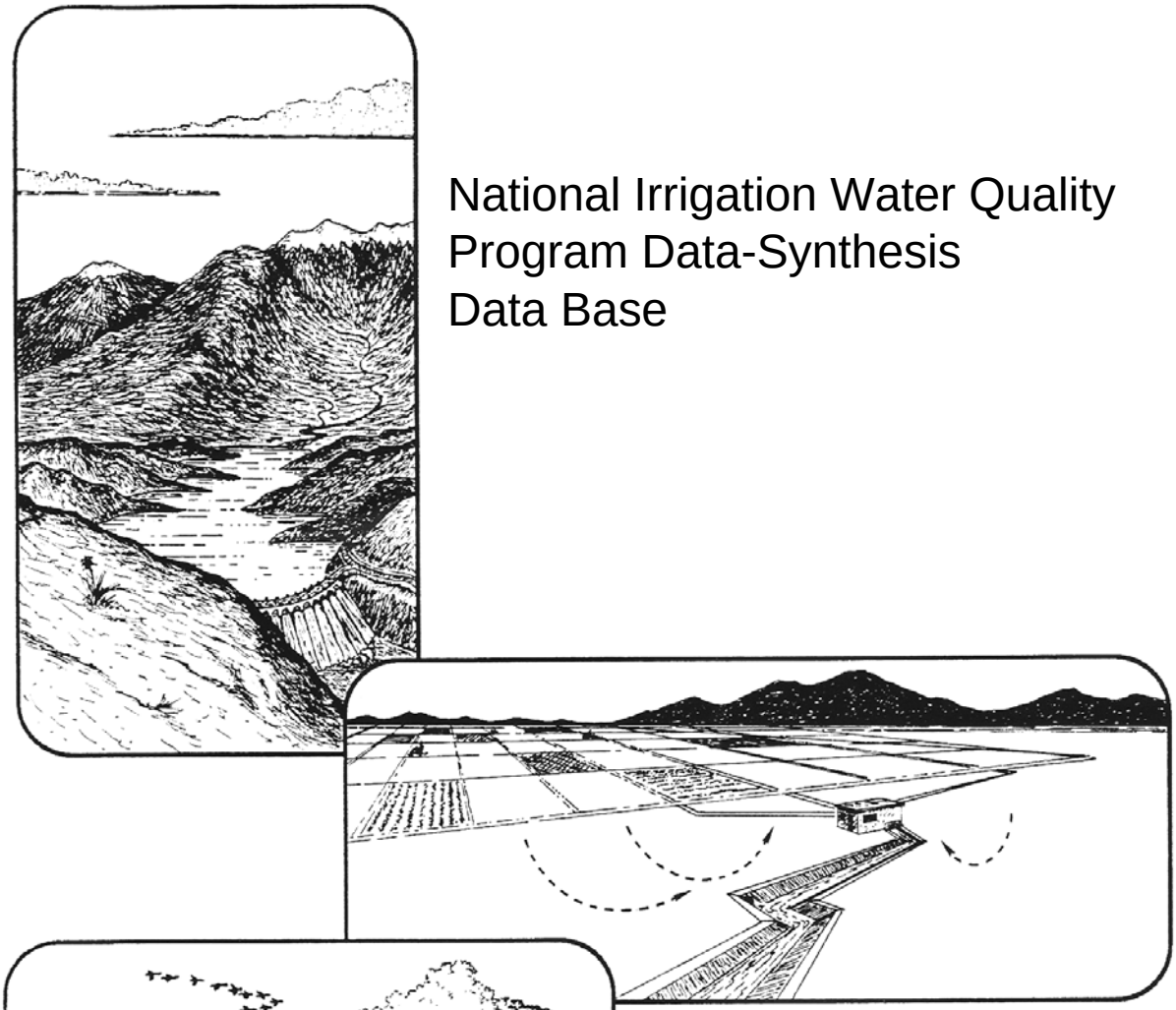

# National Irrigation Water Quality Program Data-Synthesis Data Base

U.S. GEOLOGICAL SURVEY
Open-File Report 00–513

U.S. GEOLOGICAL SURVEY
U.S. FISH AND WILDLIFE SERVICE
BUREAU OF RECLAMATION
BUREAU OF INDIAN AFFAIRS

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*By* Ralph L. Seiler and Joseph P. Skorupa

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Prepared in cooperation:
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U.S. FISH AND WILDLIFE SERVICE
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Box 25286, Federal Center
Denver, CO 80225–0286

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## CONVERSION FACTORS, WATER-QUALITY UNITS, AND VERTICAL DATUM

| Multiply | By | To obtain |
|---|---|---|
| acre | 4,047 | square meter |
| cubic foot per second ($ft^3/s$) | 0.02832 | cubic meter per second |
| foot (ft) | 0.3048 | meter |
| inch (in.) | 25.4 | millimeter |
| mile (mi) | 1.609 | kilometer |
| square mile ($mi^2$) | 2.590 | square kilometer |
| ton per day (t/d) | 0.9072 | megagram per day |

**Water-quality units used in this report:**

| | | | |
|---|---|---|---|
| g/kg | gram per kilogram | mg/kg | milligram per kilogram |
| µg/g | microgram per gram | mg/L | milligram per liter |
| µg/kg | microgram per kilogram | mm | millimeter |
| µg/L | microgram per liter | mV | millivolt |
| µS/cm | microsiemen per centimeter | pCi/L | picocuries per liter |

**Temperature:** Degrees Celsius ($^oC$) can be converted to degrees Fahrenheit ($^oF$) by using the formula $^oF = [1.8(^oC)]+32$.

**Sea level:** In this report, "sea level" refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929, formerly called "Sea-Level Datum of 1929"), which is derived from a general adjustment of the first-order leveling networks of the United States and Canada.

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## ABSTRACT

Under the National Irrigation Water Quality Program (NIWQP) of the U.S. Department of the Interior, researchers investigated contamination caused by irrigation drainage in 26 areas in the Western United States from 1986 to 1993. From 1992 to 1995, a comprehensive relational data base was built to organize data collected during the 26-area investigations. The data base provided the basis for analysis and synthesis of these data to identify common features of contaminated areas and hence dominant biologic, geologic, climatic, chemical, and physiographic factors that have resulted in contamination of water and biota in irrigated areas in the Western United States.

Included in the data base are geologic, hydrologic, climatological, chemical, and cultural data that describe the 26 study areas in 14 Western States. The data base contains information on 1,264 sites from which water and bottom sediment were collected. It also contains chemical data from 6,903 analyses of surface water, 914 analyses of ground water, 707 analyses of inorganic constituents in bottom sediments, 223 analyses of organochlorine pesticides in bottom sediments, 8,217 analyses of inorganic constituents in biota, and 1,088 analyses for organic constituents in biota.

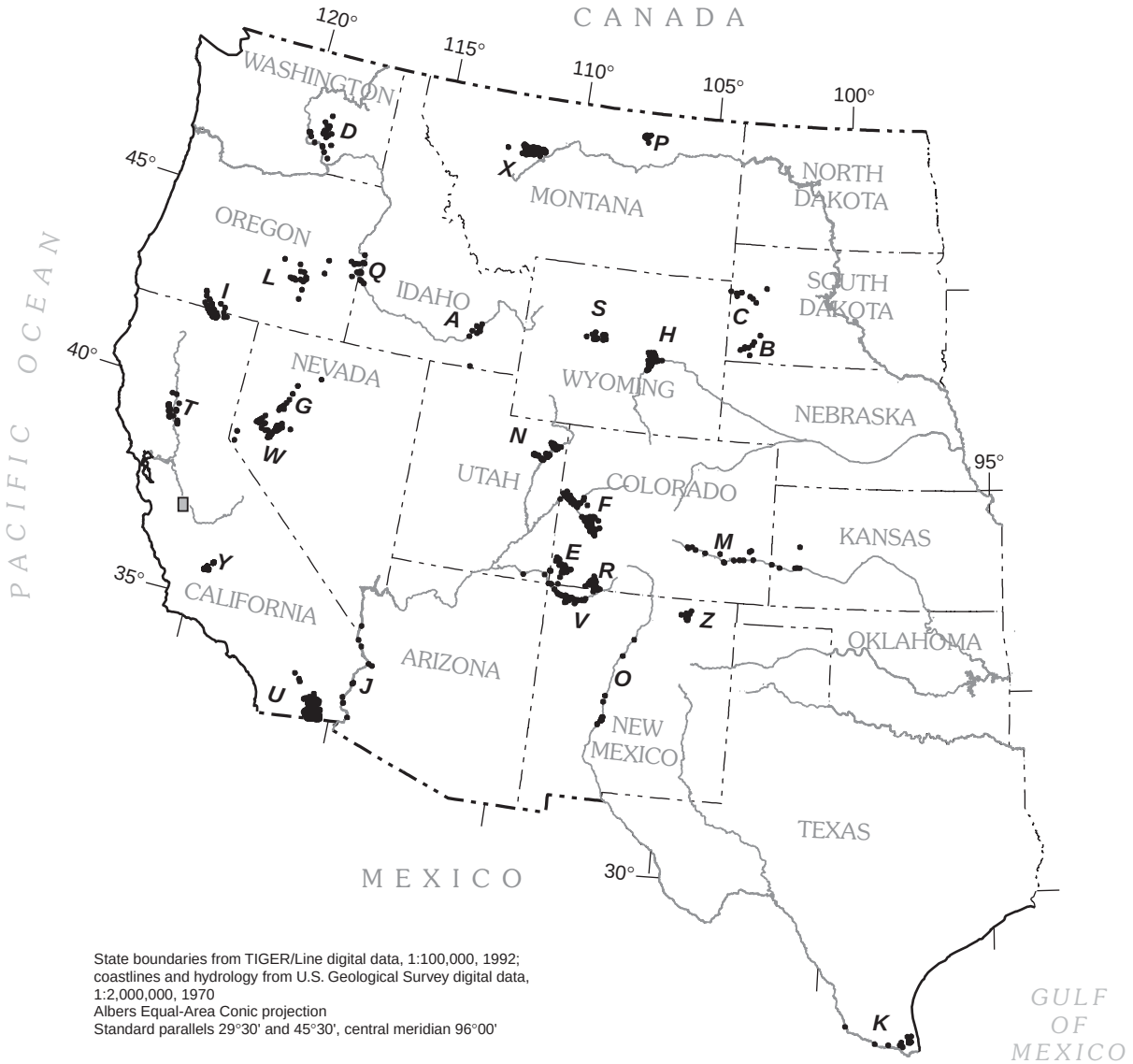
The data base is available to the public and can be obtained at the NIWQP homepage <http://www.usbr.gov/niwqp> as dBase III tables for personal-computer systems or as American Standard Code for Information Exchange structured query language (SQL) command and data files for SQL data bases.

## INTRODUCTION

In the early 1980's, national headlines announced that selenium carried by irrigation drain water was causing mortality, congenital deformities, and reproductive failure in waterfowl at Kesterson National Wildlife Refuge, western San Joaquin Valley, Calif. The National Irrigation Water Quality Program (NIWQP) of the U.S. Department of the Interior (DOI) was created in October 1985 after the U.S. Congress and environmental groups expressed concern that irrigation-induced contamination of water and biota might occur elsewhere in the Western United States. From 1986 to 1993, 26 areas in the Western United States (fig. 1, table 1) were investigated to determine the existence, magnitude, and causes of contamination related to irrigation drainage in these areas.

Preliminary analysis of results from the NIWQP studies showed that many of the sites that exhibit irrigation-induced water-quality problems have common geologic, hydrologic, and climatic characteristics (Sylvester and others, 1988). The National Research Council reviewed the NIWQP (National Research Council, 1991) and suggested the need for systems analysis to identify and address the linkages among these characteristics.

In 1992, the DOI began a 5-year data-synthesis project to assess data collected by the completed and ongoing NIWQP investigations. The overall objective of the data-synthesis project was to identify commonalities of the 26 NIWQP study areas and dominant biologic, geologic, climatic, chemical, and physiographic factors that result in contamination of water and biota in irrigated areas of the Western United States. A key step in the data-synthesis project was the construction of a relational data base to organize the data collected during the NIWQP investigations.




**EXPLANATION**

***T*** • **Data-collection site for National Irrigation Water Quality Program study area**—Letter is area identifier (table 1)

**Kesterson National Wildlife Refuge, San Joaquin Valley, Calif.**

**Figure 1.** National Irrigation Water Quality Program study areas and data-collection sites.

**TABLE 1**. Reconnaissance and detailed area studies used as data sources for National Irrigation Water Quality Program (NIWQP) data base

[—, no reference]

| NIWQP study area | | References | |
|---|---|---|---|
| Identifier[1] | Name | Reconnaissance studies | Detailed studies |
| **Reports describing specific NIWQP study areas** | | | |
| ***A*** | American Falls Reservoir, Idaho | Low and Mullins, 1990 | — |
| ***B*** | Angostura Reclamation Unit, South Dakota | Greene and others, 1990 | — |
| ***C*** | Belle Fourche Reclamation Project, South Dakota | Roddy and others, 1991 | — |
| ***D*** | Columbia River Basin, Washington | Embry and Block, 1995 | — |
| ***E*** | Dolores–Ute Mountain area, Colorado | Butler and others, 1995 | — |
| ***F*** | Gunnison River Basin–Grand Valley Project, Colorado | Butler and others, 1991 | Butler and others, 1994. |
| ***G*** | Humboldt River area, Nevada | Seiler and others, 1993 | — |
| ***H*** | Kendrick Reclamation Project, Wyoming | Peterson and others, 1988 | See, Naftz, and others, 1992; See, Peterson, and Ramirez, 1992. |
| ***I*** | Klamath Basin Refuge Complex, California-Oregon | Sorenson and Schwarzbach, 1991 | MacCoy, 1994. |
| ***J*** | Lower Colorado River valley, California-Arizona | Radtke and others, 1988 | — |
| ***K*** | Lower Rio Grande valley, Texas | Wells and others, 1988 | — |
| ***L*** | Malheur National Wildlife Refuge, Oregon | Rinella and Schuler, 1992 | — |
| ***M*** | Middle Arkansas River Basin, Colorado–Kansas | Mueller and others, 1991 | — |
| ***N*** | Middle Green River Basin, Utah | Stephens and others, 1988 | Peltz and Waddell, 1991; Stephens and others, 1992. |
| ***O*** | Middle Rio Grande, New Mexico | Ong and others, 1992 | — |
| ***P*** | Milk River Basin, Montana | Lambing and others, 1988 | — |
| ***Q*** | Owyhee-Vale Reclamation Project areas, Oregon–Idaho | Rinella and others, 1994 | — |
| ***R*** | Pine River area, Colorado | Butler and others, 1993 | — |
| ***S*** | Riverton Reclamation Project, Wyoming | Peterson and others, 1991 | — |
| ***T*** | Sacramento Refuge Complex, California | Dileanis and others, 1992 | — |
| ***U*** | Salton Sea area, California | Setmire and others, 1990 | Schroeder and others, 1993. |
| ***V*** | San Juan River area, New Mexico | Blanchard and others, 1993 | — |
| ***W*** | Stillwater Wildlife Management Area, Nevada | Hoffman and others, 1990 | Rowe and others, 1991; Lico, 1992; Hallock and Hallock, 1993; Hoffman, 1994. |
| ***X*** | Sun River area, Montana | Knapton and others, 1988 | Lambing and others, 1994. |
| ***Y*** | Tulare Lake Bed area, California | Schroeder and others, 1988 | — |
| ***Z*** | Vermejo Project area, New Mexico | Bartolino and others, 1996 | — |
| **Reports describing multiple NIWQP study areas** | | | |
| ***H, J, K, N, P, U, W, X, Z*** | ([2]) | Severson and others, 1987 | — |
| ***A, B, C, F, I, L, M, O, S, T*** | ([2]) | Harms and others, 1990 | — |
| ***C, E, G, Q, R, U, V, W*** | ([2]) | Stewart and others, 1992 | — |

[1]Used in figure 1 to show locations of study areas.

