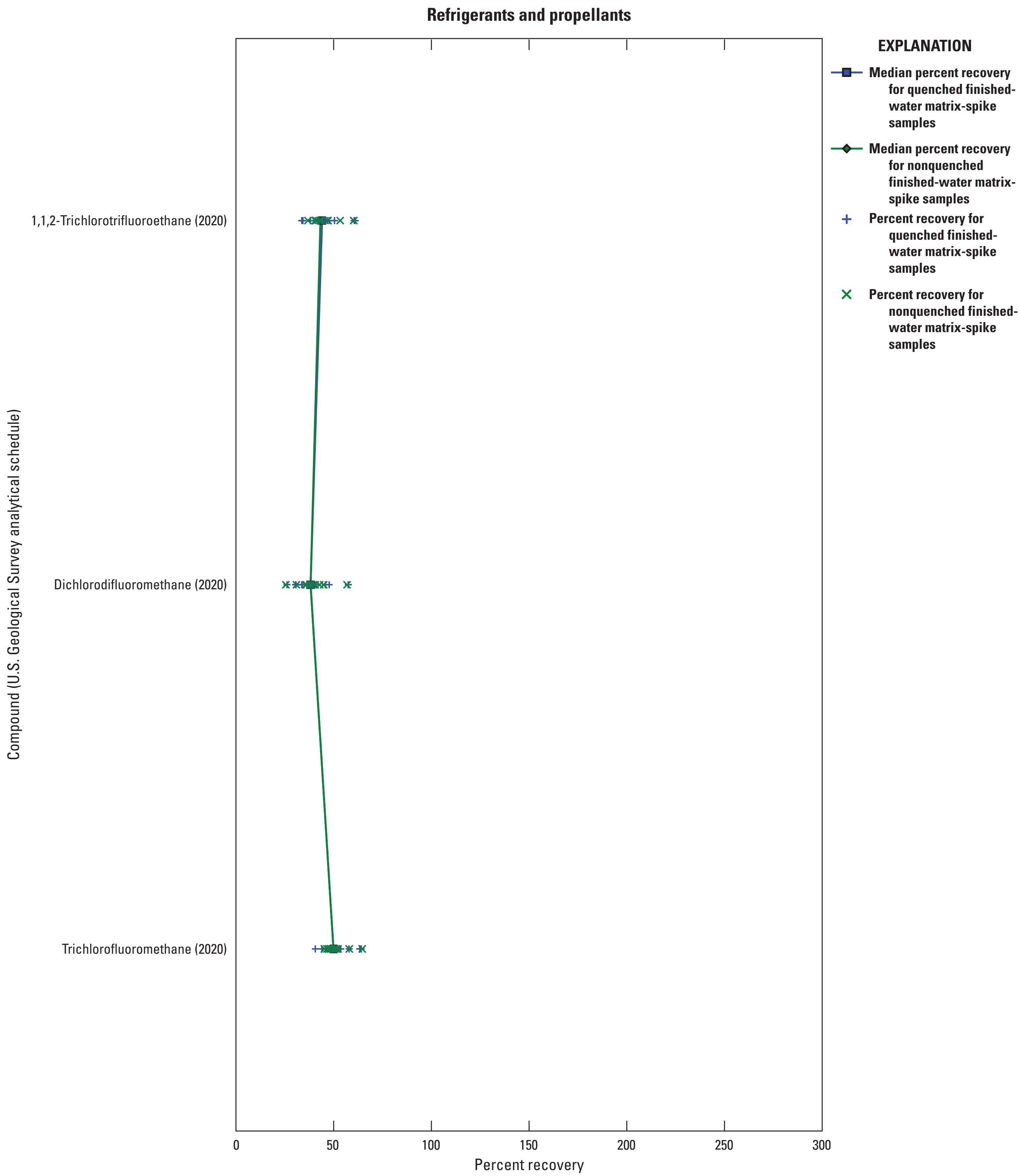


Figure 4–13. Percent recoveries for quenched and nonquenched finished-water matrix-spike samples from surface-water supplies, 2004–10, for refrigerants and propellants. The numbers of quenched and nonquenched finished-water samples for each compound are presented in table 1–2 in appendix 1. The lines shown on the graph are for visual purposes and are intended to highlight differences in percent recoveries between quenched and nonquenched samples for each individual compound.

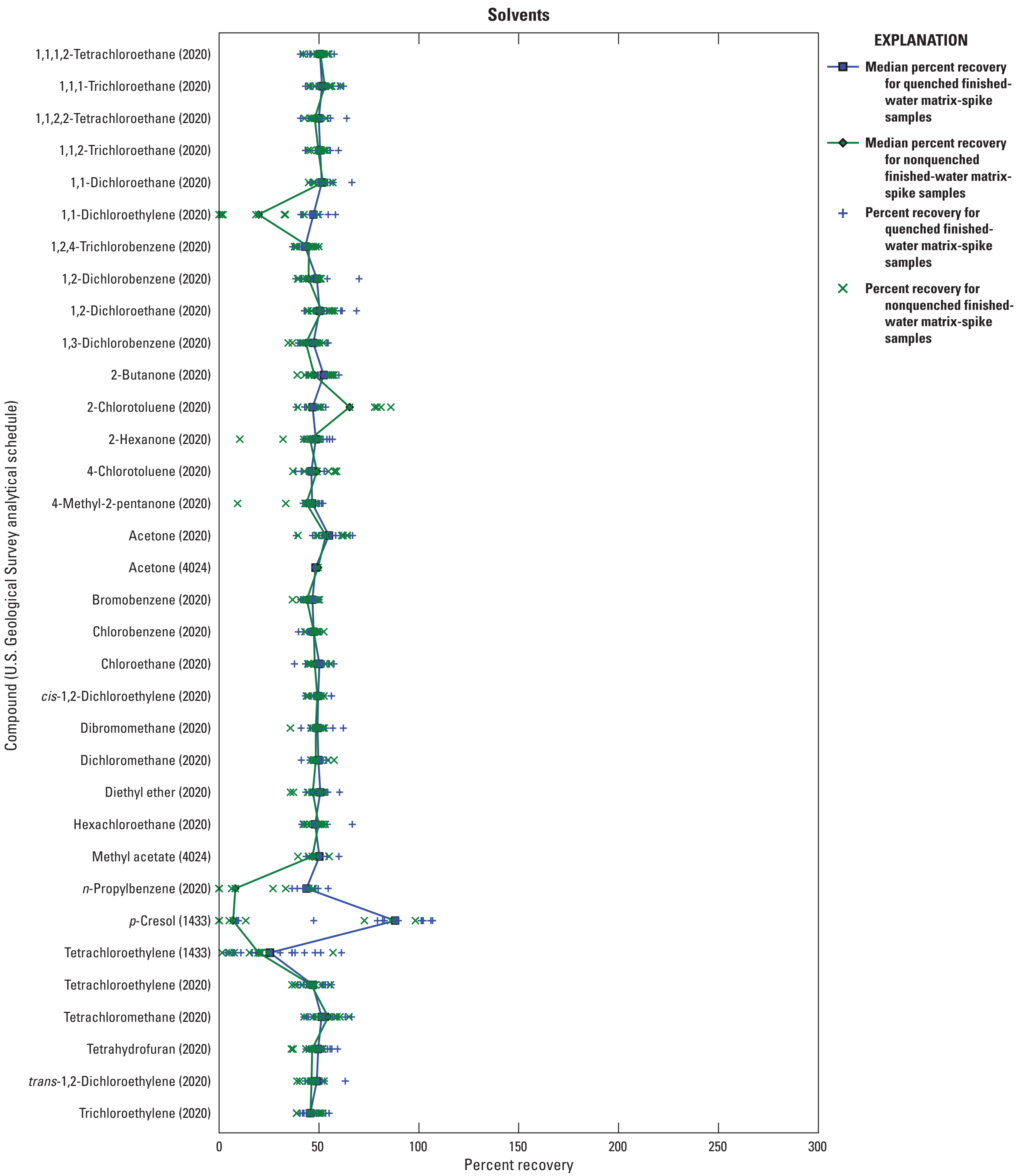


Figure 4–14. Percent recoveries for quenched and nonquenched finished-water matrix-spike samples from surface-water supplies, 2004–10, for solvents. The numbers of quenched and nonquenched finished-water samples for each compound are presented in table 1–2 in appendix 1. The lines shown on the graph are for visual purposes and are intended to highlight differences in percent recoveries between quenched and nonquenched samples for each individual compound.

