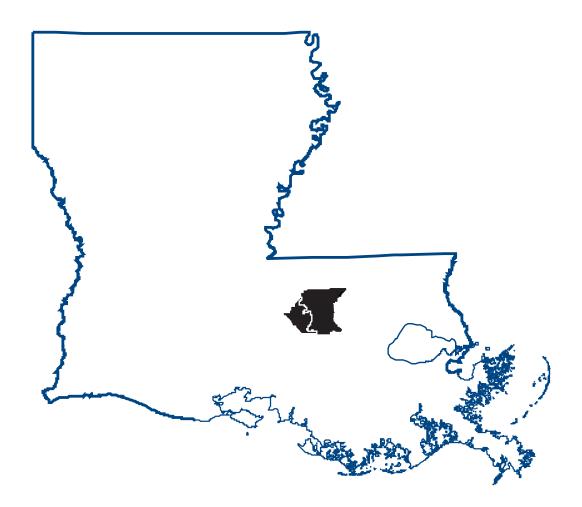




In cooperation with the Capital Area Ground Water Conservation Commission

# Chloride Concentrations in Ground Water in East and West Baton Rouge Parishes, Louisiana, 2004–05



Scientific Investigations Report 2007–5069

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By John K. Lovelace

In cooperation with the Capital Area Ground Water Conservation Commission

Scientific Investigations Report 2007–5069

U.S. Department of the Interior U.S. Geological Survey

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# **Conversion Factors, Datums, and Abbreviated Water-Quality Units**

| Length    |   |
|-----------|---|
|           |   |
| 25.4      | millimeter (mm)                                       |
| 0.3048    | meter (m)   |
| 1.609     | kilometer (km)  |
| Area      |   |
| 2.590     | square kilometer (km <sup>2</sup> )                   |
| Flow rate |   |
| 3,785     | cubic meter per day (m <sup>3</sup> /d)               |
|           | 25.4<br>0.3048<br>1.609<br>Area<br>2.590<br>Flow rate |

Temperature in degrees Celsius (°C) can be converted to degrees Fahrenheit (°F) as follows: °F = (1.8 x °C) + 32

## Datums

Vertical coordinate information in this report is referenced to the National Geodetic Vertical Datum of 1929 (NGVD 29).

Horizontal coordinate information in this report is referenced to the North American Datum of 1927 (NAD 27).

## **Abbreviated Water-Quality Units**

Specific conductance is given in microsiemens per centimeter at 25 degrees Celsius ( $\mu$ S/cm at 25 °C).

Concentrations of chloride in water are given in milligrams per liter (mg/L).

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# Chloride Concentrations in Ground Water in East and West Baton Rouge Parishes, Louisiana, 2004–05

By John K. Lovelace

## Abstract

Increasing chloride concentrations are a threat to fresh ground-water sources in East Baton Rouge and West Baton Rouge Parishes, Louisiana. Large withdrawals at Baton Rouge have lowered water levels and altered flow patterns in most of the 10 aquifers that underlie the area. Prior to development, freshwater flowed southward to the Baton Rouge fault, an east-west trending growth fault that extends through Baton Rouge and across southeastern Louisiana. Aquifers south of the fault generally contain saltwater. Ground-water withdrawals north of the fault have created gradients favorable for the movement of saltwater from south of the fault into freshwater areas north of the fault.

Water samples were collected from 152 wells during 2004–05 to document chloride concentrations in aquifers underlying East and West Baton Rouge Parishes. The back-ground concentration for chloride in fresh ground water in the Baton Rouge area north of the Baton Rouge fault is generally less than 10 milligrams per liter. Chloride concentrations exceeded 10 milligrams per liter in one or more samples from wells north of the fault screened in the "600-foot," "1,000-foot," "1,200-foot," "1,500-foot," "1,700-foot," "2,000-foot," "2,400-foot," and "2,800-foot" sands. Comparison of the 2004-05 data with historical data indicated that chloride concentrations are increasing at wells in the "600-foot," "1,000-foot," "1,200-foot," "1,500-foot," "2,000-foot," "2,400-foot," "1,200-foot," "2,000-foot," "2,000-foot," "1,200-foot," "1,500-foot," "2,000-foot," "1,200-foot," "1,200-foot," "2,000-foot," "2,000-foot," "1,200-foot," "1,500-foot," "2,000-foot," "2,400-foot," "1,200-foot," "1,500-foot," "2,000-foot," "2,000-foot," "1,200-foot," "2,000-foot," "2,000-foot," "2,000-foot," "2,000-foot," "1,200-foot," "1,200-foot," "2,000-foot," "2,000-foot," "2,000-foot," "1,200-foot," "1,200-foot," "2,000-foot," "2,000-foot," "2,000-foot," "1,200-foot," "1,200-foot," "2,000-foot," "2,000-foot," "2,000-foot," "1,200-foot," "1,500-foot," "2,000-foot," "2,000-foot,"