[2]See above list for specific area names corresponding to these identifiers.

The Ingres data-base management system (hereafter referred to as Ingres data base) was chosen because it is relational and uses the American National Standards Institute (ANSI) standard structured query language (SQL).

The NIWQP data base has been made available for scientists using different types of computer systems. SQL was chosen to disseminate the data base because applications written in SQL are portable to many hardware platforms and will be for many years to come. The NIWQP data base also is available to individuals using personal-computer (PC) data-base management systems that may or may not support SQL. Although the data-synthesis team did not use dBase III for data analysis, dBase III files were chosen to disseminate the data base because most PC data-base management systems can read dBase III files, and because utilities were available to create the dBase III files.

## PURPOSE AND SCOPE

This report describes the structure and content of the NIWQP data base, provides a data dictionary and describes how the data base was built and quality assured. The report does not include an analysis of the data contained in the data base but does include a brief summary of the types and numbers of analyses in the data base and a discussion of bias in the data base. The report also provides a list of published sources of data used to create the data base.

## CONTENTS OF DATA BASE

The data base contains chemical analyses of samples that were collected as part of NIWQP investigations. The information used to construct the data base was derived primarily from the reports listed in table 1. Physiographic and cultural data that describe the study areas and individual data-collection sites and some water and biological data that were not collected as part of a NIWQP investigation also were included in the NIWQP data base. (An attribute in the data base indicates which samples were collected as part of NIWQP investigations.)

Some samples from NIWQP sampling sites have been collected and analyzed by the U.S. Geological Survey (USGS) as part of other programs. For sites used by NIWQP investigators, all water analyses made by the USGS during the period 1986 through 1993 were included in the data base regardless of whether they were collected as part of the NIWQP or for another program. These additional data were entered in the NIWQP data base exactly as retrieved from the National Water Information System (NWIS) data base.

The NIWQP data base contains more than 30 attributes for physiographic, geologic, hydrologic, climatological, agricultural, chemical, and cultural data (app. A) that collectively describe each of the 26 study areas. More than 440 attributes store values for concentrations of chemicals in water, bottom sediment, and biota. Samples for chemical analysis of water and (or) bottom sediment were collected at 1,264 data-collection sites in 14 Western States. Of these 1,264 sites, 705 were river, stream, canal, or surface-drain sites, 348 were ground-water sites, and 211 were lake or pond sites. Also, 130 of the 1,264 are reference sites, and the remainder are sites affected in some way by irrigation drainage.

The data base includes 6,903 chemical analyses of surface water; of these 6,903 analyses, 1,661 include all major constituents, and most of these 1,661 also include trace elements. Some specific contaminants are represented by thousands of analyses, for instance, the data base contains 2,507 analyses of dissolved selenium and 545 analyses of total selenium. Also included are more than 100 analyses of organochlorine pesticides such as dichloro-diphenyl-trichloroethane (DDT) in water and almost 200 analyses of herbicides such as 2,4 dichlorophenoxyacetic acid (240). Analyses of nutrients include 1,408 for nitrate and 562 for phosphate.

Inorganic constituents in bottom sediment are represented by 707 analyses of samples collected at 324 sites. Although for some study areas only one size fraction was analyzed, typically, both fine (less than 0.062 mm) and coarse (less than 2-millimeter) fractions were analyzed. The data base also includes 223 analyses for organochlorine pesticides such as DDT and 36 analyses for organophosphates such as parathion in bottom sediments.

Inorganic constituents in biota are represented by 8,217 analyses, including 2,410 from fish tissue, 751 from invertebrate tissue, and 1,086 from plant material. The data base contains 3,913 analyses of bird tissue, of which 1,235 are of bird livers and 2,051 are of bird eggs. Also included are a few analyses of periphyton and of tissues from reptiles, amphibians, and mammals.

### Data-Base Bias

The NIWQP data base is biased in three ways that preclude its use for calculating baseline conditions in the Western United States:

1. Study areas were selected because of their potential to have irrigation-induced water-quality problems. Those study areas that were contaminated were further investigated. This approach results in a bias toward contaminated samples.
2. Within each study area, the sampling sites were not selected randomly. In some areas, many of the sampling sites were selected along main channels of large rivers because of the availability of historical data for these sites. This approach results in a bias toward uncontaminated samples in some areas because contaminants in main-channel sites tend to be more diluted. In other areas, many sites were selected for complete chemical analyses after field measurements indicated that they likely were contaminated. This approach results in a bias toward contaminated samples in other areas.
3. Within a study area, not all sites were sampled at the same frequency. During process-oriented investigations, typically the most contaminated sites were sampled more frequently than the least contaminated sites. This approach results in a bias toward contaminated samples.

## STRUCTURE OF DATA BASE

### Data Structure

The data base was designed so that relations among contaminant concentrations in water, bottom sediment, and biota can be explored. A diagram of the data structure of the NIWQP data base and the relations between the tables is shown in figure 2. Names of attributes and of tables shown in the diagram are explained in appendix A.

The AREA table within the data base contains information describing the 26 NIWQP study areas and associated subareas. For a given study area, the data in the table include amounts of evaporation and precipitation, general information about the geology and hydrology, the principal crop, and the amount of irrigated land.

The tables are linked by several key attributes (fig. 2). The AREA table is linked to the SITE table by the "area" and "sub_area" attributes, and in turn, the SITE table is linked to the other tables (in different matrix groups) by the "site_id" attribute. The SITE table contains all the primary site information, including the geographic location, the type of site, and whether the site is a reference site or is in or downstream from irrigated lands.

The tabulated chemical data are classified by type of sample matrix: water, bottom sediment, or biota. These matrix groups are cross-referenced by the linking attribute "site_id." Additionally, in the tables containing chemical data from water samples, splits of the same sample are linked through the "site_id," "samp_date," "samp_time," and "matrix" attributes.

The following tables (app. A) contain chemical data and related information from analyses of water samples:

- **FIELD** — Time-dependent data collected during the site visit (for example, pH and specific conductance) and corresponding laboratory values. Also contains metadata concerning the sampling and analysis and includes linking attributes that connect it to the SITE table ("site_id") and to other tables within the same matrix group ("matrix");
- **INORG** — Time-dependent data on inorganic chemicals and physical parameters measured in the laboratory (for example, major ions and filtered and total trace elements);
- **ISOTOPE** — Time-dependent data on stable and radioactive isotopes (for example, deuterium, tritium, and gross alpha and beta radioactivity);
- **NUTRIENT** — Time-dependent data on nutrients (for example, biochemical oxygen demand, nitrogen, and orthophosphate);
- **ORG** — Time-dependent data on organic chemicals (principally pesticides); and
- **SEDIMENT** — Time-dependent chemical data and physical characteristics of sediment (for example, suspended arsenic, suspended-sediment fall diameter, and suspended-sediment discharge).

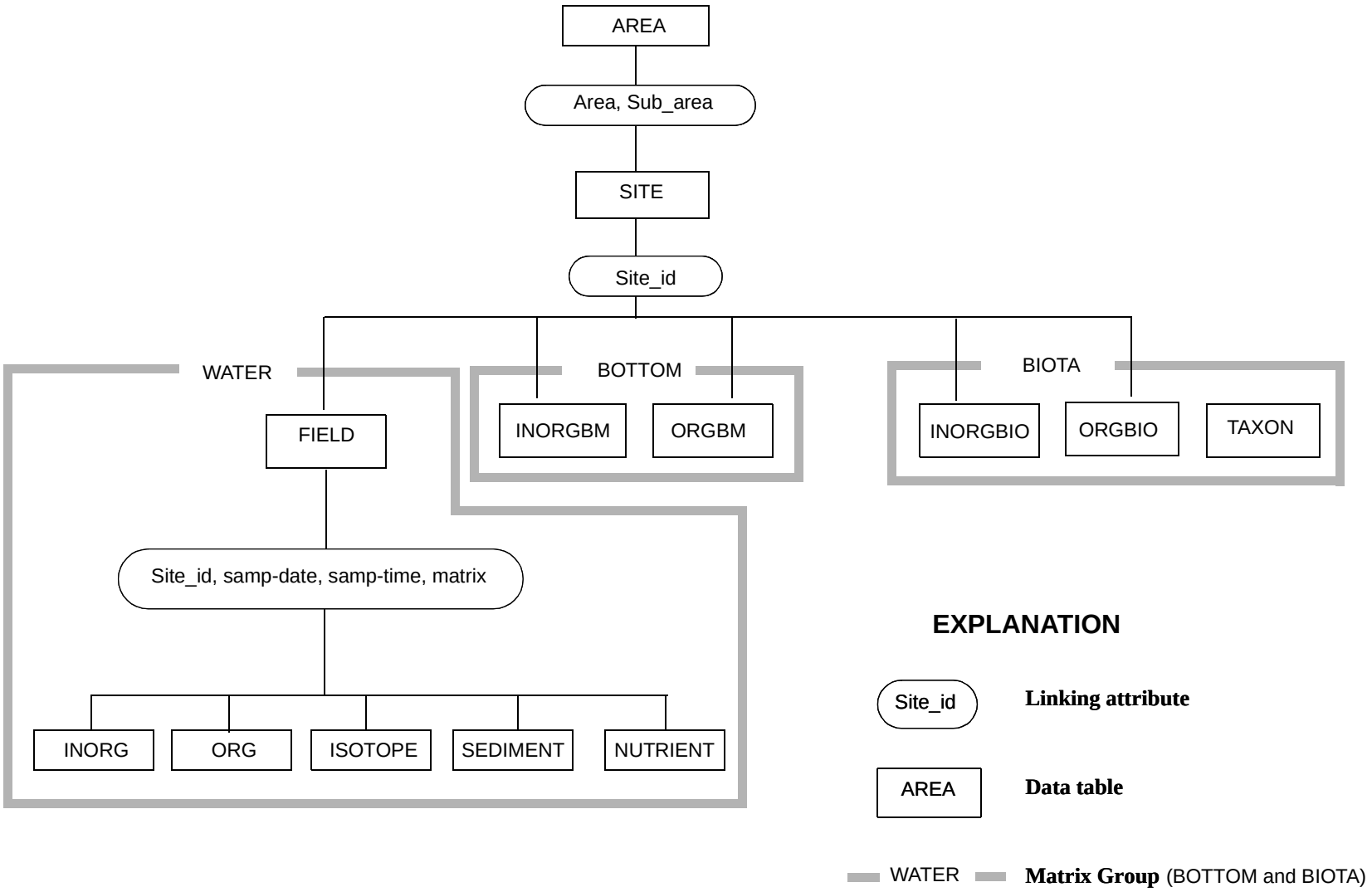



**Figure 2.** Structure and linking attributes of National Irrigation Water Quality Program data base.

The following tables (app. A) contain chemical data from analyses of bottom-sediment samples and related information:

- **INORGBM** — Time-dependent data on inorganic constituents in bottom sediment (for example, size fraction and concentrations of organic carbon and trace elements); and
- **ORGBM** — Time-dependent data on organic constituents in bottom sediment (principally pesticides, but also includes concentrations of organic carbon).

The INORGBM and ORGBM tables are not linked to other tables of chemical data because time of sample collection is not available for the INORGBM table and because the data-synthesis team was not exploring relations between concentrations of inorganic and organic constituents in samples of bottom sediment. It is likely, however, that bottom-sediment samples collected from the same location on the same date represent the same environmental matrix and could be joined using the "site_id" and "samp_date" attributes.

The following tables contain chemical data from analyses of biological samples and related information:

- **INORGBIO** — Time-dependent data on inorganic constituents in biological samples (for example, species, tissue, moisture content, and trace-element concentrations); and
- **ORGBIO** — Time-dependent data on organic constituents (principally pesticides) in biological samples (for example, species, tissue, moisture content, and DDT).

The INORGBIO and ORGBIO tables are not linked to each other because the analyses may not be of the same organism even if the species, tissues, dates, and locations of sample collection are the same.

The table **TAXON** provides information about the taxonomic classification of biological samples represented in the data base. In the INORGBIO and ORGBIO tables, biological samples are classified by the common name most frequently used in the NIWQP reports. The TAXON table is not linked to other tables and has only one attribute in common with the other tables. The attribute "niwqp_name" in the TAXON table relates scientific and common names to the common name "species" used in the INORGBIO and ORGBIO tables.

### Data Dictionary and Discussion of Attributes

A data dictionary (apps. A and B) was created to describe the NIWQP data base. The dictionary provides a complete inventory of the data attributes and their characteristics and definitions. It also functions as a directory to show the location and format of the data—to help the user access the information in the data base.

To the extent possible, attributes were given descriptive names. However, in one of the programming languages used to create the data base, attribute names could not exceed 16 characters and this limitation carried over into the SQL data bases. This limitation resulted in cryptic names for some organic chemicals. Attribute names for inorganic constituents are based on their chemical symbols. Notable exceptions are some of the attributes involving arsenic and dissolved oxygen (for example, "ars" and "dox") because "AS" and "DO" are key words reserved by SQL.

For bottom-sediment and biotic samples, the attribute names end in "_bm" and "_bio," respectively, to indicate the matrix (for example, selenium in bottom sediment is "se_bm," and selenium in biological material, "se_bio"). Matrix for water samples is not indicated in the attribute names. (Total-selenium concentrations in water are "se_t"; filtered-selenium concentrations in water are simply "se.")

Although not listed in appendix A, a "remarks" attribute of character-type is associated with almost every listed attribute. This attribute of length one indicates if the value for the associated attribute is less than the method reporting limit by the code "<." The naming convention for such remarks attributes is to add the suffix "_r" to the name of the attribute with which it is associated.

## DATA SOURCES AND RETRIEVAL

The NIWQP data base was created by gathering data from published reports (table 1), digital data bases, and analytical-laboratory data sheets for biological samples. After retrieval, the data were stored in P-STAT (P-Stat Inc., 1990) files on a Prime minicomputer at the USGS office in Carson City, Nev. P-STAT is an interactive computing system for files management, data modification, and statistical analysis. The data were manipulated and prepared using P-STAT before being imported into the Ingres data base on Data General workstations.

### Area and Site Tables

Data describing the 26 study areas for the AREA table were obtained from published reports (table 1) or directly from knowledgeable study-team members who had investigated an area. Geology and free-water-surface evaporation-rates data were obtained by plotting the locations of the data-collection sites on appropriate thematic maps of the United States (King and Beikman, 1974; Farnsworth and others, 1982). Values for the derived attributes were determined from National, rather than local, maps to maintain consistency among the 26 study areas. An American Standard Code for Interface Exchange (ASCII) file containing the data was created by using a text editor and was imported into a P-STAT file on the USGS Prime computer.

Data describing the individual data-collection sites for the SITE table were obtained from published reports, from the USGS NWIS data-base site files, and directly from study-team members. Lists of unique site-identification numbers for the data-collection sites were obtained from the published reports or from the USGS team leader of each investigation. Site data, such as altitude, latitude, longitude, and site name, were retrieved from NWIS files, if available. For bottom-sediment sites without NWIS data, the site data were obtained from published reports.

### Water and Bottom-Sediment Tables

Chemical data for water samples (FIELD, INORG, ISOTOPE, NUTRIENT, SEDIMENT, and ORG tables) and pesticide data for bottom-sediment samples (ORGBM table) were obtained from the NWIS data base. All chemical analyses made from 1986 to the date of the final retrieval were obtained from lists of unique site-identification numbers for the data-collection sites.

Inorganic-chemical data for bottom sediment (INORGBM) were obtained from Severson and others (1987), Harms and others (1990) and Stewart and others (1992). Although the data are stored in USGS data bases, it was impractical to transfer some of the data electronically. ASCII data files were created from tables in the two earlier reports by scanning the published data and applying optical-character-recognition software to the resulting files. Data from Stewart and others (1992) were uploaded directly from the floppy disk provided with the report. Some unpublished USGS data (R.C. Severson, U.S. Geological Survey, written commun., 1994) provided directly to the authors as ASCII files on floppy disk were imported into P-STAT files.