Appendix 5. Supplemental Graphs—Percent Recoveries for Quenched and Nonquenched Finished-Water Matrix-Spike Samples by Primary Use or Source Group, from Groundwater Supplies, 2004–10.

Percent recoveries for quenched and nonquenched finished-water matrix-spike samples are graphically presented in this appendix as figures 5–1 through 5–14 by primary use or source group, from groundwater supplies, 2004–10. The numbers of quenched and nonquenched finished-water samples for each compound are presented in table 1–2 in appendix 1. The lines shown on the graphs in appendix 5 are for visual purposes and are intended to highlight differences in percent recoveries between quenched and nonquenched samples for each individual compound.

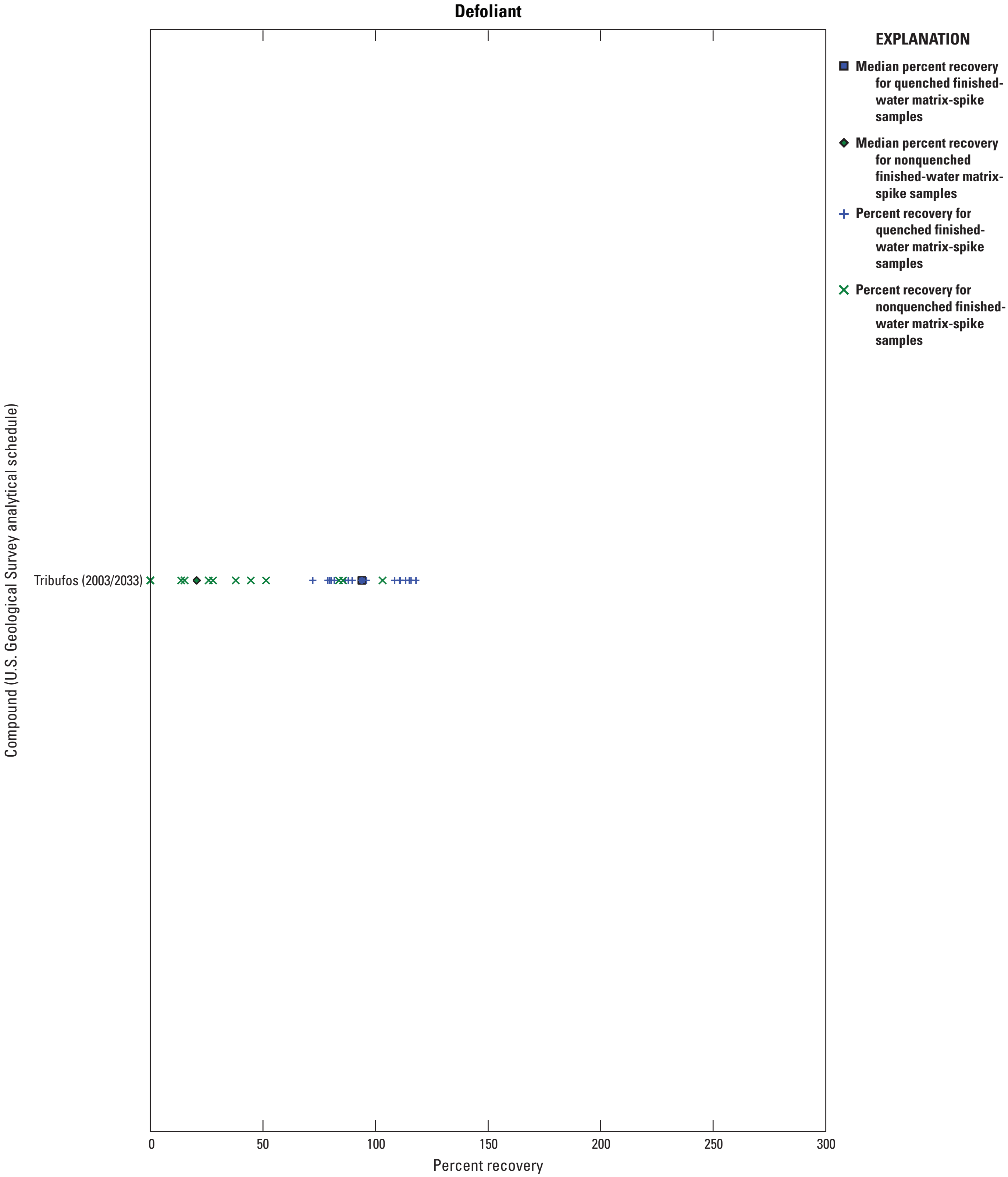


Figure 5–1. Percent recoveries for quenched and nonquenched finished-water matrix-spike samples from groundwater supplies, 2004–10, for the defoliant. The numbers of quenched and nonquenched finished-water samples for each compound are presented in table 1–2 in appendix 1.

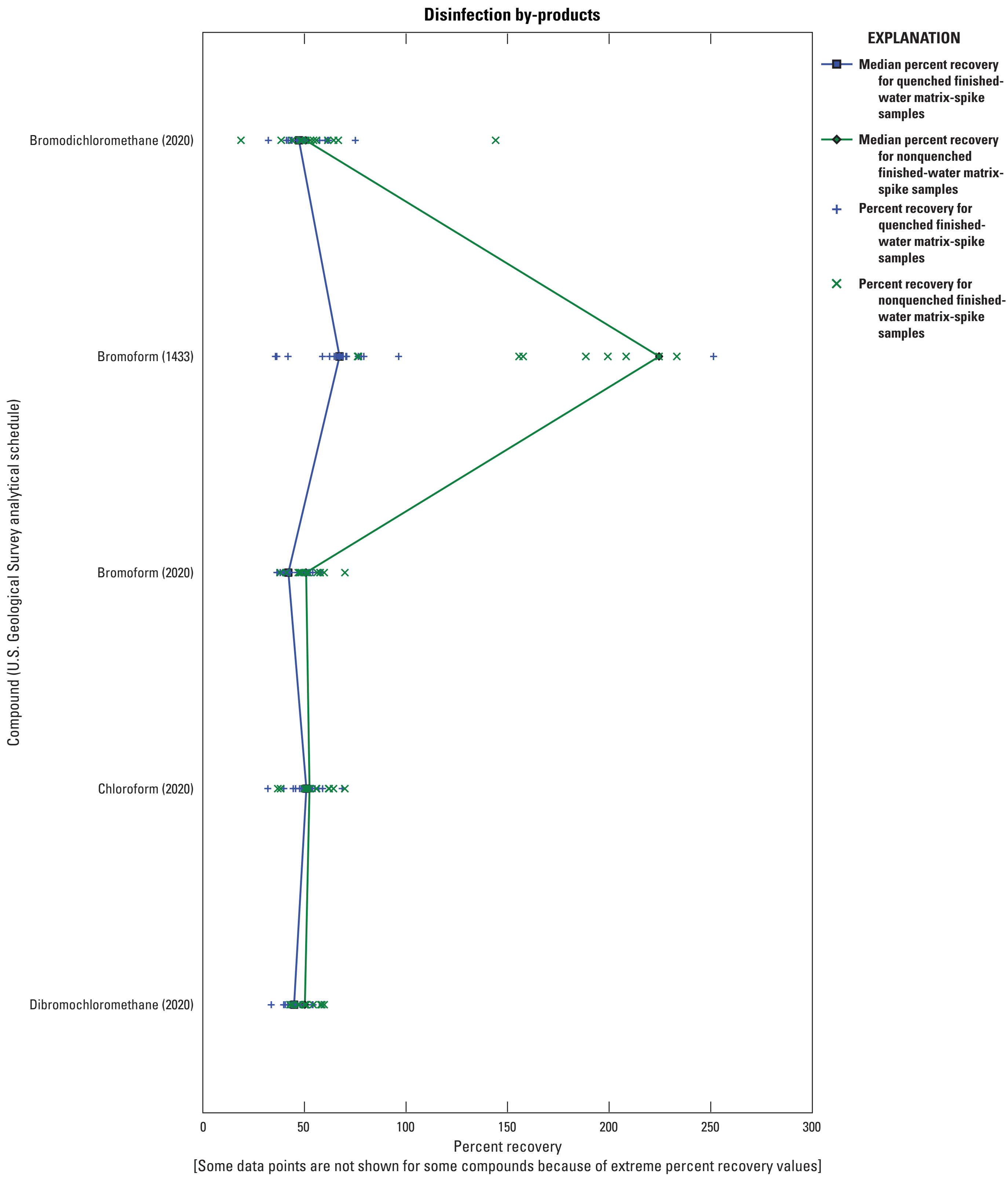


Figure 5–2. Percent recoveries for quenched and nonquenched finished-water matrix-spike samples from groundwater supplies, 2004–10, for disinfection by-products. The numbers of quenched and nonquenched finished-water samples for each compound are presented in table 1–2 in appendix 1. The lines shown on the graph are for visual purposes and are intended to highlight differences in percent recoveries between quenched and nonquenched samples for each individual compound.