### Biological Tables

Chemical data for biological samples (INORGBIO and ORGBIO tables) were obtained directly from the analytical-laboratory data sheets and entered into a spreadsheet on a PC. Although much of the data were available in PC-based spreadsheets and data bases at individual U.S. Fish and Wildlife Service (USFWS) field offices, obtaining the data from analytical-laboratory data sheets expedited importing the data into the Ingres data base and subsequent quality assurance of the data. Because the order of analyses and variables in data from the USFWS field offices did not match the order on the laboratory data sheets, data transfer and quality assurance were slow. Converting the field spreadsheets and data bases to a consistent format for input into the NIWQP data base was particularly labor intensive.

## MANIPULATION OF DATA

After chemical data for water, bottom sediment, and biota were gathered from the various sources, they were manipulated on the USGS Prime minicomputer using P-STAT software. Data manipulation involved organizing the attributes, correcting errors in the NIWQP data, and preparing the data for creation of the Ingres data base. Duplicate analyses or empty records retrieved from the NWIS data base were deleted from the NIWQP data base.

Attributes were added to the data base, given descriptive names, and ordered. Variables added to the data base included those describing the data-collection sites (attributes “area,” “sub_area,” “source,” “background”) and those describing individual analyses (“doi,” “qaqc”). Chemical attributes in the NWIS data base are identified only by nondescriptive numbers called parameter codes; in the NIWQP data base, all attributes are identified by descriptive names and are ordered by name and grouped by type (trace elements, isotopes, pesticides, etc.).

In the NWIS data base, analytes from different matrices can be combined under one analysis. For example, pesticides in bottom sediment can be in the same analysis as trace elements in water. For the NIWQP data base, analyses that combined analytes from different matrices were manipulated so that each record represents only one matrix.

In the NWIS data base, some replicate analyses are not identified as being quality-assurance samples. Instead, sample times were used to differentiate replicate quality-assurance samples. Some analyses in the NWIS data base contain some values that represent duplicates and some that do not. For the NIWQP data base, when duplicate or triplicate sets of analyses were identified, the first analysis in time was classified as the environmental sample and the others as quality-assurance samples. Analytes that were not replicated in both samples were moved from the quality-assurance sample to the environmental sample in the NIWQP data base.

SQL command files were written to create Ingres tables and read ASCII data files to populate them.

## DATA-BASE QUALITY-ASSURANCE PROCEDURES

The NIWQP data base was checked carefully to assure that all analyses in the published reports (table 1) were included in the data base. Data also were checked to ensure that retrieval and manipulation of the data had not introduced errors, especially systematic errors. In one case, for example, data manipulation had resulted in the loss of "<" symbols. Errors discovered during quality assurance were investigated and corrected. The causes of systematic errors were identified and eliminated, and all affected analyses rechecked and corrected if needed.

As part of the quality-assurance procedures, NIWQP data values also were checked to ensure that they matched published values. If errors so identified were small and within a few percent of each other, the values in the NIWQP data base were corrected to match the values in the NWIS data base, the USGS data reports, and the USFWS analytical-laboratory data sheets. For larger differences, the senior author of the published data report (table 1) was contacted and the reasons for the discrepancy were investigated. For the NIWQP data base, all differences between published data reports and the source data bases were considered to be the result of transcription error or typographic errors introduced during subsequent word processing. In cases where the NWIS data base was in error, the value in the NWIS data base was corrected. It was the responsibility of the authors of the individual study-area reports and the analytical laboratories to update the NWIS data base as well as the data reports if errors were found.

### Water Data

For each NIWQP study area, 20 percent of the water-quality analyses were verified completely against the published data reports. For a given area, every fifth analysis was selected systematically for verification. All data in the NIWQP data base for the selected analyses were compared with the corresponding published values.

Not all data collected during the NIWQP investigations were published, and therefore some of the data in the NIWQP data base could not be checked against published reports. Examples of unpublished data include some analytical results in which all the values were less than the analytical reporting limit. Additionally, some field values for water samples were not published if the principal reason for the site visit was collection of bottom sediment.

Agreement between data in the NWIS and NIWQP data bases and the published reports is very good. For example, when more than 2,000 individual data values from analyses of 93 samples from the Stillwater Wildlife Management Area (Nevada) were checked, only 5 discrepancies were found. In the San Juan River area (New Mexico), only 1 discrepancy was found in more than 400 individual values for 11 samples. The reason for the good match is probably that, for most of the published data reports, the water-quality tables were essentially data dumps from NWIS that received only minimal word processing. Many of the discrepancies were related to word-processing errors and insufficient verification. For example, the negative sign in $\delta D$ and $\delta^{18}O$ values had been converted to "<" symbols in one of the data reports on the Kendrick Reclamation Project (Wyoming).

### Bottom-Sediment Data

Because relatively few analyses of bottom sediment were done, all values for selenium, arsenic, and molybdenum in the <0.062 fraction were checked against published values. In addition, all constituents were checked in two randomly chosen analyses from each study area. If these checks revealed a disproportionately high number of errors in a study area then all values for all analyses from that study area were checked.

In a small number of cases, values in the NIWQP data base and reports from the analytical laboratory did not match values in the later published NIWQP reports. In these cases, values from the reports from the analytical laboratory were used. Tables in those reports were considered more reliable than those in the NIWQP reports because they are essentially data dumps from the USGS analytical-laboratory data base. Usually the errors were minor and involved differences in rounding or missing "<" symbols. In one case, however, significant errors were found in a published source: The values for several elements were scrambled during word processing of the San Juan River area (New Mexico) report (Blanchard and others, 1993).

### Biological Data

As discussed in the section "Biological Tables," the biological data in the NIWQP data base were retrieved from the original laboratory reports. Those reports were checked for agreement with published data reports (table 1), for accuracy of wet-weight to dry-weight conversions, for sampling dates (if not reported in published reports), and, in some cases, to verify the taxonomic identification of individual samples. After data from each original laboratory report were entered into the master spreadsheet and made to conform to uniform conventions for data rounding and the reporting of values below detection limits, each analytical value was verified individually for keypad-entry errors by other members of the data-entry team. Thus, each datum entry ultimately was reviewed for accuracy by no fewer than three people.

## DISSEMINATION

The NIWQP data base is static and is not being updated as new results from ongoing NIWQP investigations become available. The data base is available as a set of Microsoft Access files and as a set of SQL commands and associated ASCII data files from the NIWQP home-page on the World Wide Web <http://www.usbr.gov/niwqp>.

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# APPENDICES

## APPENDIX A. *Data dictionary for National Irrigation Water Quality Program data base*

[Acceptable codes for fixed-value attributes are explained in appendix B. Char, fixed-length character string of 1 to 2,000 characters; date, formatted-date data type; *ddd–mm–ss*, degrees–minutes–seconds longitude format; *dd–mm–ss*, degrees–minutes–seconds latitude format; *dd–mmm–yy*, day–month–year date format; float, floating-point data type; *hhmm*, hour–minute time-of-day (24-hour clock) format; integer, 4-byte integer data type; *mmdd*, month–day date format; *mm/dd/yy*, month/day/year date format; NIWQP, National Irrigation Water Quality Program; NWIS, National Water Information System; smallint, 2-byte integer data type; varchar, varying-length character string of 1 to 2,000 characters. —, not applicable]

| Attribute name | Attribute characteristics | | | | NWIS parameter code | Attribute description |
|---|---|---|---|---|---|---|
| | Linking | Fixed value | Data type | Field length | | |
| **AREA table (stores data on regional study areas)** | | | | | | |
| area | • | • | Varchar | 10 | — | Abbreviated name identifying NIWQP study area |
| sub_area | • | • | Varchar | 10 | — | Abbreviated name identifying subarea within NIWQP study area |
| basin_size | | | Float | 4 | — | Size of contributing drainage basin, in square miles |
| fwse | | | Float | 4 | — | Range of free-water-surface evaporation, in inches (Farnsworth and others, 1982) |
| avgfwse | | | Float | 4 | — | Average free-water-surface evaporation, in inches (Farnsworth and others, 1982) |
| avgprecip | | | Float | 4 | — | Average annual precipitation (middle of precip attribute), in inches |
| precip | | | Varchar | 10 | — | Range of precipitation given in NIQWP report (table 1), in inches |
| yrprecip | | | Float | 4 | — | Precipitation during year of data collection, in inches |
| geology | | • | Char | 25 | — | Geologic units in study area (King and Beikman, 1974) |
| mining | | • | Char | 1 | — | Whether mining occurs in study area |
| se_source | | | Char | 40 | — | Specific geologic information given in NIWQP reports (table 1) about selenium source materials |
| basin | | • | Char | 1 | — | Whether lakes in basin are terminal or flowthrough |
| drains | | | Char | 1 | — | Whether drains are buried or open |
| crop | | | Varchar | 11 | — | Principal irrigated crop in study area |
| irr_acres | | | Float | 4 | — | Amount of irrigated land within area or subarea, in acres |
| irr_end | | | Char | 4 | — | Typical month and day irrigation ends, in *mmdd* format |
| irr_start | | | Char | 4 | — | Typical month and day irrigation begins, in *mmdd* format |
| pesticides | | • | Char | 1 | — | Whether pesticides are in heavy use in area |
| remarks | | | Varchar | 36 | — | Comments about study area |
| **SITE table (stores data on sample-collection sites)** | | | | | | |
| site_id | • | | Varchar | 15 | — | Unique 9- or 15-digit identifying number assigned on basis of geographic location |
| area | • | • | Varchar | 10 | — | Abbreviated name identifying NIWQP study area |
| sub_area | • | • | Varchar | 10 | — | Abbreviated name identifying subarea within NIWQP study area |
| site_name | | | Varchar | 51 | — | Descriptive name of data-collection site |
| site | | | Varchar | 9 | — | Identifying name or number used in published report (table 1) and unique within study area covered by that report. If different names for same site were used in reconnaissance- and detailed-investigation reports, both names are used and identifier from reconnaissance report is enclosed in parentheses. |
| site_type | | • | Varchar | 2 | — | Whether site is surface-water, ground-water, or other type of site |
| background | | • | Char | 1 | — | Whether site is upgradient or downgradient from effects of irrigation in study area |
| source | | • | Char | 1 | — | Whether site represents source water for irrigation in study area |
| latitude | | | Char | 6 | — | Latitude of data-collection site, in degrees, minutes, and seconds (*ddmmss* format) |
| longitude | | | Char | 7 | — | Longitude of data-collection site, in degrees, minutes, and seconds (*dddmmss* format) |
| altitude | | | Float | 4 | — | Altitude of data-collection site, in feet |
| drain_area | | | Float | 4 | — | Drainage area of surface-water data-collection site, in square miles |
| well_depth | | | Float | 4 | — | Well depth of ground-water data-collection site, in feet below land surface |
| sitegeology | | • | Char | 5 | — | Generalized geology at sampling site |
| sitefwse | | | Float | 4 | — | Free-water-surface evaporation rate at site, in inches |
| distance | | | Float | 4 | — | Distance of sample collection in stream cross section from left bank, in feet |

| | | | | | | |
|---|---|---|---|---|---|---|
| **FIELD table (stores data on field conditions at sample-collection sites during field visits)** | | | | | | |
| site_id | • | | Varchar | 15 | — | Unique 9- or 15-digit identifying number assigned on basis of geographic location |
| samp_date | • | | Date | — | — | Date of sample collection (*dd–mmm–yy* format) |
| samp_time | • | | Integer | 2 | — | Time of sample collection (*hhmm* format) |
| matrix | • | • | Char | 2 | — | Sample matrix |
| qaqc | | • | Char | 1 | — | Whether purpose of sample collection was quality assurance |
| doi | | • | Char | 1 | — | Whether analysis was made as part of NIWQP investigation |
| recno | | | Varchar | 8 | — | U.S. Geological Survey identifer used for sample in NWIS data base |
| samp_meth | | • | Integer | 2 | — | Sample-collection method |
| agyanal | | • | Integer | 4 | — | Analyzing agency |
| agycol | | • | Integer | 4 | — | Collecting agency |
| depth_samp | | | Float | 4 | — | Depth of sample collection below water surface, in feet |
| distance | | | Float | 4 | — | Distance of sample collection in stream cross section from left bank, in feet |
| wtr_level | | | Float | 4 | — | Ground-water level below water surface, in feet |
| q | | | Float | 4 | 00061 | Discharge, instantaneous, stream, in cubic feet per second |
| ntu | | | Float | 4 | 00076 | Turbidity, in nephelometer turbidity units |
| airt | | | Float | 4 | 00020 | Temperature, air, in degrees Celsius |
| temp | | | Float | 4 | 00010 | Temperature, water, in degrees Celsius |
| dox | | | Float | 4 | 00300 | Oxygen, dissolved, in milligrams per liter |
| doxpct | | | Integer | 2 | 00301 | Oxygen, dissolved, in percent saturation |
| baro_p | | | Integer | 2 | 00025 | Barometric pressure, in millimeters of mercury |
| cond | | | Integer | 4 | 00094 | Specific conductance, field, in microsiemens per centimeter at 25 degrees Celsius |
| cond_lab | | | Integer | 4 | 90095 | Specific conductance, laboratory, in microsiemens per centimeter at 25 degrees Celsius |
| ph | | | Float | 4 | 00400 | pH, whole water, field, in standard units |
| ph_lab | | | Float | 4 | 00403 | pH, whole water, laboratory, in standard units |
| redox | | | Float | 4 | 00090 | Oxidation–reduction potential, in millivolts |
| sulfide | | | Float | 4 | 00745 | Sulfide, total, as S, in milligrams per liter |
| **INORG table (stores data on inorganic constituents in water samples)** | | | | | | |
| site_id | • | | Varchar | 15 | — | Unique 9- or 15-digit identifying number assigned on basis of geographic location |
| samp_date | • | | Date | — | — | Date of sample collection (*dd–mmm–yy* format) |
| samp_time | • | | Integer | 2 | — | Time of sample collection (*hhmm* format) |
| matrix | • | • | Char | 2 | — | Sample matrix |
| hardness | | | Float | 4 | 00900 | Hardness, as $CaCO_3$, total, in milligrams per liter |
| ca | | | Float | 4 | 00915 | Calcium, dissolved, as Ca, in milligrams per liter |
| ca_t | | | Float | 4 | 00916 | Calcium, total, recoverable, as Ca, in milligrams per liter |
| mg | | | Float | 4 | 00925 | Magnesium, dissolved, as Mg, in milligrams per liter |
| mg_t | | | Float | 4 | 00927 | Magnesium, total, as Mg, in milligrams per liter |
| na | | | Float | 4 | 00930 | Sodium, dissolved, as Na, in milligrams per liter |
| na_t | | | Float | 4 | 00929 | Sodium, total, recoverable, as Na, in milligrams per liter |
| sar | | | Float | 4 | 00931 | Sodium adsorption ratio |
| k | | | Float | 4 | 00935 | Potassium, dissolved, as K, in milligrams per liter |
| k_t | | | Float | 4 | 00937 | Potassium, total, as K, in milligrams per liter |

APPENDIX A. *Data dictionary for National Irrigation Water Quality Program data base*—Continued

| Attribute name | Attribute characteristics | | | | NWIS parameter code | Attribute description |
|---|---|---|---|---|---|---|
| | Linking | Fixed value | Data type | Field length | | |
| **INORG table (stores data on inorganic constituents in water samples)—*Continued*** | | | | | | |
| alk | | | Float | 4 | 00410 | Alkalinity, titration to pH 4.5, field, as $CaCO_3$, in milligrams per liter |
| alk_co3_it | | | Float | 4 | 99430 | Alkalinity, carbonate, incremental titration, field, as $CaCO_3$, in milligrams per liter |
| alk_dis_it | | | Float | 4 | 39086 | Alkalinity, total, dissolved, incremental titration, field, as $CaCO_3$, in milligrams per liter |
| alk_it | | | Float | 4 | 00419 | Alkalinity, incremental titration, field, as $CaCO_3$, in milligrams per liter |
| alk_lab | | | Float | 4 | 90410 | Alkalinity, titration to pH 4.5, laboratory, as $CaCO_3$, in milligrams per liter |
| alk_ww_fe | | | Float | 4 | 00417 | Alkalinity, water, whole, total, fixed-endpoint titration, laboratory, as $CaCO_3$, in milligrams per liter |
| alk_ww_gt | | | Float | 4 | 29813 | Alkalinity, water, whole, gran titration, field, as $CaCO_3$, in milligrams per liter |
| co3 | | | Float | 4 | 00445 | Carbonate, total, fixed-endpoint titration, field, as $CO_3$, in milligrams per liter |
| co3_ft | | | Float | 4 | 00452 | Carbonate, dissolved, incremental titration, field, as $CO_3$, in milligrams per liter |
| co3_it | | | Float | 4 | 00447 | Carbonate, total, incremental titration, field, as $CO_3$, in milligrams per liter |
| co3_it_2 | | | Float | 4 | 99445 | Carbonate, incremental titration, field, as $CO_3$, in milligrams per liter |
| hco3 | | | Float | 4 | 00440 | Bicarbonate, total, fixed-endpoint titration, field, as $HCO_3$, in milligrams per liter |
| hco3_ft | | | Float | 4 | 00453 | Bicarbonate, dissolved, incremental titration, field, as $HCO_3$, in milligrams per liter |
| hco3_it | | | Float | 4 | 00450 | Bicarbonate, total, incremental titration, field, as $HCO_3$, in milligrams per liter |
| hco3_it_2 | | | Float | 4 | 99440 | Bicarbonate, incremental titration, field, as $HCO_3$, in milligrams per liter |
| so4 | | | Float | 4 | 00945 | Sulfate, dissolved, as $SO_4$, in milligrams per liter |
| so4_unc | | | Float | 4 | 99890 | Sulfate, water, dissolved, uncorrected, as $SO_4$, in milligrams per liter |
| cl | | | Float | 4 | 00940 | Chloride, dissolved, as Cl, in milligrams per liter |
| f | | | Float | 4 | 00950 | Fluoride, dissolved, as F, in milligrams per liter |
| si | | | Float | 4 | 00955 | Silica, dissolved, as $SiO_2$, in milligrams per liter |
| ds_sum | | | Float | 4 | 70301 | Solids, sum of constituents, dissolved, in milligrams per liter |
| res105_t | | | Float | 4 | 00500 | Solids, residue on evaporation at 105 degrees Celsius, total, in milligrams per liter |
| res180 | | | Float | 4 | 70300 | Solids, residue on evaporation at 180 degrees Celsius, dissolved, in milligrams per liter |
| ag | | | Float | 4 | 01075 | Silver, dissolved, as Ag, in micrograms per liter |
| ag_t | | | Float | 4 | 01077 | Silver, total, as Ag, in micrograms per liter |
| al | | | Float | 4 | 01106 | Aluminum, dissolved, as Al, in micrograms per liter |
| al_t | | | Float | 4 | 01105 | Aluminum, total, as Al, in micrograms per liter |
| ars | | | Float | 4 | 01000 | Arsenic, dissolved, as As, in micrograms per liter |
| ars_t | | | Float | 4 | 01002 | Arsenic, total, as As, in micrograms per liter |
| b | | | Float | 4 | 01020 | Boron, dissolved, as B, in micrograms per liter |
| b_t | | | Float | 4 | 01022 | Boron, total, as B, in micrograms per liter |
| ba | | | Float | 4 | 01005 | Barium, dissolved, as Ba, in micrograms per liter |
| ba_t | | | Float | 4 | 01007 | Barium, total, as Ba, in micrograms per liter |
| be | | | Float | 4 | 01010 | Beryllium, dissolved, as Be, in micrograms per liter |
| be_t | | | Float | 4 | 01012 | Beryllium, total, as Be, in micrograms per liter |
| br | | | Float | 4 | 71870 | Bromide, dissolved, as Br, in milligrams per liter |

| | | | | |
|---|---|---|---|---|
| cd | Float | 4 | 01025 | Cadmium, dissolved, as Cd, in micrograms per liter |
| cd_t | Float | 4 | 01027 | Cadmium, total, as Cd, in micrograms per liter |
| co | Float | 4 | 01035 | Cobalt, dissolved, as Co, in micrograms per liter |
| co_t | Float | 4 | 01037 | Cobalt, total, as Co, in micrograms per liter |
| cr | Float | 4 | 01030 | Chromium, dissolved, as Cr, in micrograms per liter |
| cr_t | Float | 4 | 01034 | Chromium, total, as Cr, in micrograms per liter |
| cr_hex | Float | 4 | 01032 | Chromium, hexavalent, as Cr, in micrograms per liter |
| cu | Float | 4 | 01040 | Copper, dissolved, as Cu, in micrograms per liter |
| cu_t | Float | 4 | 01042 | Copper, total, as Cu, in micrograms per liter |
| fe | Float | 4 | 01046 | Iron, dissolved, as Fe, in micrograms per liter |
| fe_t | Float | 4 | 01045 | Iron, total, as Fe, in micrograms per liter |
| hg | Float | 4 | 71890 | Mercury, dissolved, as Hg, in micrograms per liter |
| hg_t | Float | 4 | 71900 | Mercury, total recoverable, as Hg, in micrograms per liter |
| i | Float | 4 | 71865 | Iodide, dissolved, as I, in milligrams per liter |
| li | Float | 4 | 01130 | Lithium, dissolved, as Li, in micrograms per liter |
| li_t | Float | 4 | 01132 | Lithium, total, as Li, in micrograms per liter |
| mn | Float | 4 | 01056 | Manganese, dissolved, as Mn, in micrograms per liter |
| mn_t | Float | 4 | 01055 | Manganese, total, as Mn, in micrograms per liter |
| mo | Float | 4 | 01060 | Molybdenum, dissolved, as Mo, in micrograms per liter |
| mo_t | Float | 4 | 01062 | Molybdenum, total, as Mo, in micrograms per liter |
| ni | Float | 4 | 01065 | Nickel, dissolved, as Ni, in micrograms per liter |
| ni_t | Float | 4 | 01067 | Nickel, total, as Ni, in micrograms per liter |
| pb | Float | 4 | 01049 | Lead, dissolved, as Pb, in micrograms per liter |
| pb_t | Float | 4 | 01051 | Lead, total, as Pb, in micrograms per liter |
| sb | Float | 4 | 01095 | Antimony, dissolved, as Sb, in micrograms per liter |
| sb_t | Float | 4 | 01097 | Antimony, total, as Sb, in micrograms per liter |
| se | Float | 4 | 01145 | Selenium, dissolved, as Se, in micrograms per liter |
| se_t | Float | 4 | 01147 | Selenium, total, as Se, in micrograms per liter |
| sr | Float | 4 | 01080 | Strontium, dissolved, as Sr, in micrograms per liter |
| sr_t | Float | 4 | 01082 | Strontium, total, as Sr, in micrograms per liter |
| tl | Float | 4 | 01057 | Thallium, dissolved, as Tl, in micrograms per liter |
| tl_t | Float | 4 | 01059 | Thallium, total, as Tl, in micrograms per liter |
| v | Float | 4 | 01085 | Vanadium, dissolved, as V, in micrograms per liter |
| zn | Float | 4 | 01090 | Zinc, dissolved, as Zn, in micrograms per liter |
| zn_t | Float | 4 | 01092 | Zinc, total, as Zn, in micrograms per liter |

APPENDIX A. *Data dictionary for National Irrigation Water Quality Program data base*—Continued

| Attribute name | Attribute characteristics | | | | NWIS parameter code | Attribute description |
|---|---|---|---|---|---|---|
| | Linking | Fixed value | Data type | Field length | | |
| **ISOTOPE table (stores data on inorganic isotopes in water samples)** | | | | | | |
| site_id | • | | Varchar | 15 | — | Unique 9- or 15-digit identifying number assigned on basis of geographic location |
| samp_date | • | | Date | — | — | Date of sample collection (*dd–mmm–yy* format) |
| samp_time | • | | Integer | 2 | — | Time of sample collection (*hhmm* format) |
| matrix | • | • | Char | 2 | — | Sample matrix |
| alpha_ugl | | | Float | 4 | 80030 | Gross alpha radioactivity, dissolved, as natural U, in micrograms per liter |
| alpha_ugl_t | | | Float | 4 | 80040 | Gross alpha radioactivity, total, suspended, as natural U, in micrograms per liter |
| beta_cs | | | Float | 4 | 03516 | Gross beta radioactivity, suspended, as Cs-137, in picocuries per liter |
| beta_sr | | | Float | 4 | 80050 | Gross beta radioactivity, dissolved, as Sr/Y-90, in picocuries per liter |
| c13 | | | Float | 4 | 82081 | Carbon-13/12 ratio, in permil |
| deut | | | Float | 4 | 82082 | Hydrogen-2/1 ratio, in permil |
| k40 | | | Float | 4 | 82068 | Potassium-40, dissolved, as K-40, in picocuries per liter |
| o18 | | | Float | 4 | 82085 | Oxygen-18/16 ratio, in permil |
| ra_226_pcl | | | Float | 4 | 09511 | Radium-226, dissolved, radon method, in picocuries per liter |
| ra_226_plcht | | | Float | 4 | 09510 | Radium-226, dissolved, planchet count, in picocuries per liter |
| radon_t | | | Float | 4 | 82303 | Radon-222, total, in picocuries per liter |
| radon_t_2sig | | | Float | 4 | 76002 | Radon-222, 2-sigma-precision estimate, water, whole, total, in picocuries per liter |
| s34 | | | Float | 4 | 82086 | Sulfur-34/32 ratio, in permil |
| trit | | | Integer | 2 | 07000 | Tritium, total, in picocuries per liter |
| trit_2sig | | | Float | 4 | 75985 | Tritium, 2-sigma-precision estimate, water, whole, total, in picocuries per liter |
| u | | | Float | 4 | 22703 | Uranium, natural, dissolved, as U, in micrograms per liter |
| u_2sig | | | Float | 4 | 75990 | Uranium, natural, 2-sigma-precision estimate, water, dissolved, as U, in micrograms per liter |
| u_ext_ugl | | | Float | 4 | 80020 | Uranium, dissolved, as U, extraction fluorometric, in micrograms per liter |
| u_t | | | Float | 4 | 28011 | Uranium, natural, total, as U, in micrograms per liter |
| u_t_2sig | | | Float | 4 | 75993 | Uranium, natural, 2-sigma-precision estimate, water, whole, total, as U, in micrograms per liter |
| **NUTRIENT table (stores data on nutrients in water samples)** | | | | | | |
| site_id | • | | Varchar | 15 | — | Unique 9- or 15-digit identifying number assigned on basis of geographic location |
| samp_date | • | | Date | — | — | Date of sample collection (*dd–mmm–yy* format) |
| samp_time | • | | Integer | 2 | — | Time of sample collection (*hhmm* format) |
| matrix | • | • | Char | 2 | — | Sample matrix |
| bod | | | Float | 4 | 00310 | Oxygen demand, biochemical, 5-day, at 20 degrees Celsius, in milligrams per liter |
| cod | | | Float | 4 | 00340 | Oxygen demand, chemical, 0.25 N potassium dichromate, in milligrams per liter |
| doc | | | Float | 4 | 00681 | Carbon, organic, dissolved, as C, in milligrams per liter |
| toc | | | Float | 4 | 00680 | Carbon, organic, total, as C, in milligrams per liter |
| cn_d | | | Float | 4 | 00723 | Cyanide, dissolved, as CN, in milligrams per liter |
| cn_t | | | Float | 4 | 00720 | Cyanide, total, as CN, in milligrams per liter |

| | | | | | | |
|---|---|---|---|---|---|---|
| n | | | Float | 4 | 00602 | Nitrogen, dissolved, as N, in milligrams per liter |
| n_tot | | | Float | 4 | 00600 | Nitrogen, total, as N, in milligrams per liter |
| nitr_t | | | Float | 4 | 71887 | Nitrogen, total, as $NO_3$, in milligrams per liter |
| no2 | | | Float | 4 | 00613 | Nitrogen, nitrite, dissolved, as N, in milligrams per liter |
| no2_t | | | Float | 4 | 00615 | Nitrogen, nitrite, total, as N, in milligrams per liter |
| no2_no3 | | | Float | 4 | 00631 | Nitrogen, nitrite plus nitrate, dissolved, as N, in milligrams per liter |
| no2_no3_t | | | Float | 4 | 00630 | Nitrogen, nitrite plus nitrate, total, as N, in milligrams per liter |
| n_kjel | | | Float | 4 | 00625 | Nitrogen, Kjeldahl (ammonia plus organic), total, as N, in milligrams per liter |
| n_org_t | | | Float | 4 | 00605 | Nitrogen, organic, total, as N, in milligrams per liter |
| nh3 | | | Float | 4 | 00608 | Nitrogen, ammonia, dissolved, as N, in miiligrams per liter |
| nh3_org | | | Float | 4 | 00623 | Nitrogen, ammonia plus organic, dissolved, as N, in milligrams per liter |
| nh3_union | | | Smallint | 2 | 00619 | Nitrogen, ammonia, un-ionized, as N, in milligrams per liter |
| nh3_nh4 | | | Float | 4 | 00610 | Nitrogen, ammonia, and ammonium, total, as N, in milligrams per liter |
| nh4_nh4 | | | Float | 4 | 71846 | Nitrogen, ammonia, dissolved, as $NH_4$, in milligrams per liter |
| p | | | Float | 4 | 00666 | Phosphorus, dissolved, as P, in milligrams per liter |
| p_t | | | Float | 4 | 00665 | Phosphorus, total, as P, in milligrams per liter |
| phos_t | | | Float | 4 | 71886 | Phosphorus, total, as $PO_4$, in milligrams per liter |
| po4 | | | Float | 4 | 00671 | Phosphorus, orthophosphate, dissolved, as P, in milligrams per liter |
| p_hyd | | | Float | 4 | 00677 | Phosphorus, hydrolyzable plus orthophosphate, dissolved, as P, in milligrams per liter |
| p_ortho | | | Float | 4 | 70507 | Phosphorus, orthophosphate, total, as P, in milligrams per liter |

**ORG table (stores data on organic chemicals in water samples)**

| | | | | | | |
|---|---|---|---|---|---|---|
| site_id | • | | Varchar | 15 | — | Unique 9- or 15-digit identifying number assigned on basis of geographic location |
| samp_date | • | | Date | — | — | Date of sample collection (*dd–mmm–yy* format) |
| samp_time | • | | Integer | 2 | — | Time of sample collection (*hhmm* format) |
| matrix | • | • | Char | 2 | — | Sample matrix |
| acenaphthene | | | Float | 4 | 34205 | Acenaphthene, total, in micrograms per liter |
| acenaphthylene | | | Float | 4 | 34200 | Acenaphthylene, total, in micrograms per liter |
| alachlor | | | Float | 4 | 77825 | Alachlor, total recoverable, in micrograms per liter |
| aldrin | | | Float | 4 | 39330 | Aldrin, total, in micrograms per liter |
| ametryne | | | Float | 4 | 82184 | Ametryne, total, in micrograms per liter |
| anthracene | | | Float | 4 | 34220 | Anthracene, total, in micrograms per liter |
| atrazine | | | Float | 4 | 39630 | Atrazine, total, in micrograms per liter |
| b2ethxphth | | | Float | 4 | 39100 | Bis(2-ethylhexyl) phthalate, total, in micrograms per liter |
| benzanthra | | | Float | 4 | 34526 | Benzo(a)anthracene, total, in micrograms per liter |
| benzapyrene | | | Float | 4 | 34247 | Benzo(a)pyrene, total, in micrograms per liter |
| benzbfluorant | | | Float | 4 | 34230 | Benzo(b)fluoranthene, total, in micrograms per liter |
| benzkfluorant | | | Float | 4 | 34242 | Benzo(k)fluoranthene, total, in micrograms per liter |
| benzperyln | | | Float | 4 | 34521 | Benzo(g,h,i)perylene, total, in micrograms per liter |
| bis2chlorethox | | | Float | 4 | 34278 | Bis(2-chloroethoxy) methane, total, in micrograms per liter |
| bis2chlorisopr | | | Float | 4 | 34283 | Bis(2-chloroisopropyl) ether, total, in micrograms per liter |
| bis2chloroethy | | | Float | 4 | 34273 | Bis(2-chloroethyl) ether, total, in micrograms per liter |
| brphphethr | | | Float | 4 | 34636 | 4-Bromophenyl phenyl ether, total, in micrograms per liter |
| chlordane | | | Float | 4 | 39350 | Chlordane, technical and met, total, in micrograms per liter |
| chrysene | | | Float | 4 | 34320 | Chrysene, total, in micrograms per liter |
| clnaphthal | | | Float | 4 | 34581 | 2-Chloronaphthalene, total, in micrograms per liter |
| clphenol | | | Float | 4 | 34586 | 2-Chlorophenol, total, in micrograms per liter |
| clphnlphenethr | | | Float | 4 | 34641 | 4-Chlorophenyl phenyl ether, total, in micrograms per liter |
| clpyrifos_t | | | Float | 4 | 38932 | Chlorpyrifos, total, recoverable, in micrograms per liter |
| cyanazine | | | Float | 4 | 81757 | Cyanazine, total, in micrograms per liter |
| cyprazine_t | | | Float | 4 | 82187 | Cyprazine total, in micrograms per liter |