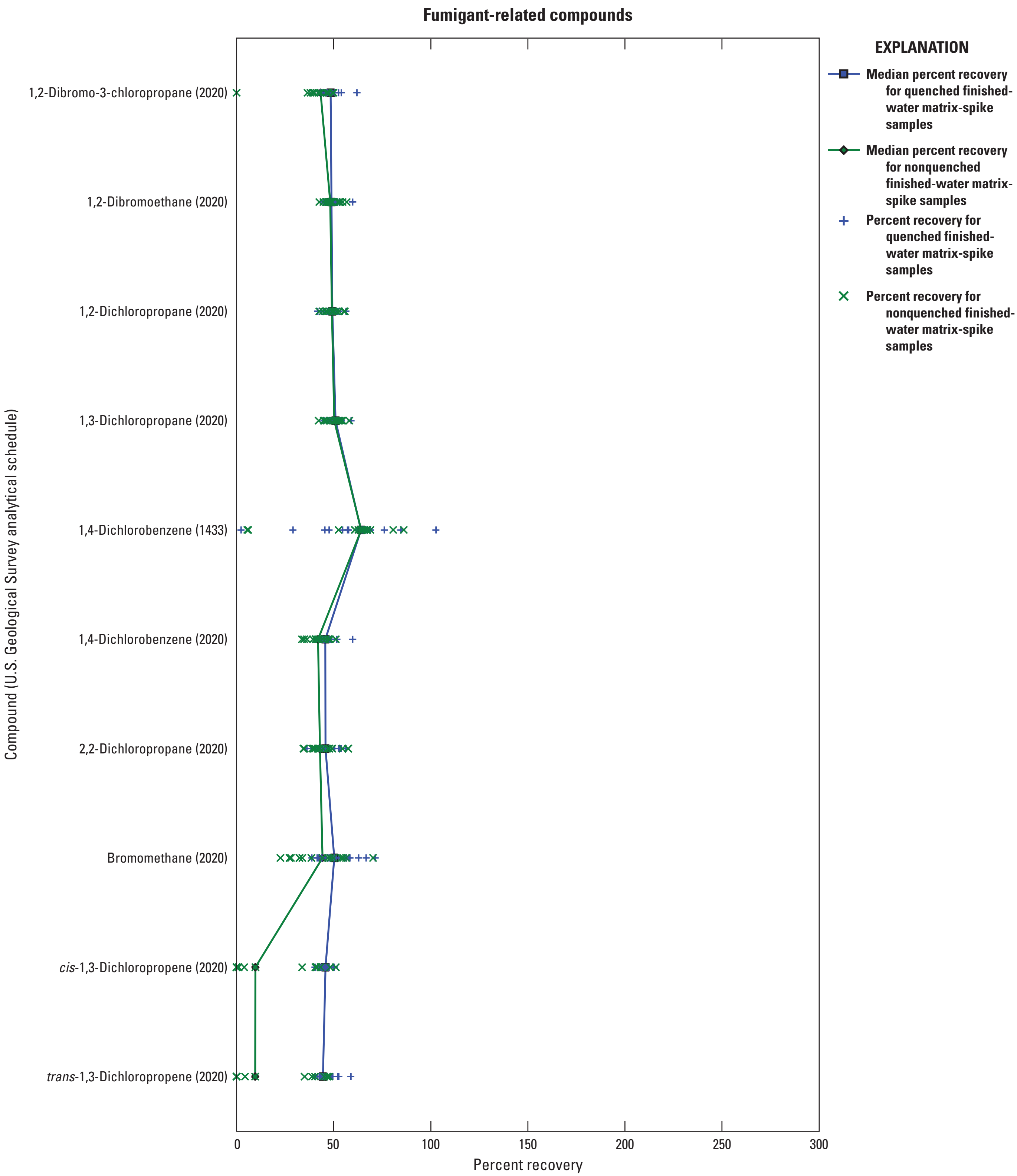


Figure 5–3. Percent recoveries for quenched and nonquenched finished-water matrix-spike samples from groundwater supplies, 2004–10, for fumigant-related compounds. The numbers of quenched and nonquenched finished-water samples for each compound are presented in table 1–2 in appendix 1. The lines shown on the graph are for visual purposes and are intended to highlight differences in percent recoveries between quenched and nonquenched samples for each individual compound.

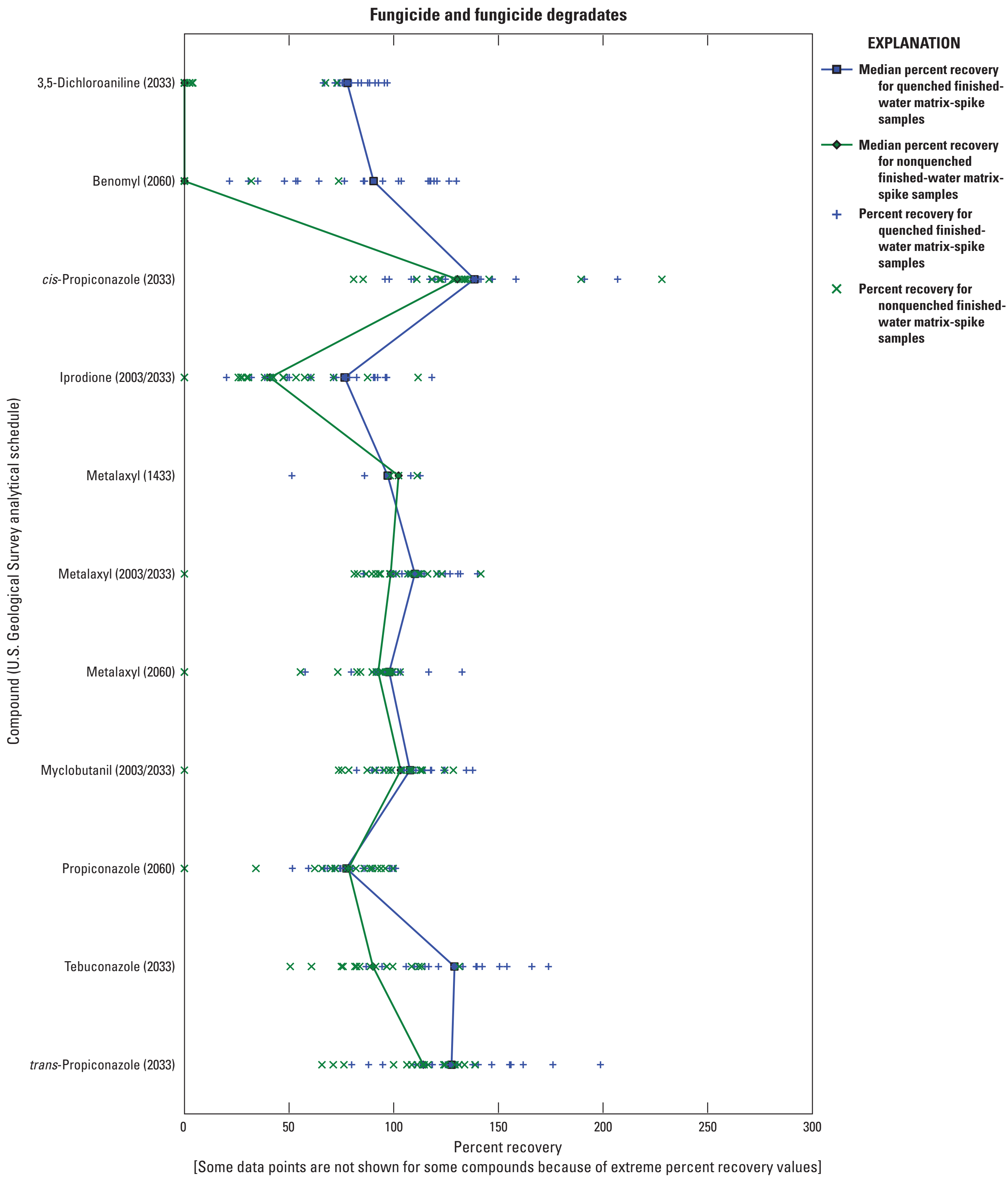


Figure 5–4. Percent recoveries for quenched and nonquenched finished-water matrix-spike samples from groundwater supplies, 2004–10, for fungicides and fungicide degradates. The numbers of quenched and nonquenched finished-water samples for each compound are presented in table 1–2 in appendix 1. The lines shown on the graph are for visual purposes and are intended to highlight differences in percent recoveries between quenched and nonquenched samples for each individual compound.