APPENDIX A. *Data dictionary for National Irrigation Water Quality Program data base*—Continued

| Attribute name | Attribute characteristics | | | | NWIS parameter code | Attribute description |
|---|---|---|---|---|---|---|
| | Linking | Fixed value | Data type | Field length | | |
| **ORG table (stores data on organic chemicals in water samples)—*Continued*** | | | | | | |
| d24 | | | Float | 4 | 39730 | 2,4-Dichlorophenoxyacetic acid, total, in micrograms per liter |
| ddd | | | Float | 4 | 39360 | Dichloro-diphenyl-dichloroethane (DDD), total, in micrograms per liter |
| dde | | | Float | 4 | 39365 | Dichloro-diphenyl-dichloroethylene (DDE), total, in micrograms per liter |
| ddt | | | Float | 4 | 39370 | Dichloro-diphenyl-trichloroethane (DDT), total, in micrograms per liter |
| def_t | | | Float | 4 | 39040 | DEF (tributyl phosphorotrithioate), in micrograms per liter |
| diazinon | | | Float | 4 | 39570 | Diazinon, total, in micrograms per liter |
| dibenzanthr | | | Float | 4 | 34556 | 1,2,5,6-Dibenzanthracene, total, in micrograms per liter |
| dicamba_t | | | Float | 4 | 82052 | Dicamba (Mediben, Banvel D), total, in micrograms per liter |
| diclbenz12 | | | Float | 4 | 34536 | 1,2-Dichlorobenzene, total, in micrograms per liter |
| diclbenz13 | | | Float | 4 | 34566 | 1,3-Dichlorobenzene, total, in micrograms per liter |
| diclbenz14 | | | Float | 4 | 34571 | 1,4-Dichlorobenzene, total, in micrograms per liter |
| diclphenol | | | Float | 4 | 34601 | 2,4-Dichlorophenol, total, in micrograms per liter |
| dieldrin | | | Float | 4 | 39380 | Dieldrin, total, in micrograms per liter |
| dietpthlate | | | Float | 4 | 34336 | Diethylphthalate, total, in micrograms per liter |
| dimephtlate | | | Float | 4 | 34341 | Dimethylphthalate, total, in micrograms per liter |
| dimthphenl | | | Float | 4 | 34606 | 2,4-Dimethylphenol, total, in micrograms per liter |
| dinocresol | | | Float | 4 | 34657 | 4,6-Dinitro-orthocresol, total, in micrograms per liter |
| dinphenol | | | Float | 4 | 34616 | 2,4-Dinitrophenol, total, in micrograms per liter |
| dintolu24 | | | Float | 4 | 34611 | 2,4-Dinitrotoluene, total, in micrograms per liter |
| dintolu26 | | | Float | 4 | 34626 | 2,6-Dinitrotoluene, total, in micrograms per liter |
| dioctphthl | | | Float | 4 | 34596 | Di-n-octyl phthalate, total, in micrograms per liter |
| disyston_t | | | Float | 4 | 39011 | Disyston (Disulfoton), total, in micrograms per liter |
| dnb_phtha | | | Float | 4 | 39110 | Di-n-butyl phthalate, total, in micrograms per liter |
| dp_2_4 | | | Float | 4 | 82183 | 2,4-Dichlorprop, total, in micrograms per liter |
| endosulf | | | Float | 4 | 39388 | Endosulfan, total, in micrograms per liter |
| endrin | | | Float | 4 | 39390 | Endrin, total, in micrograms per liter |
| ethion | | | Float | 4 | 39398 | Ethion, total, in micrograms per liter |
| flranthene | | | Float | 4 | 34376 | Fluoranthene, total, in micrograms per liter |
| fluorene | | | Float | 4 | 34381 | Fluorene, total, in micrograms per liter |
| fonofos | | | Float | 4 | 82614 | Fonofos (Dyfonate), water, whole, total recoverable, in micrograms per liter |
| guthion | | | Float | 4 | 39580 | Guthion, total, in micrograms per liter |
| hcb | | | Float | 4 | 39700 | Hexachlorobenzene, total, in micrograms per liter |
| heptchlr | | | Float | 4 | 39410 | Heptachlor, total, in micrograms per liter |
| heptepox | | | Float | 4 | 39420 | Heptachlor epoxide, total, in micrograms per liter |
| hexclbutdie | | | Float | 4 | 39702 | Hexachlorobutadiene, total, in micrograms per liter |
| hexclcyclpd | | | Float | 4 | 34386 | Hexachlorocyclopentadiene, total, in micrograms per liter |
| hexclethan | | | Float | 4 | 34396 | Hexachloroethane, total, in micrograms per liter |
| ind_pyr | | | Float | 4 | 34403 | Indeno(1,2,3-cd)pyrene, total, in micrograms per liter |
| isphrone | | | Float | 4 | 34408 | Isophorone, total, in micrograms per liter |
| lindane | | | Float | 4 | 39340 | Gamma-benzene hexachloride (lindane), total, in micrograms per liter |

| | | | | |
|---|---|---|---|---|
| malathion | Float | 4 | 39530 | Malathion, total, in micrograms per liter |
| mbas | Float | 4 | 38260 | Methylene blue active substances, in milligrams per liter |
| methomyl | Float | 4 | 39051 | Methomyl, total, in micrograms per liter |
| methoxchlr | Float | 4 | 39480 | Methoxychlor, total, in micrograms per liter |
| metolachlor | Float | 4 | 82612 | Metolachlor, total recoverable, in micrograms per liter |
| metribuzin | Float | 4 | 82611 | Metribuzin, total recoverable, in micrograms per liter |
| mirex | Float | 4 | 39755 | Mirex, total, in micrograms per liter |
| mparathion | Float | 4 | 39600 | Methyl parathion, total, in micrograms per liter |
| mtrithion | Float | 4 | 39790 | Methyl trithion, total, in micrograms per liter |
| naphthalene | Float | 4 | 34696 | Naphthalene, total, in micrograms per liter |
| nbb_phth | Float | 4 | 34292 | N-Butylbenzyl phthlate, total, in micrograms per liter |
| nitrphenol4 | Float | 4 | 34646 | 4-Nitrophenol, total, in micrograms per liter |
| nsodimeth.t | Float | 4 | 34438 | N-nitrosodimethylamine, total, in micrograms per liter |
| nsodiphenyl.t | Float | 4 | 34433 | N-nitrosodiphenylamine, total, in micrograms per liter |
| ntrobenzen | Float | 4 | 34447 | Nitrobenzene, total, in micrograms per liter |
| ntrphenol2 | Float | 4 | 34591 | 2-Nitrophenol, total, in micrograms per liter |
| parathion | Float | 4 | 39540 | Parathion, total, in micrograms per liter |
| pcb | Float | 4 | 39516 | Polychlorinated biphyenyls, total, in micrograms per liter |
| pclmcresol | Float | 4 | 34452 | Parachlorometacresol, total, in micrograms per liter |
| pcn | Float | 4 | 39250 | Naphthalenes, polychlorinated, total, in micrograms per liter |
| pcn_d | Float | 4 | 82360 | Naphthalenes, polychlorinated, dissolved, in micrograms per liter |
| pcp | Float | 4 | 39032 | Pentachlorophenol, total, in micrograms per liter |
| perthane | Float | 4 | 39034 | Perthane, total, in micrograms per liter |
| phenol | Float | 4 | 34694 | Phenol ($C_6H_5OH$), total, in micrograms per liter |
| phnanthren | Float | 4 | 34461 | Phenanthrene, total, in micrograms per liter |
| phorate_t | Float | 4 | 39023 | Phorate, total, in micrograms per liter |
| picloram | Float | 4 | 39720 | Picloram (Tordon, Amdon), total, in micrograms per liter |
| prometone | Float | 4 | 39056 | Prometone, total, in micrograms per liter |
| prometryne | Float | 4 | 39057 | Prometryne, total, in micrograms per liter |
| propazine | Float | 4 | 39024 | Propazine, total, in micrograms per liter |
| propham | Float | 4 | 39052 | Propham, total, in micrograms per liter |
| pyrene | Float | 4 | 34469 | Pyrene, total, in micrograms per liter |
| sevin | Float | 4 | 39750 | Sevin (Carbaryl), total, in micrograms per liter |
| silvex | Float | 4 | 39760 | Silvex, total, in micrograms per liter |
| simazine | Float | 4 | 39055 | Simazine, total, in micrograms per liter |
| simetone_t | Float | 4 | 82188 | Simetone, total, in micrograms per liter |
| simetryne | Float | 4 | 39054 | Simetryne, total, in micrograms per liter |
| t245 | Float | 4 | 39740 | 2,4,5-Trichlorophenoxyacetic acid, total, in micrograms per liter |
| toxaphene | Float | 4 | 39400 | Toxaphene, total, in micrograms per liter |
| triclbenze | Float | 4 | 34551 | 1,2,4-Trichlorobenzene, total, in micrograms per liter |
| triclphenl | Float | 4 | 34621 | 2,4,6-Trichlorophenol, total, in micrograms per liter |
| trifluralin | Float | 4 | 39030 | Trifluralin, total recoverable, in micrograms per liter |
| trithion | Float | 4 | 39786 | Trithion, total, in micrograms per liter |

APPENDIX A. *Data dictionary for National Irrigation Water Quality Program data base*—Continued

| Attribute name | Attribute characteristics | | | | NWIS parameter code | Attribute description |
|---|---|---|---|---|---|---|
| | Linking | Fixed value | Data type | Field length | | |
| **SEDIMENT table (stores data on suspended sediment and bed material)** | | | | | | |
| site_id | • | | Varchar | 15 | — | Unique 9- or 15-digit identifying number assigned on basis of geographic location |
| samp_date | • | | Date | — | — | Date of sample collection (*dd–mmm–yy* format) |
| samp_time | • | | Integer | 2 | — | Time of sample collection (*hhmm* format) |
| matrix | • | • | Char | 2 | — | Sample matrix (water, bottom sediment, or biota) |
| res105_sus | | | Float | 4 | 00530 | Solids, residue at 105 degrees Celsius, suspended, in milligrams per liter |
| beta_cs_sus | | | Float | 4 | 03516 | Gross beta radioactivity, suspended, as Cs-137, in picocuries per liter |
| beta_r_sus | | | Float | 4 | 80060 | Gross beta radioactivity, suspended, total, as Sr/Y-90, in picocuries per liter |
| ag_sus | | | Float | 4 | 01076 | Silver, suspended, as Ag, in micrograms per liter |
| as_t_sus | | | Float | 4 | 01001 | Arsenic, suspended, total, as As, in micrograms per liter |
| ba_rec_sus | | | Float | 4 | 01006 | Barium, suspended, recoverable, as Ba, in micrograms per liter |
| cd_sus | | | Float | 4 | 01026 | Cadmium, suspended, as Cd, in micrograms per liter |
| cr_sus | | | Float | 4 | 01031 | Chromium, suspended, as Cr, in micrograms per liter |
| co_sus | | | Float | 4 | 01036 | Cobalt, suspended, as Co, in micrograms per liter |
| cu_rec_sus | | | Float | 4 | 01041 | Copper, suspended, recoverable, as Cu, in micrograms per liter |
| fe_rec_sus | | | Float | 4 | 01044 | Iron, suspended, recoverable, as Fe, in micrograms per liter |
| hg_rec_sus | | | Float | 4 | 71895 | Mercury, suspended, recoverable, as Hg , in micrograms per liter |
| mn_rec_sus | | | Float | 4 | 01054 | Manganese, suspended, recoverable, as Mn, in micrograms per liter |
| nh3_org_sus | | | Float | 4 | 00624 | Nitrogen, ammonia plus organic, suspended, total, as N, in milligrams per liter |
| pb_rec_sus | | | Float | 4 | 01050 | Lead, suspended, recoverable, as Pb, in micrograms per liter |
| se_sus | | | Float | 4 | 01146 | Selenium, suspended, total, as Se, in micrograms per liter |
| soc | | | Float | 4 | 00689 | Carbon, organic, suspended, as C, in milligrams per liter |
| zn_rec_sus | | | Float | 4 | 01091 | Zinc, suspended, recoverable, as Zn, in micrograms per liter |
| bm_fdiam_002 | | | Float | 4 | 80294 | Sediment, bed material, distilled-water fall diameter less than 0.002 millimeter, in percent |
| sbm_fdiam_004 | | | Float | 4 | 80157 | Sediment, bed material, distilled-water fall diameter less than 0.004 millimeter, in percent |
| bm_fdiam_008 | | | Float | 4 | 80293 | Sediment, bed material, distilled-water fall diameter less than 0.008 millimeter, in percent |
| bm_fdiam_016 | | | Float | 4 | 80282 | Sediment, bed material, distilled-water fall diameter less than 0.016 millimeter, in percent |
| bm_fdiam_031 | | | Float | 4 | 80283 | Sediment, bed material, distilled-water fall diameter less than 0.031 millimeter, in percent |
| sbm_fdiam_062 | | | Float | 4 | 80158 | Sediment, bed material, distilled-water fall diameter less than 0.062 millimeter, in percent |
| sbm_fdiam_125 | | | Float | 4 | 80159 | Sediment, bed material, distilled-water fall diameter less than 0.125 millimeter, in percent |
| sbm_fdiam_250 | | | Float | 4 | 80160 | Sediment, bed material, distilled-water fall diameter less than 0.250 millimeter, in percent |
| sbm_fdiam_500 | | | Float | 4 | 80161 | Sediment, bed material, distilled-water fall diameter less than 0.500 millimeter, in percent |
| sbm_fdiam_1 | | | Float | 4 | 80162 | Sediment, bed material, distilled-water fall diameter less than 1.00 millimeter, in percent |
| sbm_sdiam_062 | | | Float | 4 | 80164 | Sediment, bed material, sieve diameter less than 0.062 millimeter, in percent |
| sbm_sdiam_125 | | | Float | 4 | 80165 | Sediment, bed material, sieve diameter less than 0.125 millimeter, in percent |
| sbm_sdiam_250 | | | Float | 4 | 80166 | Sediment, bed material, sieve diameter less than 0.250 millimeter, in percent |
| sbm_sdiam_500 | | | Float | 4 | 80167 | Sediment, bed material, sieve diameter less than 0.500 millimeter, in percent |
| sbm_sdiam_1 | | | Float | 4 | 80168 | Sediment, bed material, sieve diameter less than 1.00 millimeter, in percent |
| sbm_sdiam_2 | | | Float | 4 | 80169 | Sediment, bed material, sieve diameter less than 2.00 millimeters, in percent |
| sbm_sdiam_4 | | | Float | 4 | 80170 | Sediment, bed material, sieve diameter less than 4.00 millimeters, in percent |
| sbm_sdiam_8 | | | Float | 4 | 80171 | Sediment, bed material, sieve diameter less than 8.00 millimeters, in percent |
| sbm_sdiam_16 | | | Float | 4 | 80172 | Sediment, bed material, sieve diameter less than 16.0 millimeters, in percent |
| sbm_sdiam_32 | | | Float | 4 | 80173 | Sediment, bed material, sieve diameter less than 32.0 millimeters, in percent |

| | | | | | | |
|---|---|---|---|---|---|---|
| sfdiam_002 | | | Integer | 2 | 70337 | Sediment, suspended, distilled-water fall diameter less than 0.002 millimeter, in percent |
| sfdiam_004 | | | Integer | 2 | 70338 | Sediment, suspended, distilled-water fall diameter less than 0.004 millimeter, in percent |
| sfdiam_008 | | | Integer | 2 | 70339 | Sediment, suspended, distilled-water fall diameter less than 0.008 millimeter, in percent |
| sfdiam_016 | | | Integer | 2 | 70340 | Sediment, suspended, distilled-water fall diameter less than 0.016 millimeter, in percent |
| sfdiam_031 | | | Float | 4 | 70341 | Sediment, suspended, distilled-water fall diameter less than 0.031 millimeter, in percent |
| sfdiam_062 | | | Integer | 2 | 70342 | Sediment, suspended, distilled-water fall diameter less than 0.062 millimeter, in percent |
| sfdiam_125 | | | Integer | 2 | 70343 | Sediment, suspended, distilled-water fall diameter less than 0.125 millimeter, in percent |
| sfdiam_250 | | | Integer | 2 | 70344 | Sediment, suspended, distilled-water fall diameter less than 0.250 millimeter, in percent |
| sfdiam_500 | | | Integer | 2 | 70345 | Sediment, suspended, distilled-water fall diameter less than 0.500 millimeter, in percent |
| sfdiam_1 | | | Integer | 2 | 70346 | Sediment, suspended, distilled-water fall diameter less than 1.00 millimeter, in percent |
| sfdiam_2 | | | Float | 4 | 70347 | Sediment, suspended, distilled-water fall diameter less than 2.00 millimeters, in percent |
| ssdiam_lt062 | | | Integer | 2 | 70331 | Sediment, suspended, sieve diameter less than 0.062 millimeter, in percent |
| ssdiam_lt125 | | | Integer | 2 | 70332 | Sediment, suspended, sieve diameter less than 0.125 millimeter, in percent |
| ssdiam_lt250 | | | Float | 4 | 70333 | Sediment, suspended, sieve diameter less than 0.250 millimeter, in percent |
| ssdiam_lt500 | | | Float | 4 | 70334 | Sediment, suspended, sieve diameter less than 0.500 millimeter, in percent |
| ssdiam_lt1 | | | Float | 4 | 70335 | Sediment, suspended, sieve diameter less than 1.00 millimeter, in percent |
| ss_conc_lt062 | | | Float | 4 | 80222 | Sediment, suspended, concentration, sieve diameter less than 0.062 millimeter, in milligrams per liter |
| sed_t | | | Float | 4 | 80180 | Sediment, total, concentration, in milligrams per liter |
| sed_q | | | Float | 4 | 80156 | Sediment discharge, total, suspended plus bed material, in tons per day |
| sus_sed | | | Integer | 2 | 80154 | Sediment, suspended, concentration, in milligrams per liter |
| sus_sed_q | | | Float | 4 | 80155 | Sediment discharge, suspended, in tons per day |

**INORGBM table (stores data on inorganic constituents in bottom material)**

| | | | | | | |
|---|---|---|---|---|---|---|
| site_id | • | | Varchar | 15 | — | Unique 9- or 15-digit identifying number assigned on basis of geographic location |
| samp_date | • | | Date | — | — | Date of sample collection (*dd–mmm–yy* format) |
| matrix | • | • | Char | 2 | — | Sample matrix |
| site | | | Varchar | 9 | — | Identifying name or number used in published report (table 1) and unique within study area covered by report. If different names for same site were used in reconnaissance- and detailed-investigation reports, both names are used and identifier from reconnaissance report is enclosed in parentheses. |
| prime_id | | | Varchar | 8 | — | Laboratory identifier used in original U.S. Geological Survey data reports (table 1) |
| qaqc | • | • | Char | 1 | — | Whether purpose of sample collection was quality assurance |
| fraction | • | • | Varchar | 6 | — | Size-fraction of sample material |
| ag_bm | | | Integer | 2 | — | Silver, total, in bottom material, as Ag, in micrograms per gram |
| al_bm | | | Float | 4 | — | Aluminum, total, in bottom material, as Al, in percent |
| as_bm | | | Float | 4 | — | Arsenic, in bottom material, as As, in micrograms per gram |
| au_bm | | | Integer | 2 | — | Gold, in bottom material, as Au, in micrograms per gram |
| b_xw_bm | | | Float | 4 | — | Boron, hot-water-extractable, in bottom material, as B, in micrograms per liter |
| ba_bm | | | Integer | 2 | — | Barium, total, in bottom material, as Ba, in micrograms per gram |
| be_bm | | | Integer | 2 | — | Beryllium, total, in bottom material, as Be, in micrograms per gram |
| bi_bm | | | Integer | 2 | — | Bismuth, total, in bottom material, as Bi, in micrograms per gram |
| c_co3_bm | | | Float | 4 | — | Carbon, carbonate, in bottom material, as C, in percent |
| c_org_bm | | | Float | 4 | — | Carbon, organic, in bottom material, as C, in percent |
| c_tot_bm | | | Float | 4 | — | Carbon, total, in bottom material, as C, in percent |
| ca_bm | | | Float | 4 | — | Calcium, recoverable from bottom material, as Ca, in percent |
| cd_bm | | | Integer | 2 | — | Cadmium, total, in bottom material, as Cd, in micrograms per gram |
| ce_bm | | | Integer | 2 | — | Cerium, total, in bottom material, as Ce, in micrograms per gram |
| co_bm | | | Integer | 2 | — | Cobalt, total, in bottom material, as Co, in micrograms per gram |
| cr_bm | | | Integer | 2 | — | Chromium, total, in bottom material, as Cr, in micrograms per gram |
| cu_bm | | | Integer | 2 | — | Copper, total, in bottom material, as Cu, in micrograms per gram |

APPENDIX A. *Data dictionary for National Irrigation Water Quality Program data base*—Continued

| Attribute name | Attribute characteristics | | | | NWIS parameter code | Attribute description |
|---|---|---|---|---|---|---|
| | Linking | Fixed value | Data type | Field length | | |
| **INORGBM table (stores data on inorganic constituents in bottom material)—*Continued*** | | | | | | |
| fe_bm | | | Float | 4 | 01170 | Iron, total, in bottom material, as Fe, in percent |
| ga_bm | | | Integer | 2 | — | Gallium, total, in bottom material, as Ga, in micrograms per gram |
| hg_bm | | | Float | 4 | 71921 | Mercury, in bottom material, as Hg, in micrograms per gram |
| k_bm | | | Float | 4 | 00938 | Potassium, in bottom material, as K, in percent |
| la_bm | | | Integer | 2 | — | Lanthanum, total, in bottom material, as La, in micrograms per gram |
| li_bm | | | Integer | 2 | 01133 | Lithium, in bottom material, as Li, in micrograms per gram |
| mg_bm | | | Float | 4 | 00924 | Magnesium, in bottom material, as Mg, in percent |
| mn_bm | | | Integer | 2 | 01053 | Manganese, total, in bottom material, as Mn, in micrograms per gram |
| mo_bm | | | Integer | 2 | 01063 | Molybdenum, total, in bottom material, as Mo, in micrograms per gram |
| na_bm | | | Float | 4 | 00934 | Sodium, in bottom material, as Na, in percent |
| nb_bm | | | Integer | 2 | — | Niobium, total, in bottom material, as Nb, in micrograms per gram |
| nd_bm | | | Integer | 2 | — | Neodymium, total, in bottom material, as Nd, in micrograms per gram |
| ni_bm | | | Integer | 2 | 01068 | Nickel, total, in bottom material, as Ni, in micrograms per gram |
| p_bm | | | Float | 4 | 00668 | Phosphorus, total, in bottom material, as P, in percent |
| pb_bm | | | Integer | 2 | 01052 | Lead, total, in bottom material, as Pb, in micrograms per gram |
| sc_bm | | | Integer | 2 | 82317 | Scandium, total, in bottom material, as Sc, in micrograms per gram |
| se_bm | | | Float | 4 | 01148 | Selenium, total, in bottom material, as Se, in micrograms per gram |
| sr_bm | | | Integer | 2 | 01083 | Strontium, total, in bottom material, as Sr, in micrograms per gram |
| th_bm | | | Integer | 2 | 82313 | Thorium, total, in bottom material, as Th, in micrograms per kilogram |
| ti_bm | | | Float | 4 | 01153 | Titanium, total, in bottom material, as Ti, in micrograms per gram |
| u_bm | | | Float | 4 | 22707 | Uranium, natural, total, in bottom material, as U, in micrograms per gram |
| v_bm | | | Integer | 2 | 01088 | Vanadium, total, in bottom material, as V, in micrograms per gram |
| y_bm | | | Integer | 2 | — | Yttrium, total, in bottom material, as Y, in micrograms per gram |
| yb_bm | | | Integer | 2 | 82311 | Ytterbium, total, in bottom material, as Yb, in micrograms per kilogram |
| zn_bm | | | Integer | 2 | 01093 | Zinc, total, in bottom material, as Zn, in micrograms per gram |
| **ORGBM table (stores data on organic chemicals and nitrogen in bottom material)** | | | | | | |
| site_id | • | | Varchar | 15 | — | Unique 9- or 15-digit identifying number assigned on basis of geographic location |
| samp_date | • | | Date | — | — | Date of sample collection (*dd–mmm–yy* format) |
| samp_time | • | | Integer | 2 | — | Time of sample collection (*hhmm* format) |
| matrix | • | • | Char | 2 | — | Sample matrix |
| acenaphthen_bm | | | Float | 4 | 34208 | Acenaphthene, in bottom material, in micrograms per kilogram |
| acenaphthyl_bm | | | Float | 4 | 34203 | Acenaphthylene, in bottom material, in micrograms per kilogram |
| aldrin_bm | | | Float | 4 | 39333 | Aldrin, in bottom material, dry weight, in micrograms per kilogram |
| anthracene_bm | | | Float | 4 | 34223 | Anthracene, in bottom material, in micrograms per kilogram |

| | | | | |
|---|---|---|---|---|
| b2ethxphth_bm | Float | 4 | 39102 | Bis(2-ethylhexyl) phthalate, in bottom material, in micrograms per kilogram |
| benzapyren_bm | Float | 4 | 34250 | Benzo(a)pyrene, total, in bottom material, in micrograms per kilogram |
| benzbflrant_bm | Float | 4 | 34233 | Benzo(b)fluoranthene, total, in bottom material, in micrograms per kilogram |
| benzkflrant_bm | Float | 4 | 34245 | Benzo(k)fluoranthene, total, in bottom material, in micrograms per kilogram |
| benzperyln_bm | Float | 4 | 34524 | Benzo(g,h,i) perylene(1,12-Benzoperylene), in bottom material, in micrograms per kilogram |
| bis2cleth_e_bm | Float | 4 | 34276 | Bis(2-chloroethyl) ether, in bottom material, in micrograms per kilogram |
| bis2cleth_m_bm | Float | 4 | 34281 | Bis(2-chloroethoxy) methane, in bottom material, in micrograms per kilogram |
| bis2cliso_e_bm | Float | 4 | 34286 | Bis(2-chloroisopropyl) ether, in bottom material, in micrograms per kilogram |
| brphphethr_bm | Float | 4 | 34639 | 4-Bromophenyl phenyl ether, in bottom material, in micrograms per kilogram |
| c_inorg_bm | Float | 4 | 00686 | Carbon, inorganic, in bottom material, as C, in grams per kilogram |
| c_org_bm | Float | 4 | 30243 | Carbon, organic, in bottom material, as C, in percent |
| c_org_t_bm | Float | 4 | 00687 | Carbon, organic, total, in bottom material, as C, dry weight, in grams per kilogram |
| c_tot_bm | Float | 4 | 00693 | Carbon, inorganic plus organic, total, in bottom material, as C, dry weight, in grams per kilogram |
| chlordane_bm | Float | 4 | 39351 | Chlordane, technical, in bottom material, dry weight, in micrograms per kilogram |
| chrysene_bm | Float | 4 | 34323 | Chrysene, in bottom material, in micrograms per kilogram |
| clnaphthal_bm | Float | 4 | 34584 | 2-Chloronaphthalene, in bottom material, in micrograms per kilogram |
| clphenol_bm | Float | 4 | 34589 | 2-Chlorophenol, in bottom material, in micrograms per kilogram |
| d24_bm | Float | 4 | 39731 | 2,4-Dichlorophenoxyacetic acid, in bottom material, dry weight, in micrograms per kilogram |
| ddd_bm | Float | 4 | 39363 | Dichloro-diphenyl-dichloroethane (DDD), in bottom material, in micrograms per kilogram |
| dde_bm | Float | 4 | 39368 | Dichloro-diphenyl-dichloroethylene (DDE), in bottom material, in micrograms per kilogram |
| ddt_bm | Float | 4 | 39373 | Dichloro-diphenyl-trichloroethane (DDT), in bottom material, in micrograms per kilogram |
| diazinon_bm | Float | 4 | 39571 | Diazinon, in bottom material, dry weight, in micrograms per kilogram |
| dibenzanthr_bm | Float | 4 | 34559 | 1,1,5,6-Dibenzanthracene, in bottom material, in micrograms per kilogram |
| dicamba_bm | Float | 4 | 38931 | Dicamba, in bottom material, dry weight, in micrograms per kilogram |
| diclbenz12_bm | Float | 4 | 34539 | 1,2-Dichlorobenzene, in bottom material, in micrograms per kilogram |
| diclbenz13_bm | Float | 4 | 34569 | 1,3-Dichlorobenzene, in bottom material, in micrograms per kilogram |
| diclbenz14_bm | Float | 4 | 34574 | 1,4-Dichlorobenzene, in bottom material, in micrograms per kilogram |
| diclphenol_bm | Float | 4 | 34604 | 2,4-Dichlorophenol, in bottom material, in micrograms per kilogram |
| dieldrin_bm | Float | 4 | 39383 | Dieldrin, in bottom material, dry weight, in micrograms per kilogram |
| dietpthlate_bm | Float | 4 | 34339 | Diethyl phthalate, in bottom material, in micrograms per kilogram |
| dimephtlate_bm | Float | 4 | 34344 | Dimethyl phthalate in bottom material, in micrograms per kilogram |
| dimthphenl_bm | Float | 4 | 34609 | 2,4-Dichlorprop, in bottom material, in micrograms per kilogram |
| dinocresol_bm | Float | 4 | 34660 | 4,6-Dinitro-orthocresol, in bottom material, in micrograms per kilogram |
| dinphenol_bm | Float | 4 | 34619 | 2,4-Dinitrophenol, in bottom material, in micrograms per kilogram |
| dintolu24_bm | Float | 4 | 34614 | 2,4-Dinitro-toluene, in bottom material, in micrograms per kilogram |
| dintolu26_bm | Float | 4 | 34629 | 2,6-Dinitro-toluene, in bottom material, in micrograms per kilogram |
| dioctphthl_bm | Float | 4 | 34599 | Di-n-octyl phthalate, in bottom material, in micrograms per kilogram |
| dnb_phtha_bm | Float | 4 | 39112 | Di-n-butyl phthalate, in bottom material, in micrograms per kilogram |
| endosulf_bm | Float | 4 | 39389 | Endosulfan, in bottom material, dry weight, in micrograms per kilogram |
| endrin_bm | Float | 4 | 39393 | Endrin, in bottom material, dry weight, in micrograms per kilogram |
| ethion_bm | Float | 4 | 39399 | Ethion, in bottom material, dry weight, in micrograms per kilogram |
| flranthene_bm | Float | 4 | 34379 | Fluoranthene, in bottom material, in micrograms per kilogram |
| fluorene_bm | Float | 4 | 34384 | Fluorene, in bottom material, in micrograms per kilogram |