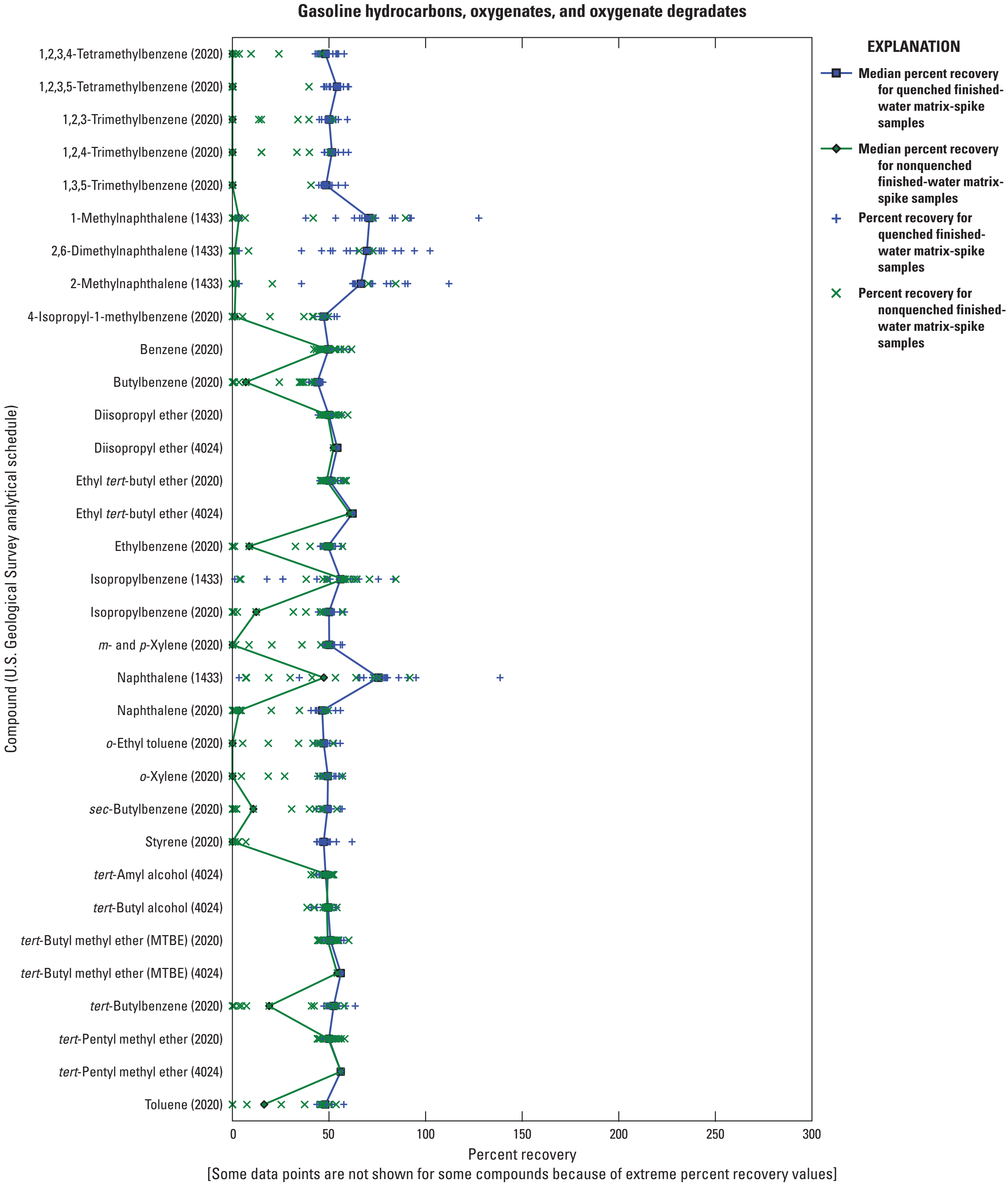
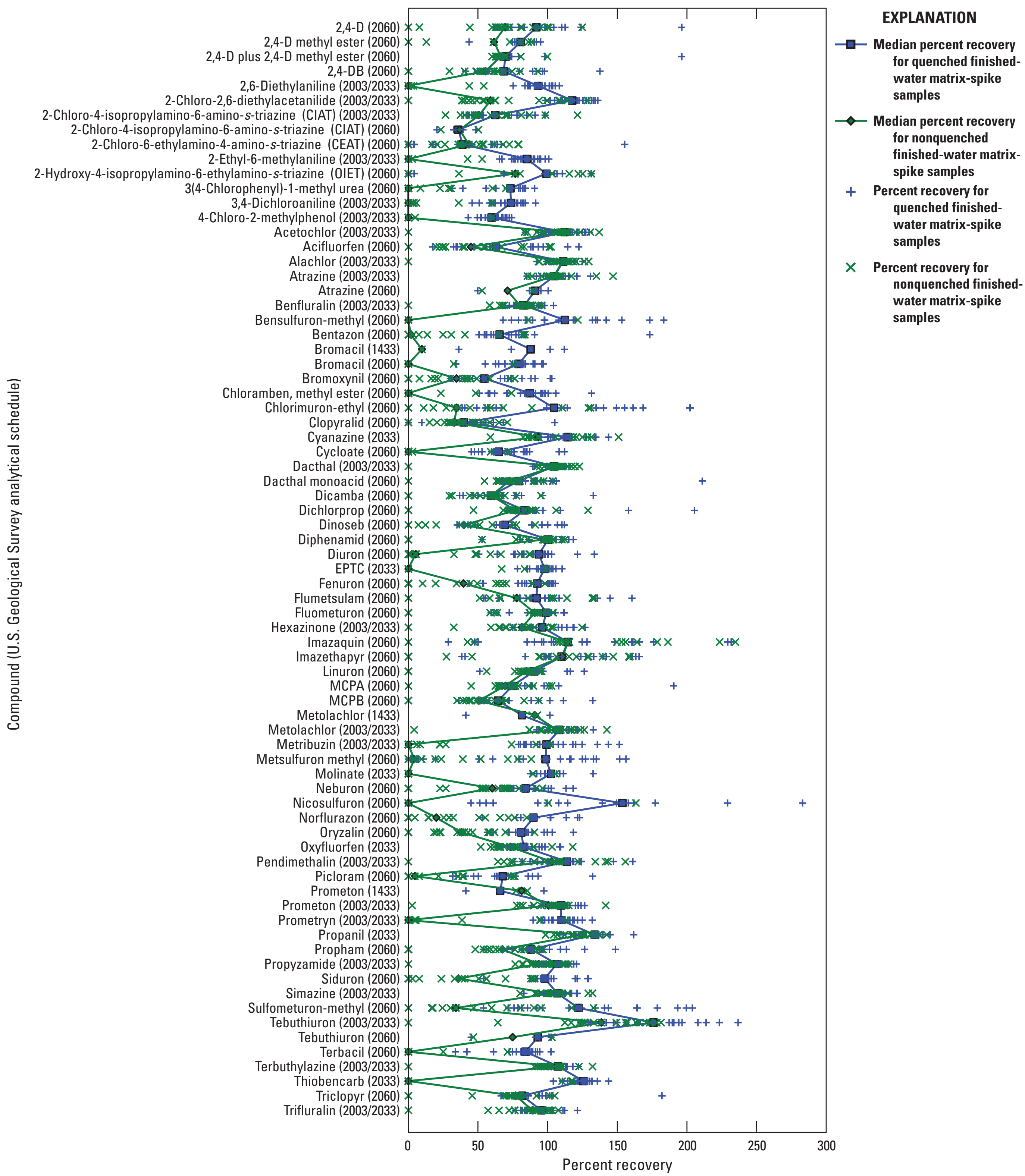


Figure 5–5. Percent recoveries for quenched and nonquenched finished-water matrix-spike samples from groundwater supplies, 2004–10, for gasoline hydrocarbons, oxygenates, and oxygenate degradates. The numbers of quenched and nonquenched finished-water samples for each compound are presented in table 1–2 in appendix 1. The lines shown on the graph are for visual purposes and are intended to highlight differences in percent recoveries between quenched and nonquenched samples for each individual compound.