APPENDIX A. *Data dictionary for National Irrigation Water Quality Program data base*—Continued

| Attribute name | Attribute characteristics | | | | NWIS parameter code | Attribute description |
|---|---|---|---|---|---|---|
| | Linking | Fixed value | Data type | Field length | | |
| **ORGBM table (stores data on organic chemicals and nitrogen in bottom material)—*Continued*** | | | | | | |
| hcb_bm | | | Float | 4 | 39701 | Hexachlorobenzene, in bottom material, dry weight, in micrograms per kilogram |
| heptchlr_bm | | | Float | 4 | 39413 | Heptachlor, in bottom material, dry weight, in micrograms per kilogram |
| heptepox_bm | | | Float | 4 | 39423 | Heptachlor epoxide, in bottom material, dry weight, in micrograms per kilogram |
| hexclbutdie_bm | | | Float | 4 | 39705 | Hexachlorobutadiene, in bottom material, in micrograms per kilogram |
| hexclcyclpd_bm | | | Float | 4 | 34389 | Hexachlorocyclopentadiene, in bottom material, in micrograms per kilogram |
| hexclethan_bm | | | Float | 4 | 34399 | Hexachloroethane, in bottom material, in micrograms per kilogram |
| ind_pyr_bm | | | Float | 4 | 34406 | Indeno (1,2,3-cd) pyrene, in bottom material, in micrograms per kilogram |
| isphrone_bm | | | Float | 4 | 34411 | Isophorone, in bottom material, in micrograms per kilogram |
| lindane_bm | | | Float | 4 | 39343 | Gamma-benzene hexachloride (lindane), in bottom material, dry weight, in micrograms per kilogram |
| malathion_bm | | | Float | 4 | 39531 | Malathion, in bottom material, dry weight, in micrograms per kilogram |
| methoxchlr_bm | | | Float | 4 | 39481 | Methoxychlor, in bottom material, dry weight, in micrograms per kilogram |
| mirex_bm | | | Float | 4 | 39758 | Mirex, in bottom material, dry weight, in micrograms per kilogram |
| mparathion_bm | | | Float | 4 | 39601 | Methyl parathion, in bottom material, dry weight, in micrograms per kilogram |
| mtrithion_bm | | | Float | 4 | 39791 | Methyl trithion, in bottom material, dry weight, in micrograms per kilogram |
| naphthalen_bm | | | Float | 4 | 34445 | Naphthalene, in bottom material, in micrograms per kilogram |
| nbb_phth_bm | | | Float | 4 | 34295 | N-Butylbenzyl phthalate, in bottom material, in micrograms per kilogram |
| nh3org_t_bm | | | Float | 4 | 00626 | Nitrogen, ammonia plus organic, total, in bottom material, as N, dry weight, in milligrams per kilogram |
| nh3_t_bm | | | Float | 4 | 00611 | Nitrogen, ammonia, total, in bottom material, as N, dry weight, in milligrams per kilogram |
| no2no3_t_bm | | | Float | 4 | 00633 | Nitrogen, nitrite plus nitrate, total, in bottom material, as N, dry weight, in milligrams per kilogram |
| nitrobenzen_bm | | | Float | 4 | 34450 | Nitrobenzene, in bottom material, in micrograms per kilogram |
| nitrphenol2_bm | | | Float | 4 | 34594 | 2-Nitrophenol, in bottom material, in micrograms per kilogram |
| nitrphenol4_bm | | | Float | 4 | 34649 | 4-Nitrophenol, in bottom material, in micrograms per kilogram |
| nsodiphynyl_bm | | | Float | 4 | 34436 | N-Nitrosodiphenylamine, in bottom material, in micrograms per kilogram |
| parathion_bm | | | Float | 4 | 39541 | Parathion, dry weight, in bottom material, in micrograms per kilogram |
| pcb_bm | | | Float | 4 | 39519 | Polychlorinated biphenyls, in bottom material, dry weight, in micrograms per kilogram |
| pclmcresol_bm | | | Float | 4 | 34455 | Parachlorometacresol, in bottom material, in micrograms per kilogram |
| pclphenol_bm | | | Float | 4 | 39061 | Pentachlorophenol, in bottom material, in micrograms per kilogram |
| pcn_bm | | | Float | 4 | 39251 | Naphthalenes, polychlorinated, in bottom material, dry weight, in micrograms per kilogram |
| perthane_bm | | | Float | 4 | 81886 | Perthane, in bottom material, in micrograms per kilogram |
| phenol_bm | | | Float | 4 | 34695 | Phenol ($C_6H_5OH$), in bottom material, in micrograms per kilogram |
| phnanthren_bm | | | Float | 4 | 34464 | Phenanthrene, in bottom material, in micrograms per kilogram |
| picloram_bm | | | Float | 4 | 38930 | Picloram, in bottom material, dry weight, in micrograms per kilogram |
| pyrene_bm | | | Float | 4 | 34472 | Pyrene, in bottom material, in micrograms per kilogram |
| silvex_bm | | | Float | 4 | 39761 | Silvex, in bottom material, dry weight, in micrograms per kilogram |
| t245_bm | | | Float | 4 | 39741 | 2,4,5-Trichlorophenoxyacetic acid, in bottom material, dry weight, in micrograms per kilogram |
| toxaphene_bm | | | Float | 4 | 39403 | Toxaphene, in bottom material, dry weight, in micrograms per kilogram |
| triclbenze_bm | | | Float | 4 | 34554 | 1,2,4-Trichlorobenzene, in bottom material, in micrograms per kilogram |
| triclphenl_bm | | | Float | 4 | 34624 | 2,4,6-Trichlorophenol, in bottom material, in micrograms per kilogram |
| trithion_bm | | | Float | 4 | 39787 | Trithion, in bottom material, dry weight, in micrograms per kilogram |

**INORGBIO table (stores data on sample matrix and inorganic constituents in biotic samples)**

| | | | | | | |
|---|---|---|---|---|---|---|
| site_id | • | | Varchar | 15 | — | Identification for nearest appropriate site where surface-water samples were collected. Blank indicates no match between biological-sampling location and water-sampling site. |
| area | • | • | Varchar | 10 | — | Abbreviated name identifying NIWQP study area |
| subarea | • | • | Varchar | 10 | — | Abbreviated name identifying subarea within NIWQP study area |
| location | | | Varchar | 64 | — | Biologist-designated sampling location within study area |
| category | | • | Char | 17 | — | Broad taxonomic category of sample, such as plant or bird |
| species | | | Varchar | 35 | — | Standardized common name of organism used in NIWQP data base (see section on TAXON table, this appendix). |
| samp_date | | | Date | — | — | Date of sample collection (*mm/dd/yy* format) |
| year | | | Varchar | 7 | — | Last two digits of year sample was collected (00–99, of 1900's) |
| month | | | Integer | 2 | — | Month sample was collected (01–12) |
| day | | | Integer | 2 | — | Day sample was collected (unknown if missing) |
| compos_n | | | Float | 4 | — | Number of individuals in composite sample |
| life_stage | | | Varchar | 16 | — | Life stage of sample (for example, juvenile) if appropriate |
| tissue | | | Varchar | 20 | — | Tissue analyzed (for example, liver, whole body) |
| moisture | | | Float | 4 | — | Moisture content of sample, in percent |
| ag_bio | | | Float | 4 | — | Silver, in biological material, as Ag, dry weight, in micrograms per gram |
| al_bio | | | Float | 4 | — | Aluminum, in biological material, as Al, dry weight, in micrograms per gram |
| as_bio | | | Float | 4 | — | Arsenic, in biological material, as As, dry weight, in micrograms per gram |
| b_bio | | | Float | 4 | — | Boron, in biological material, as B, dry weight, in micrograms per gram |
| ba_bio | | | Float | 4 | — | Barium, in biological material, as Ba, dry weight, in micrograms per gram |
| be_bio | | | Float | 4 | — | Beryllium, in biological material, as Be, dry weight, in micrograms per gram |
| cd_bio | | | Float | 4 | — | Cadmium, in biological material, as Cd, dry weight, in micrograms per gram |
| co_bio | | | Float | 4 | — | Cobalt, in biological material, as Co, dry weight, in micrograms per gram |
| cr_bio | | | Float | 4 | — | Chromium, in biological material, as Cr, dry weight, in micrograms per gram |
| cu_bio | | | Float | 4 | — | Copper, in biological material, as Cu, dry weight, in micrograms per gram |
| fe_bio | | | Float | 4 | — | Iron, in biological material, as Fe, dry weight, in micrograms per gram |
| hg_bio | | | Float | 4 | — | Mercury, in biological material, as Hg, dry weight, in micrograms per gram |
| mg_bio | | | Float | 4 | — | Magnesium, in biological material, as Mg, dry weight, in micrograms per gram |
| mn_bio | | | Float | 4 | — | Manganese, in biological material, as Mn, dry weight, in micrograms per gram |
| mo_bio | | | Float | 4 | — | Molybdenum, in biological material, as Mo, dry weight, in micrograms per gram |
| ni_bio | | | Float | 4 | — | Nickel, in biological material, as Ni, dry weight, in micrograms per gram |
| pb_bio | | | Float | 4 | — | Lead, in biological material, as Pb, dry weight, in micrograms per gram |
| sb_bio | | | Float | 4 | — | Antimony, in biological material, as Sb, dry weight, in micrograms per gram |
| se_bio | | | Float | 4 | — | Selenium, in biological material, as Se, dry weight, in micrograms per gram |
| sn_bio | | | Float | 4 | — | Tin, in biological material, as Sn, dry weight, in micrograms per gram |
| sr_bio | | | Float | 4 | — | Strontium, in biological material, as Sr, dry weight, in micrograms per gram |
| tl_bio | | | Float | 4 | — | Thallium, in biological material, as Tl, dry weight, in micrograms per gram |
| v_bio | | | Float | 4 | — | Vanadium, in biological material, as V, dry weight, in micrograms per gram |
| zn_bio | | | Float | 4 | — | Zinc, in biological material, as Zn, dry weight, in micrograms per gram |

APPENDIX A. *Data dictionary for National Irrigation Water Quality Program data base*—Continued

| Attribute name | Attribute characteristics | | | | NWIS parameter code | Attribute description |
|---|---|---|---|---|---|---|
| | Linking | Fixed value | Data type | Field length | | |
| **ORGBIO table (stores data on sample matrix and organic chemicals in biotic samples)** | | | | | | |
| site_id | • | | Varchar | 15 | — | Identification for nearest appropriate site where surface-water samples were collected. Blank indicates no match between biological-sampling location and water-sampling site. |
| area | • | • | Varchar | 10 | — | Abbreviated name identifying NIWQP study area |
| subarea | • | • | Varchar | 10 | — | Abbreviated name identifying subarea within NIWQP study area |
| location | | | Varchar | 30 | — | Biologist-designated sampling location within study area |
| category | | • | Char | 10 | — | Broad taxonomic category of sample, such as plant, or bird |
| species | | | Varchar | 30 | — | Standardized common name of organism used in NIWQP data base (see section on TAXON table, this appendix) |
| samp_date | | | Date | — | — | Date of sample collection (*mm/dd/yy* format) |
| year | | | Varchar | 7 | — | Last two digits of year sample was collected (00–99, of 1900's) |
| month | | | Integer | 2 | — | Numeric value for month sample was collected |
| day | | | Integer | 2 | — | Day sample was collected (unknown if missing) |
| compos_n | | | Float | 4 | — | Number of individuals in composite sample |
| life_stage | | | Varchar | 30 | — | Life stage of sample (for example, juvenile) if appropriate |
| tissue | | | Varchar | 30 | — | Tissue analyzed (for example, liver, whole body) |
| moisture | | | Float | 4 | — | Moisture content of sample, in percent |
| lipid | | | Float | 4 | — | Lipid content of sample, in percent |
| acenaphthe_bio | | | Float | 4 | — | Acenaphthene, in biological material, wet weight, in micrograms per gram |
| acenaphthy_bio | | | Float | 4 | — | Acenaphthylene, in biological material, wet weight, in micrograms per gram |
| aldrin_bio | | | Float | 4 | — | Aldrin, in biological material, wet weight, in micrograms per gram |
| anthracene_bio | | | Float | 4 | — | Anthracene, in biological material, wet weight, in micrograms per gram |
| archlr1248_bio | | | Float | 4 | — | Arochlor 1248, in biological material, wet weight, in micrograms per gram |
| archlr1254_bio | | | Float | 4 | — | Arochlor 1254, in biological material, wet weight, in micrograms per gram |
| archlr1260_bio | | | Float | 4 | — | Arochlor 1260, in biological material, wet weight, in micrograms per gram |
| benzaanthr_bio | | | Float | 4 | — | Benzo(a)anthracene, in biological material, wet weight, in micrograms per gram |
| benzbflran_bio | | | Float | 4 | — | Benzo(b)fluoranthene, in biological material, wet weight, in micrograms per gram |
| benzkflran_bio | | | Float | 4 | — | Benzo(k)fluoranthene, in biological material, wet weight, in micrograms per gram |
| benzoapyre_bio | | | Float | 4 | — | Benzo(a)pyrene, in biological material, wet weight, in micrograms per gram |
| benzoepyre_bio | | | Float | 4 | — | Benzo(e)pyrene, in biological material, wet weight, in micrograms per gram |
| benzperyln_bio | | | Float | 4 | — | Benzo(ghi)perylene, in biological material, wet weight, in micrograms per gram |
| bhc_alpha_bio | | | Float | 4 | — | Alpha-benzene hexachloride, in biological material, wet weight, in micrograms per gram |
| bhc_beta_bio | | | Float | 4 | — | Beta-benzene hexachloride, in biological material, wet weight, in micrograms per gram |
| bhc_delta_bio | | | Float | 4 | — | Delta-benzene hexachloride, in biological material, wet weight, in micrograms per gram |
| bhc_gamma_bio | | | Float | 4 | — | Gamma-benzene hexachloride (lindane), in biological material, wet weight, in micrograms per gram |
| bhc_total_bio | | | Float | 4 | — | Benzene hexachloride, total, in biological material, wet weight, in micrograms per gram |
| chlord_bio | | | Float | 4 | — | Chlordane, in biological material, wet weight, in micrograms per gram |
| chlord_a_bio | | | Float | 4 | — | Alpha chlordane (cis-Chlordane), in biological material, wet weight, in micrograms per gram |
| chlord_g_bio | | | Float | 4 | — | Gamma chlordane (trans-Chlordane), in biological material, wet weight, in micrograms per gram |
| chrysene_bio | | | Float | 4 | — | Chrysene, in biological material, wet weight, in micrograms per gram |