Herbicides and herbicide degradates



[Some data points are not shown for some compounds because of extreme percent recovery values]

Figure 5–6. Percent recoveries for quenched and nonquenched finished-water matrix-spike samples from groundwater supplies, 2004–10, for herbicides and herbicide degradates. The numbers of quenched and nonquenched finished-water samples for each compound are presented in table 1–2 in appendix 1. The lines shown on the graph are for visual purposes and are intended to highlight differences in percent recoveries between quenched and nonquenched samples for each individual compound.

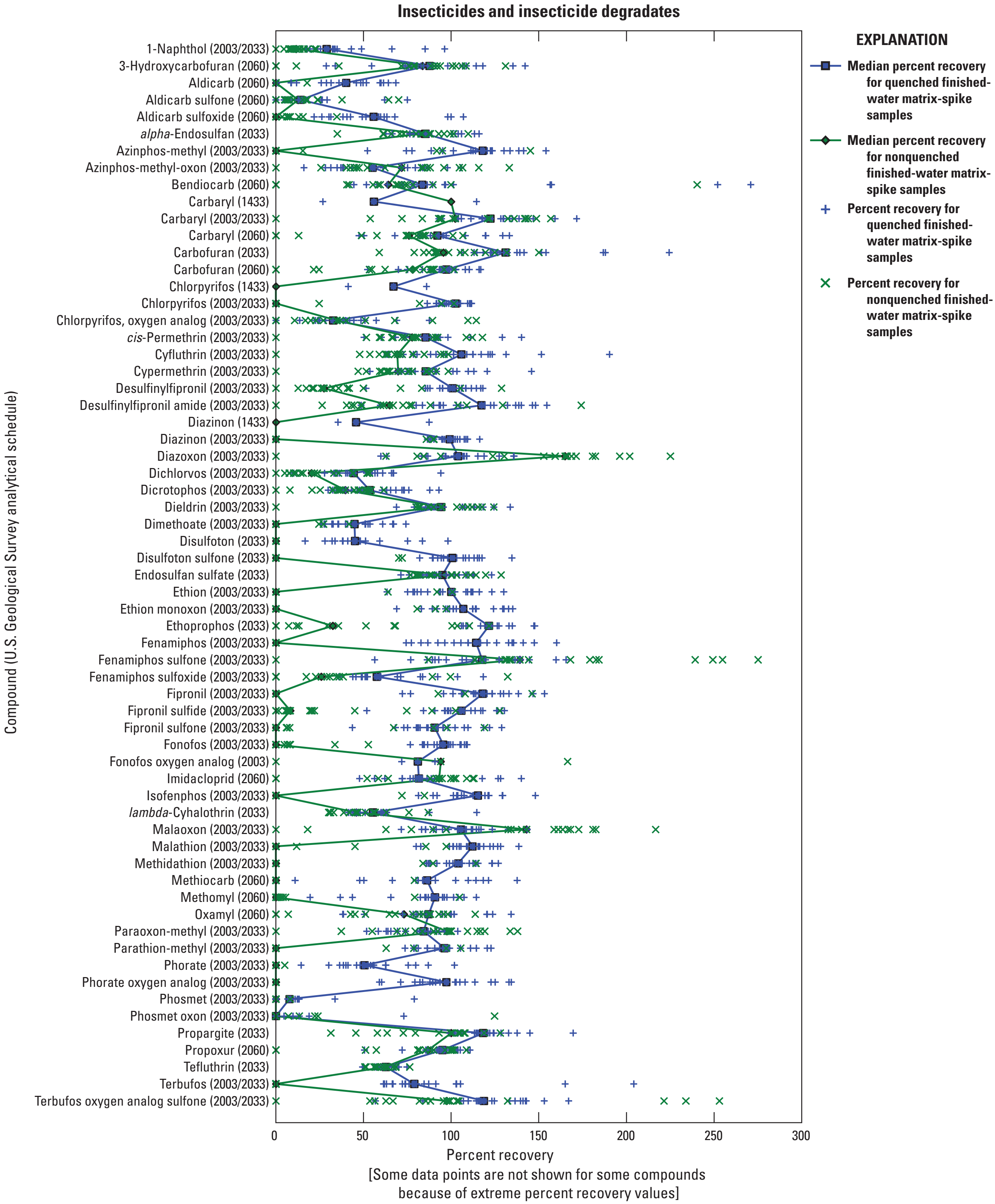


Figure 5–7. Percent recoveries for quenched and nonquenched finished-water matrix-spike samples from groundwater supplies, 2004–10, for insecticides and insecticide degradates. The numbers of quenched and nonquenched finished-water samples for each compound are presented in table 1–2 in appendix 1. The lines shown on the graph are for visual purposes and are intended to highlight differences in percent recoveries between quenched and nonquenched samples for each individual compound.

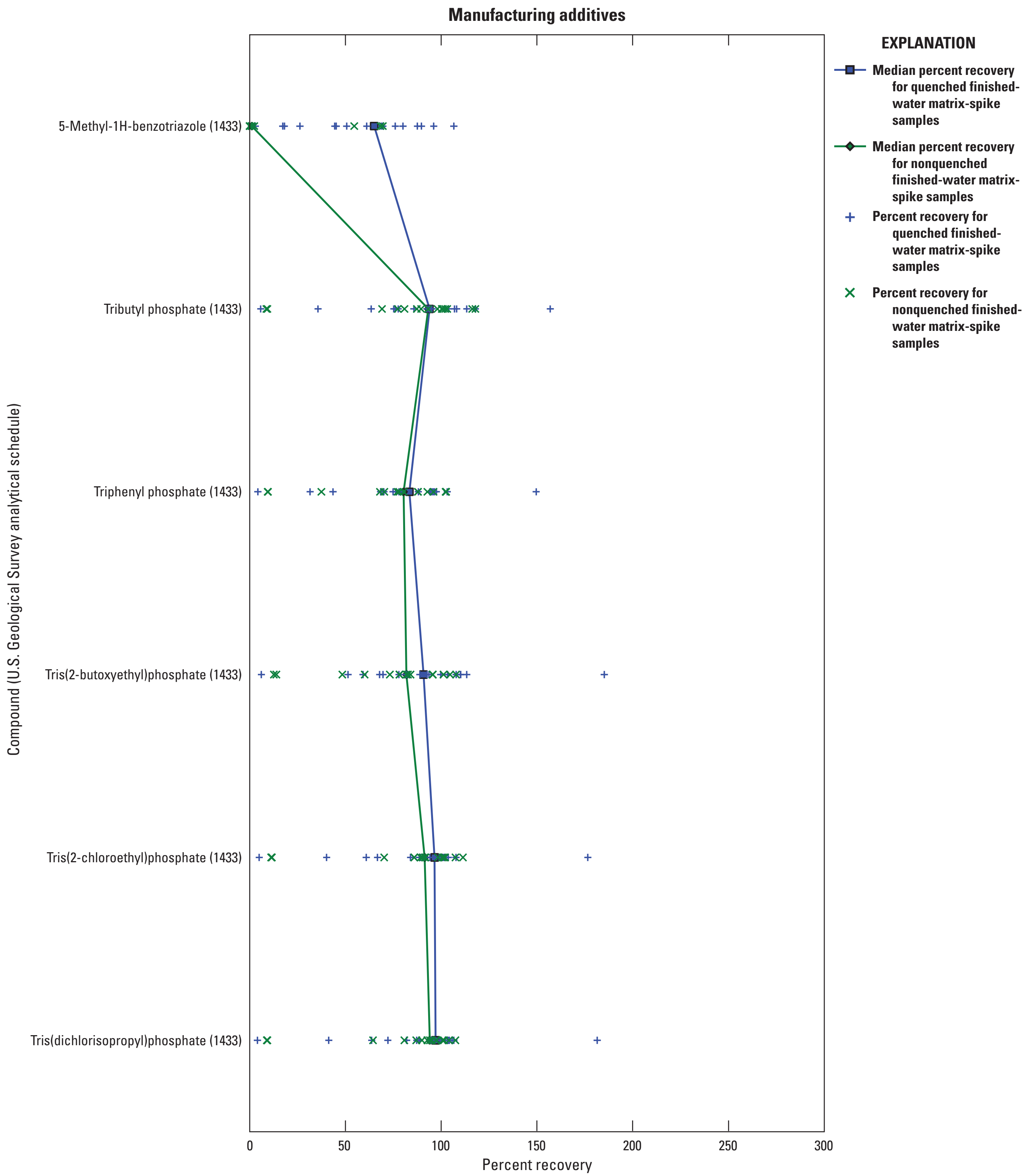


Figure 5–8. Percent recoveries for quenched and nonquenched finished-water matrix-spike samples from groundwater supplies, 2004–10, for manufacturing additives. The numbers of quenched and nonquenched finished-water samples for each compound are presented in table 1–2 in appendix 1. The lines shown on the graph are for visual purposes and are intended to highlight differences in percent recoveries between quenched and nonquenched samples for each individual compound.