| | | | | |
|---|---|---|---|---|
| ddmu_bio | Float | 4 | — | 1,1' (Chloroethenylidene)bis(4-chlorobenzene) (DDMU) in biological material, wet weight, in micrograms per gram |
| dcpa_bio | Float | 4 | — | Dacthal, in biological material, wet weight, in micrograms per gram |
| ddd_op_bio | Float | 4 | — | O-p-Dichloro-diphenyl-dichloroethane (DDD), in biological material, wet weight, in micrograms per gram. |
| ddd_pp_bio | Float | 4 | — | P-p' dichloro-diphenyl-dichloroethane (DDD), in biological material, wet weight, in micrograms per gram. |
| dde_op_bio | Float | 4 | — | O-p dichloro-diphenyl-dichloroethylene (DDE), in biological material, wet weight, in micrograms per gram. |
| dde_pp_bio | Float | 4 | — | O-p' dichloro-diphenyl-dichloroethylene (DDE), in biological material, wet weight, in micrograms per gram. |
| ddt_op_bio | Float | 4 | — | O-p dichloro-diphenyl-trichloroethane (DDT), in biological material, wet weight, in micrograms per gram. |
| ddt_pp_bio | Float | 4 | — | P-p' dichloro-diphenyl-trichloroethane (DDT), in biological material, wet weight, in micrograms per gram. |
| dibenzanth_bio | Float | 4 | — | 1,1,5,6-Dibenzanthracene, in biological material, wet weight, in micrograms per gram |
| dieldrin_bio | Float | 4 | — | Dieldrin, in biological material, wet weight, in micrograms per gram |
| dimethnaph_bio | Float | 4 | — | Dimethylnaphthalene, in biological material, wet weight, in micrograms per gram |
| endosulf_1_bio | Float | 4 | — | Endosulfan I, in biological material, wet weight, in micrograms per gram |
| endosulf_2_bio | Float | 4 | — | Endosulfan II, in biological material, wet weight, in micrograms per gram |
| endosulf_s_bio | Float | 4 | — | Endosulfan sulfate, in biological material, wet weight, in micrograms per gram |
| endrin_bio | Float | 4 | — | Endrin, in biological material, wet weight, in micrograms per gram |
| flranthene_bio | Float | 4 | — | Fluoranthene, in biological material, wet weight, in micrograms per gram |
| fluorene_bio | Float | 4 | — | Fluorene, in biological material, wet weight, in micrograms per gram |
| hcb_bio | Float | 4 | — | Hexachlorobenzene, in biological material, wet weight, in micrograms per gram |
| heptepox_bio | Float | 4 | — | Heptachlor epoxide, in biological material, wet weight, in micrograms per gram |
| ind_pyr_bio | Float | 4 | — | Indeno (1,2,3-cd) pyrene, in biological material, wet weight, in micrograms per gram |
| methnaphth_bio | Float | 4 | — | Methylnaphthalene, in biological material, wet weight, in micrograms per gram |
| methoxchlr_bio | Float | 4 | — | Methoxychlor, in biological material, wet weight, in micrograms per gram |
| mirex_bio | Float | 4 | — | Mirex, in biological material, wet weight, in micrograms per gram |
| naphthalen_bio | Float | 4 | | Naphthalene, in biological material, wet weight, in micrograms per gram |
| nonachlr_c_bio | Float | 4 | — | Cis-nonachlor, in biological material, wet weight, in micrograms per gram |
| nonachlr_t_bio | Float | 4 | — | Trans-nonachlor, in biological material, wet weight, in micrograms per gram |
| oxychlor_bio | Float | 4 | — | Oxychlordane, in biological material, wet weight, in micrograms per gram |
| pcb_tot_bio | Float | 4 | — | Polychlorinated biphyenyls, total, in biological material, wet weight, in micrograms per gram |
| perylene_bio | Float | 4 | — | Perylene, in biological material, wet weight, in micrograms per gram |
| phnanthren_bio | Float | 4 | — | Phenanthrene, in biological material, wet weight, in micrograms per gram |
| pyrene_bio | Float | 4 | — | Pyrene, in biological material, wet weight, in micrograms per gram |
| toxaphene_bio | Float | 4 | — | Toxaphene, in biological material, wet weight, in micrograms per gram |
| trimethnap_bio | Float | 4 | — | Trimethylnaphthalene, in biological material, wet weight, in micrograms per gram |

**TAXON table (stores data on taxonomy)**

| | | | | |
|---|---|---|---|---|
| category | Varchar | 17 | — | Broad taxonomic category of sample, such as plant or bird |
| id_level | Varchar | 35 | — | Lowest taxonomic level for which classification is known (genus, family, class, or kingdom) |
| common_name | Varchar | 49 | — | Common name for organism; typically same as attribute “niwqp_name” |
| latin_name | Varchar | 38 | — | Latin binomial for organism where known. Higher level classification given if species unknown |
| niwqp_name | Varchar | 49 | — | Organism name used in NIWQP data base; same as attribute “species” in tables INORGBIO and ORGBIO |

APPENDIX B. *Codes used for fixed-value attributes in National Irrigation Water Quality Program data base*

| Code or value | Explanation |
|---|---|
| | **Attribute "agyanal" (used in FIELD table)** |
| PRIV | Water sample analyzed by private laboratory |
| USGS | Water sample analyzed by U.S. Geological Survey |
| WYDOA | Water sample analyzed by Wyoming Department of Agriculture |
| | **Attribute "agycol" (used in FIELD table)** |
| USGS | Water sample collected by U.S. Geological Survey |
| SDWRI | Water sample collected by South Dakota Water Resources Institute |
| | **Attribute "area" (used in AREA, SITE, INORGBIO, and ORGBIO tables)** |
| AMFALLS | American Falls Reservoir, Idaho |
| ANGOSTURA | Angostura Reclamation Unit, South Dakota |
| BELLE | Belle Fourche Reclamation Project, South Dakota |
| COLUMBIA | Columbia River Basin, Washington |
| DOLORES | Dolores–Ute Mountain area, Colorado |
| GUNNISON | Gunnison River Basin–Grand Valley Project, Colorado |
| HUMBOLDT | Humboldt River area, Nevada |
| KENDRICK | Kendrick Reclamation Project, Wyoming |
| KLAMATH | Klamath Basin Refuge Complex, California–Oregon |
| LOWERCOLO | Lower Colorado River valley, California–Arizona |
| LOWERRIO | Lower Rio Grande valley, Texas |
| MALHEUR | Malheur National Wildlife Refuge, Oregon |
| MIDARK | Middle Arkansas River Basin, Colorado–Kansas |
| MIDGREEN | Middle Green River Basin, Utah |
| MIDDLERIO | Middle Rio Grande, New Mexico |
| MILK | Milk River Basin, Montana |
| OWYHEE | Owyhee–Vale Reclamation Project areas, Oregon–Idaho |
| PINE | Pine River area, Colorado |
| RIVERTON | Riverton Reclamation Project, Wyoming |
| SACRAMENTO | Sacramento Refuge Complex, California |
| SALTON | Salton Sea area, California |
| SANJUAN | San Juan River area, New Mexico |
| STILLWATER | Stillwater Wildlife Management Area, Nevada |
| SUNRIVER | Sun River area, Montana |
| TULARE | Tulare Lake Bed area, California |
| VERMEJO | Vermejo Project area, New Mexico |
| | **Attribute "background" (used in SITE table)** |
| C | Contaminated: Site is either within or downgradient from irrigated areas within study area |
| R | Reference: Site is upgradient from irrigated areas within study area |
| | **Attribute "basin" (used in AREA table)** |
| O | Open: Lakes in study area are flowthrough |
| M | Mixed: Some lakes in study area are terminal, and others are flowthrough |
| C | Closed: Lakes in study area are terminal |
| | **Attribute "category" (used in INORGBIO, ORGBIO, and TAXON tables)** |
| AMPHIBIAN | Amphibian |
| BIRD | Bird |
| FISH | Fish |
| INVERTEBRATE | Invertebrate |
| MAMMAL | Mammal |
| PLANKTON | Plankton |
| PLANT | Plant |
| REPTILE | Reptile |

APPENDIX B. *Codes used for fixed-value attributes in National Irrigation Water Quality Program data base*—Continued

| Code or value | Explanation |
|---|---|
| | **Attribute "doi" (used in FIELD table)** |
| Y | Yes: Sample was collected as part of NIWQP investigation |
| N | No: Sample was not collected as part of NIWQP investigation |
| | **Attribute "fraction" (used in INORGBM table)** |
| <2.0 | Bottom material of particle size less than 2 millimeters |
| <0.062 | Bottom material of particle size less than 0.062 millimeter |
| | **Attribute "geology" (used in AREA table; same codes as for "sitegeology"; listed generally in age order; units modified after King and Beikman, 1974)** |
| | Quaternary volcanic and sedimentary deposits: |
| Q | Stratified sedimentary deposits |
| QV | Volcanic rocks |
| | Tertiary volcanic and sedimentary deposits: |
| TPV | Nonfelsic volcanic rocks (Pliocene) |
| TPC | Continental sedimentary deposits (Pliocene) |
| TMF | Felsic volcanic rocks (Miocene) |
| TMV | Nonfelsic volcanic rocks (Miocene) |
| TEC | Continental sedimentary deposits (Eocene) |
| TXC | Continental sedimentary deposits (Paleocene) |
| | Upper Cretaceous stratified, mainly marine, sedimentary rocks: |
| UK | Undivided (includes Tuscaloosa, Woodbine, Eagle Ford, Austin, Taylor, and Navarro Groups; locally includes Lower Cretaceous rocks not mapped separately). |
| UK4 | Navarro Group |
| UK3, UK3A | Taylor Group |
| UK2 | Austin and Eagle Ford Groups, undivided |
| UK1 | Woodbine and Tuscaloosa Groups, undivided (locally includes Lower Cretaceous rocks not mapped separately) |
| UPZ | Upper Paleozoic stratified, mainly marine, sedimentary rocks |
| | Early Proterozoic metamorphic and igneous rocks: |
| XG | Plutonic and intrusive granitic rocks |
| XM | Orthogneiss and paragneiss |
| | **Attribute "matrix" (used in FIELD, INORG, ISOTOPE, NUTRIENT, ORG, SEDIMENT, INORGBM, and ORGBM tables)** |
| BC | Borehole coring |
| BM | Bottom material |
| GW | Ground water |
| IW | Interstitial water |
| SC | Salt crust |
| SO | Soil |
| SS | Suspended sediment |
| SW | Surface water |
| | **Attribute "mining" (used in AREA table)** |
| Y | Yes: Mining activities are reported for study area |
| N | No: Mining activities are not reported for study area |
| | **Attribute "pesticides" (used in AREA table)** |
| Y | Yes: Heavy pesticide use is reported for study area |
| N | No: Heavy pesticide use is not reported for study area |
| | **Attribute "qaqc" (used in FIELD and INORGBM tables)** |
| Y | Yes: Sample was collected and(or) analyzed for quality-assurance purposes |
| N | No: Sample was not collected and(or) analyzed specifically for quality-assurance purposes but for routine environmental monitoring |

APPENDIX B. *Codes used for fixed-value attributes in National Irrigation Water Quality Program data base*—Continued

| Code or value | Explanation |
|---|---|
| | **Attribute "samp_meth" (used in FIELD table)** |
| EDI | Equal-discharge increment |
| ETR | Equal transit rate (integrated discharge) |
| EWI | Equal-width increment |
| GRAB | Grab (dip) |
| MVERT | Multiple vertical |
| OTB | Open-top bailer |
| SQZ | Squeeze pump |
| SUBM | Submersible pump |
| SVERT | Single vertical |
| THIEF | Thief |
| VDORN | Van Dorn |
| WB | Weighted bottle |
| OTHER | Method other than those listed above |
| | **Attribute "sitegeology" (used in SITE table; same codes as for "geology"; listed generally in age order; units modified after King and Beikman, 1974)** |
| | Quaternary volcanic and sedimentary deposits: |
| Q | Stratified sedimentary deposits |
| QV | Volcanic rocks |
| | Tertiary volcanic and sedimentary deposits: |
| TPV | Nonfelsic volcanic rocks (Pliocene) |
| TPC | Continental sedimentary deposits (Pliocene) |
| TMF | Felsic volcanic rocks (Miocene) |
| TMV | Nonfelsic volcanic rocks (Miocene) |
| TEC | Continental sedimentary deposits (Eocene) |
| TXC | Continental sedimentary deposits (Paleocene) |
| | Upper Cretaceous stratified, mainly marine, sedimentary rocks: |
| UK | Undivided (includes Tuscaloosa, Woodbine, Eagle Ford, Austin, Taylor, and Navarro Groups; locally includes Lower Cretaceous rocks not mapped separately). |
| UK4 | Navarro Group |
| UK3, UK3A | Taylor Group |
| UK2 | Austin and Eagle Ford Groups, undivided |
| UK1 | Woodbine and Tuscaloosa Groups, undivided (locally includes Lower Cretaceous rocks not mapped separately) |
| UPZ | Upper Paleozoic stratified, mainly marine, sedimentary rocks |
| | Early Proterozoic metamorphic and igneous rocks: |
| XG | Plutonic and intrusive granitic rocks |
| XM | Orthogneiss and paragneiss |
| | **Attribute "site_type" (used in SITE table)** |
| DR | Drain |
| GW | Ground water |
| LK | Lake or pond |
| SP | Spring |
| SW | Surface water |
| | **Attribute "source" (used in SITE table)** |
| Y | Yes: Site represents source water for irrigation |
| N | No: Site does not represent source water for irrigation |

APPENDIX B. *Codes used for fixed-value attributes in National Irrigation Water Quality Program data base*—Continued

| Code or value | Explanation |
|---|---|
| | **Attribute "sub_area" (used in AREA, SITE, INORGBIO, AND ORGBIO tables; study-area name precedes colon)** |
| AMFALLS | American Falls Reservoir, Idaho (no subarea) |
| ANGOSTURA | Angostura Reclamation Unit, South Dakota (no subarea) |
| BELLE | Belle Fourche Reclamation Project, South Dakota (no subarea) |
| COLUMBIA | Columbia River Basin, Washington (no subarea) |
| DOLORES | Dolores–Ute Mountain area, Colorado (no subarea) |
| GRANDVALLE | Grand Valley subarea of Gunnison River Basin–Grand Valley Project, Colorado |
| UNCOMPAHGR | Uncompahgre Project subarea of Gunnison River Basin–Grand Valley Project, Colorado |
| HUMBOLDT | Humboldt River area, Nevada (no subarea) |
| KENDRICK | Kendrick Reclamation Project, Wyoming (no subarea) |
| KLAMATH | Klamath Basin Refuge Complex, California–Oregon (no subarea) |
| LOWERCOLO | Lower Colorado River valley, California–Arizona (no subarea) |
| LOWERRIO | Lower Rio Grande valley, Texas (no subarea) |
| MALHEUR | Malheur National Wildlife Refuge, Oregon (no subarea) |
| MIDARK | Middle Arkansas River Basin, Colorado–Kansas (no subarea) |
| OURAY | Ouray subarea of Middle Green River Basin, Utah |
| PARIETTE | Pariette subarea of Middle Green River Basin, Utah |
| STEWART | Stewart subarea of Middle Green River Basin, Utah |
| MIDDLERIO | Middle Rio Grande, New Mexico (no subarea) |
| MILK | Milk River Basin, Montana (no subarea) |
| OWYHEE | Owyhee–Vale Reclamation Project areas, Oregon–Idaho (no subarea) |
| PINE | Pine River area, Colorado (no subarea) |
| RIVERTON | Riverton Reclamation Project, Wyoming (no subarea) |
| SACDELCOL | Sacramento, Delevan, and Colusa National Wildlife Refuges in Sacramento Refuge Complex, California |
| BUTTESUTTE | Butte Sink National Wildlife Management Area and Sutter National Wildlife Refuge in Sacramento Refuge Complex, California |
| SALTON | Salton Sea area, California (no subarea) |
| SANJUAN | San Juan River area, New Mexico (no subarea) |
| CARSONLAKE | Carson Lake subarea of Stillwater Wildlife Management Area, Nevada |
| FERNLEY | Fernley subarea of Stillwater Wildlife Management Area, Nevada |
| MASSIE | Massie Slough subarea of Stillwater Wildlife Management Area, Nevada |
| STILLWATER | Stillwater subarea of Stillwater Wildlife Management Area, Nevada |
| BENTONLAKE | Benton Lake National Wildlife Refuge in Sun River area, Montana |
| FREEZOUT | Freezout Lake National Wildlife Refuge in Sun River area, Montana |
| GREENFIELD | Greenfield Irrigation Division subarea of Sun River area, Montana |
| TULARE | Tulare Lake Bed area, California (no subarea) |
| VERMEJO | Vermejo Project area, New Mexico (no subarea) |