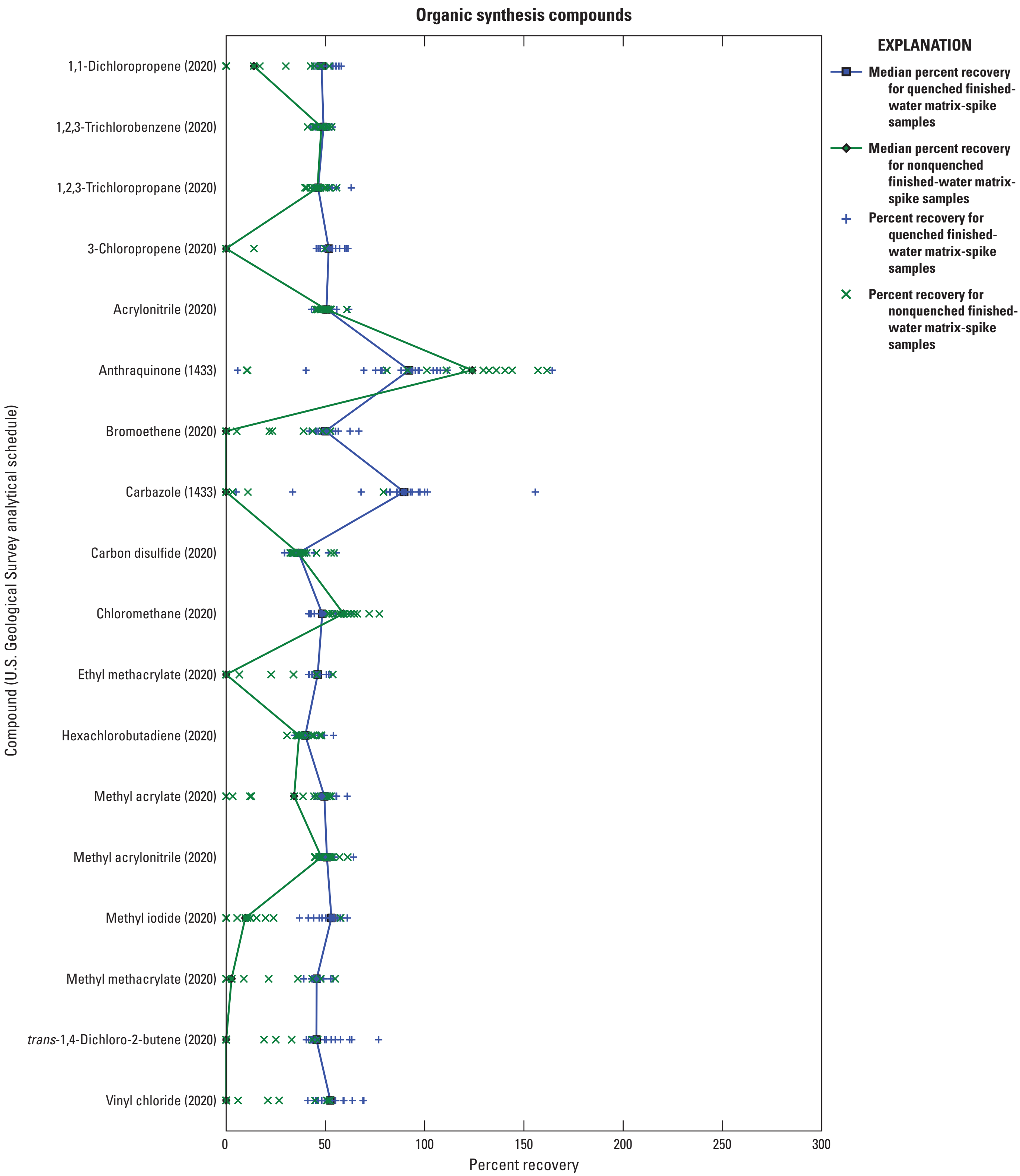


Figure 5–9. Percent recoveries for quenched and nonquenched finished-water matrix-spike samples from groundwater supplies, 2004–10, for organic synthesis compounds. The numbers of quenched and nonquenched finished-water samples for each compound are presented in table 1–2 in appendix 1. The lines shown on the graph are for visual purposes and are intended to highlight differences in percent recoveries between quenched and nonquenched samples for each individual compound.

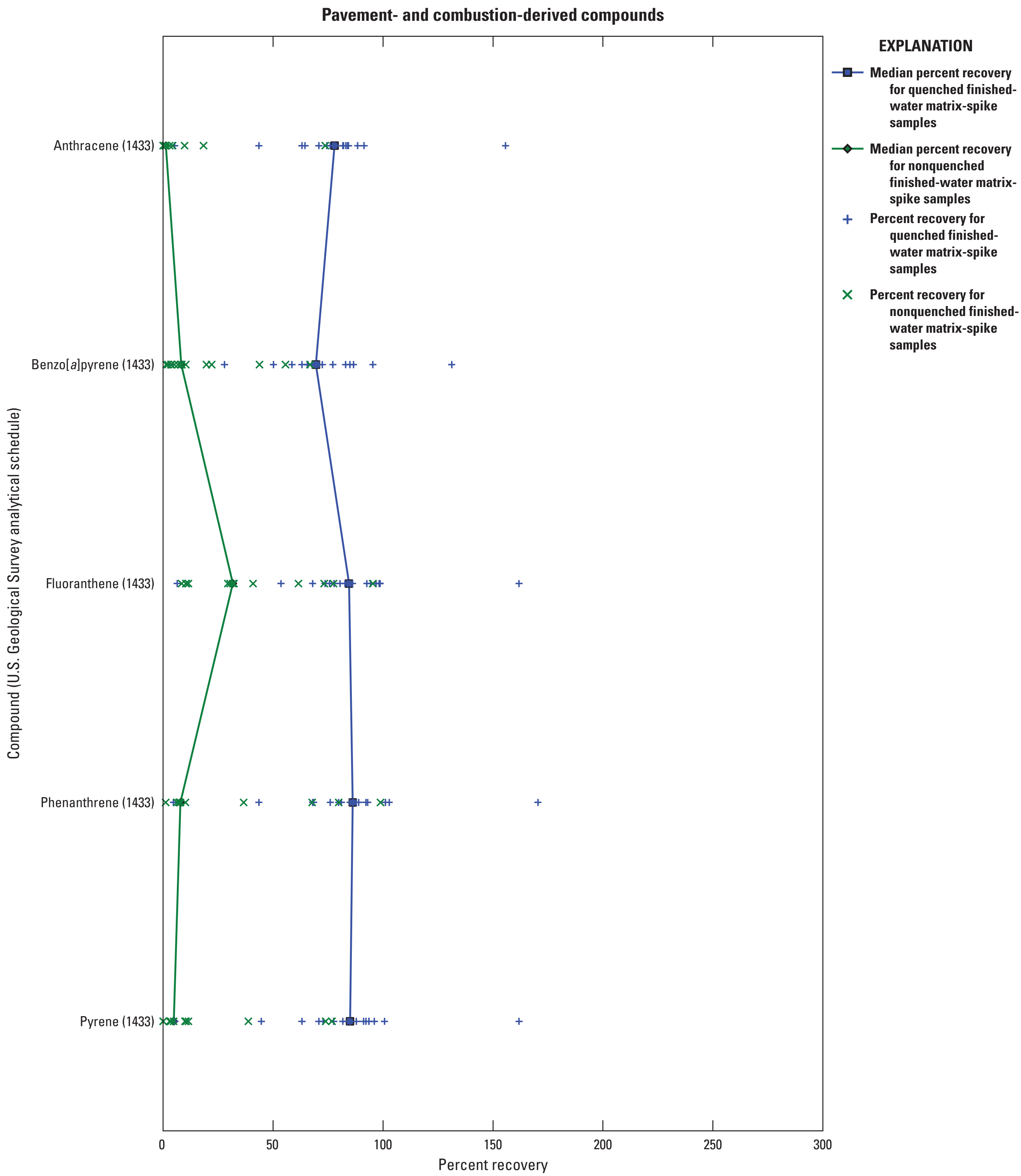


Figure 5–10. Percent recoveries for quenched and nonquenched finished-water matrix-spike samples from groundwater supplies, 2004–10, for pavement- and combustion-derived compounds. The numbers of quenched and nonquenched finished-water samples for each compound are presented in table 1–2 in appendix 1. The lines shown on the graph are for visual purposes and are intended to highlight differences in percent recoveries between quenched and nonquenched samples for each individual compound.

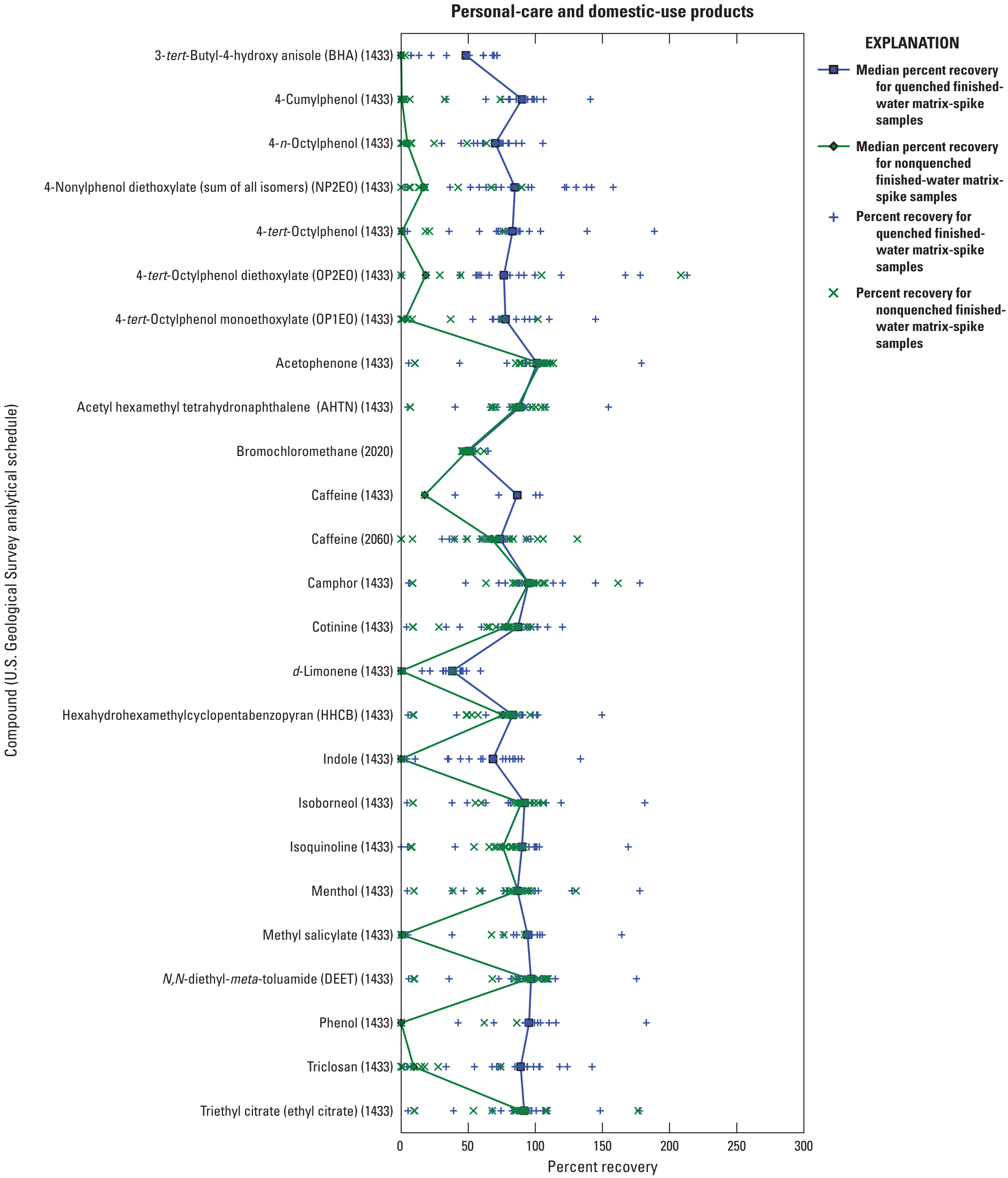


Figure 5–11. Percent recoveries for quenched and nonquenched finished-water matrix-spike samples from groundwater supplies, 2004–10, for personal-care and domestic-use products. The numbers of quenched and nonquenched finished-water samples for each compound are presented in table 1–2 in appendix 1. The lines shown on the graph are for visual purposes and are intended to highlight differences in percent recoveries between quenched and nonquenched samples for each individual compound.

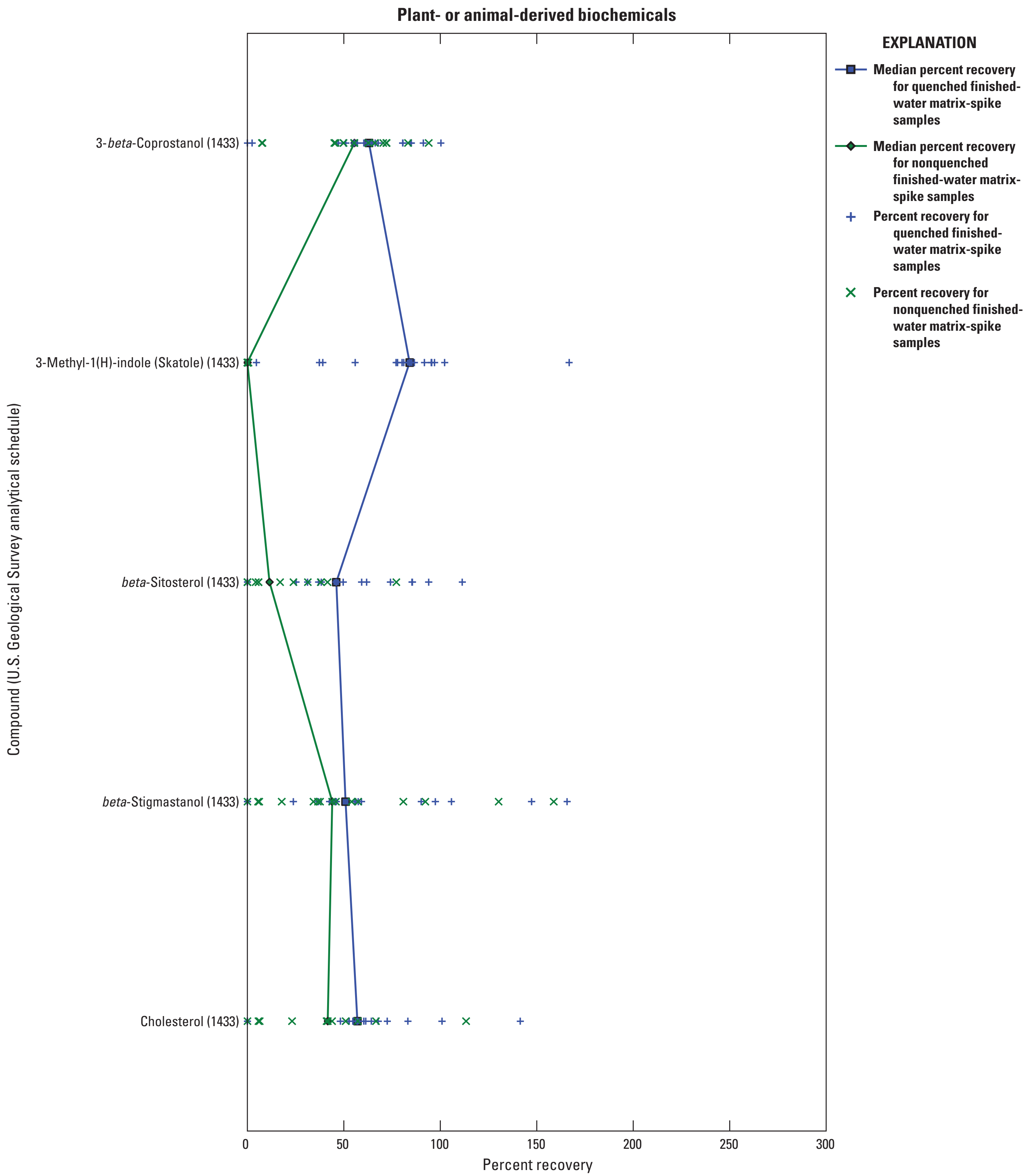
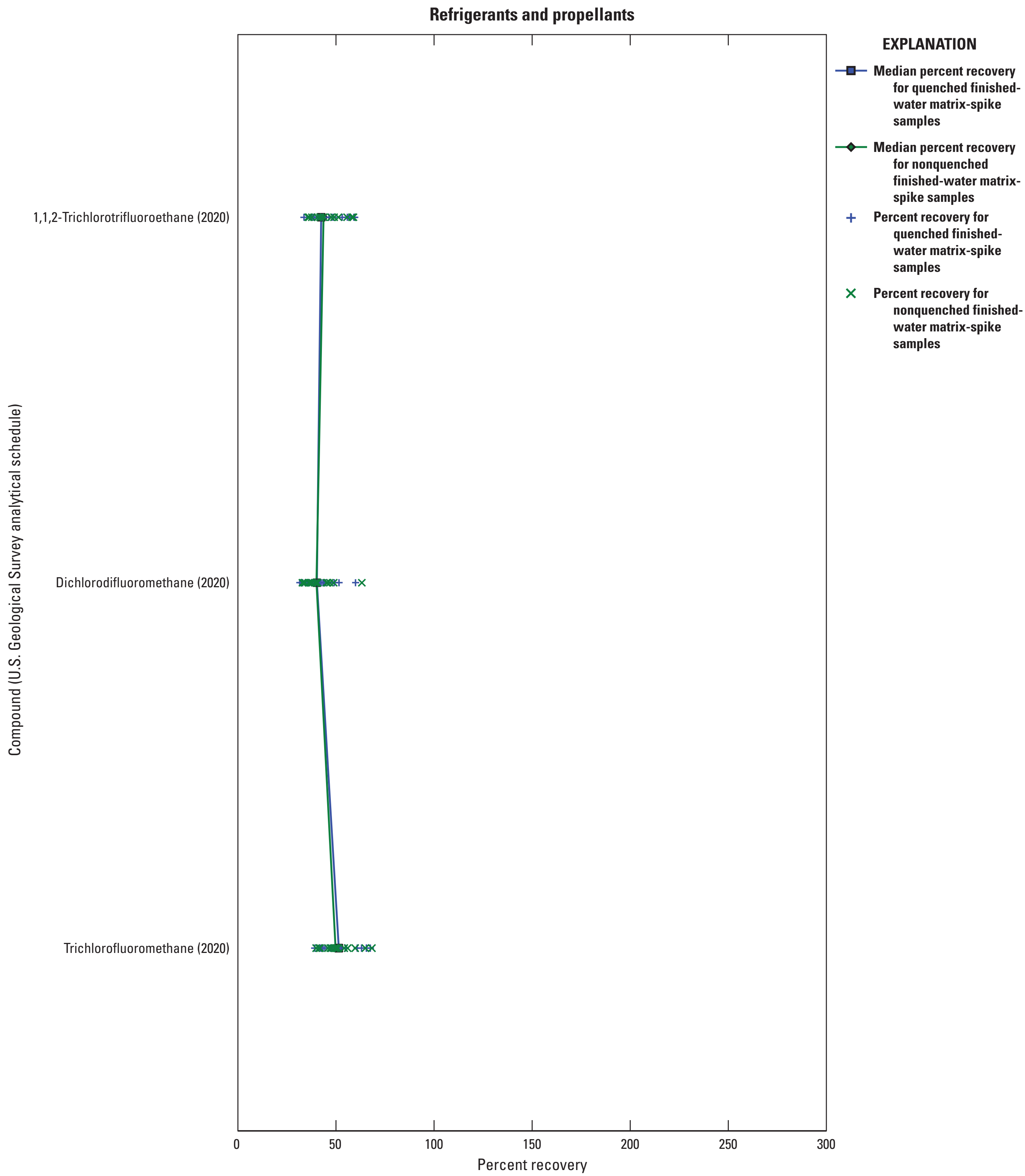


Figure 5–12. Percent recoveries for quenched and nonquenched finished-water matrix-spike samples from groundwater supplies, 2004–10, for plant- or animal-derived biochemicals. The numbers of quenched and nonquenched finished-water samples for each compound are presented in table 1–2 in appendix 1. The lines shown on the graph are for visual purposes and are intended to highlight differences in percent recoveries between quenched and nonquenched samples for each individual compound.



[Some data points are not shown for some compounds because of extreme percent recovery values]

Figure 5–13. Percent recoveries for quenched and nonquenched finished-water matrix-spike samples from groundwater supplies, 2004–10, for refrigerants and propellants. The numbers of quenched and nonquenched finished-water samples for each compound are presented in table 1–2 in appendix 1. The lines shown on the graph are for visual purposes and are intended to highlight differences in percent recoveries between quenched and nonquenched samples for each individual compound.

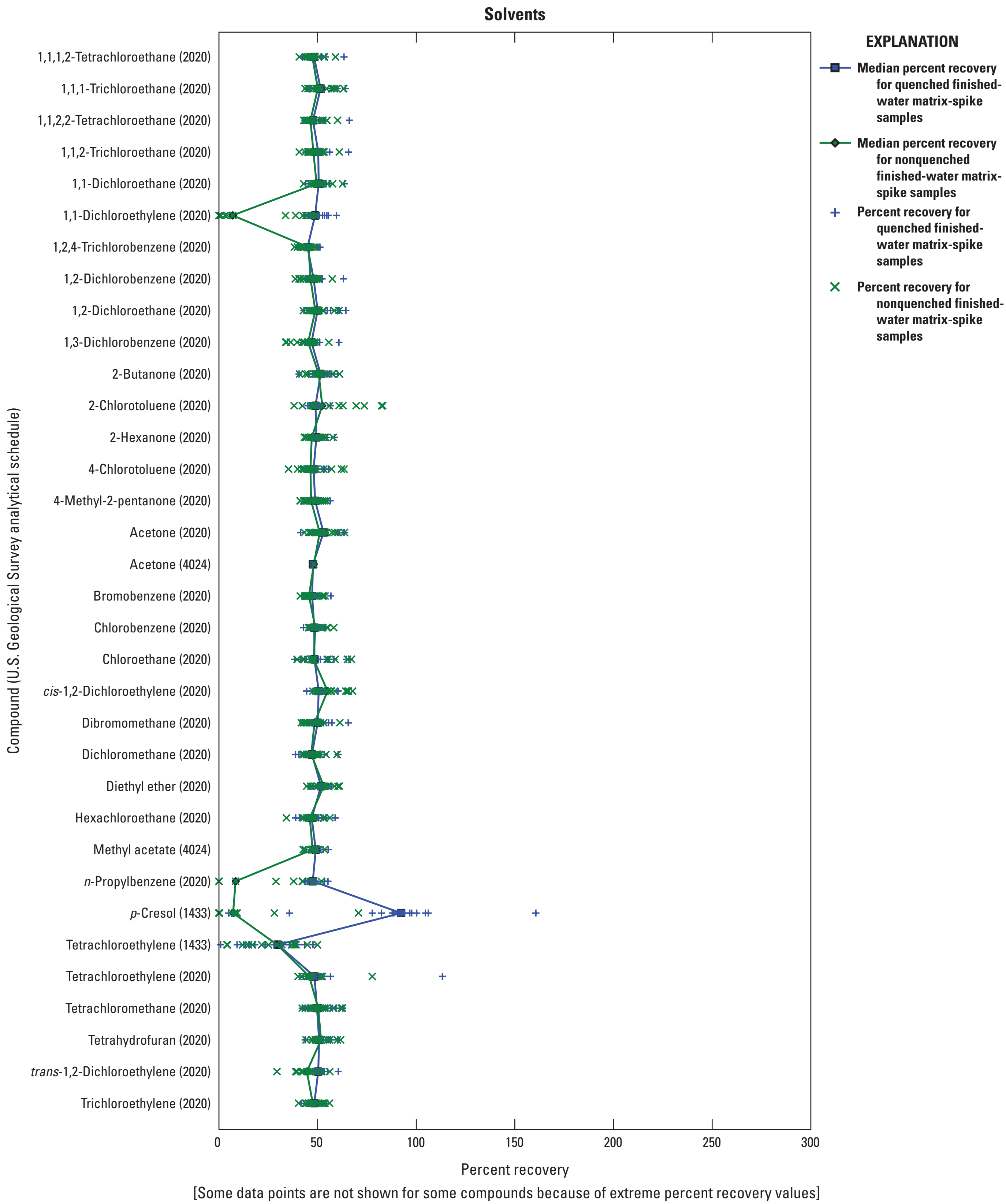


Figure 5–14. Percent recoveries for quenched and nonquenched finished-water matrix-spike samples from groundwater supplies, 2004–10, for solvents. The numbers of quenched and nonquenched finished-water samples for each compound are presented in table 1–2 in appendix 1. The lines shown on the graph are for visual purposes and are intended to highlight differences in percent recoveries between quenched and nonquenched samples for each individual compound.

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http://sd.water.usgs.gov/

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

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