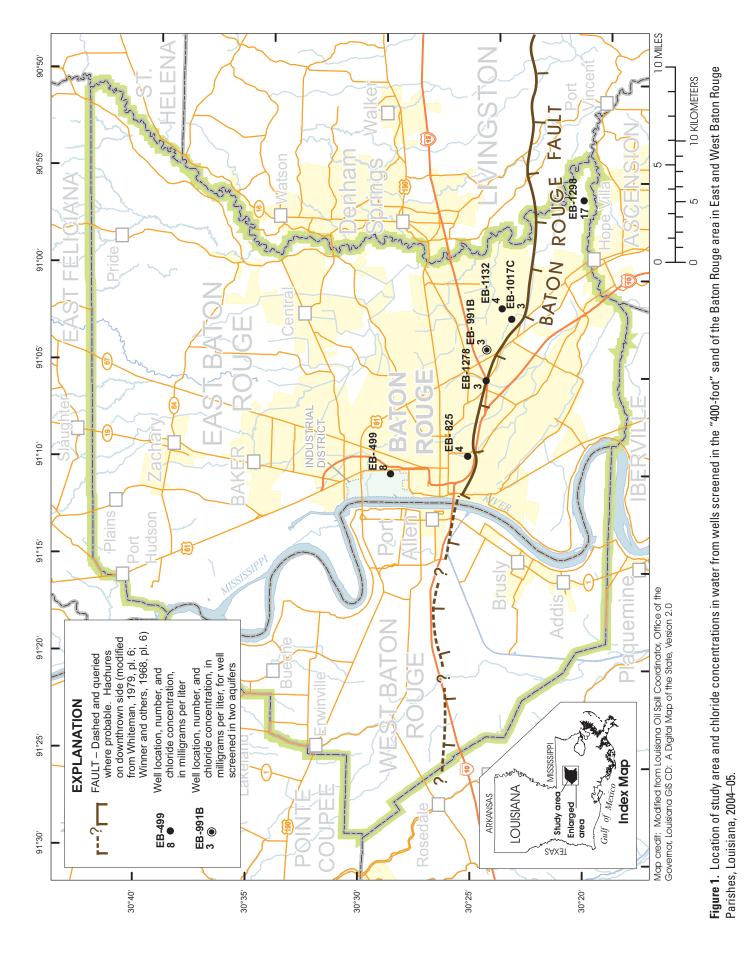
## Introduction

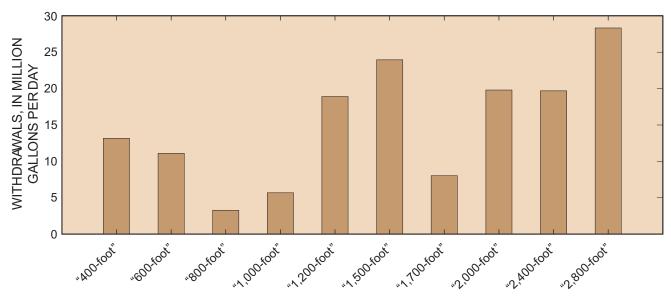
Increasing chloride concentrations are a threat to fresh ground-water sources in East and West Baton Rouge Parishes, Louisiana (fig. 1). In 2005, approximately 153 Mgal/d of water was withdrawn from 10 aquifers in East and West Baton Rouge Parishes (fig. 2) (B.P. Sargent, U.S. Geological Survey, written commun., 2007). The aquifers include the "400-foot," "600-foot," "800-foot," "1,000-foot," "1,200-foot," "1,200-foot," "1,500-foot," "1,700-foot," "2,000-foot," "2,400-foot," and "2,800-foot" sands of the Baton Rouge area. About 70 percent of the water was withdrawn in or near the City of Baton Rouge for public supply or industrial uses (B.P. Sargent, U.S. Geological Survey, written commun., 2007). Large withdrawals at Baton Rouge have lowered water levels and altered flow patterns in most of the 10 aquifers that underlie the area (Tomaszewski, 1996). Prior to development, freshwater flowed southward to the Baton Rouge fault, an east-west trending growth fault that extends through Baton Rouge and across southeastern Louisiana. Aquifers south of the fault generally contain saltwater.<sup>1</sup> Ground-water withdrawals north of the fault have created gradients favorable for the movement of saltwater from south of the fault into freshwater areas north of the fault (Tomaszewski, 1996, p. 1).

Saltwater encroachment, which is the migration of saltwater into a freshwater area, was first documented in an aquifer beneath the Baton Rouge area, the "600-foot" sand, by Meyer and Turcan (1955). Since that time, saltwater encroachment also has been documented in the "800-foot," "1,000-foot," "1,500-foot," and "2,000-foot" sands underlying East and West Baton Rouge Parishes (Morgan and Winner, 1964; Whiteman, 1979; Tomaszewski, 1996). These studies also documented the presence, but not encroachment, of saltwater in the "400-foot," "1,200-foot," and "2,800-foot" sands north of the Baton Rouge fault.

Using data collected through 1992, Tomaszewski (1996) showed that saltwater encroachment had continued in the "1,500-foot" and "2,000-foot" sands. Data collected from 1993 to 2003 from wells in a chloride-monitoring network indicate concentrations of chloride have increased in wells in the "1,000-foot," "1,500-foot," "2,000-foot," "2,400-foot," and "2,800-foot" sands in East and West Baton Rouge Parishes. Data from additional wells are needed to document current (2004–05) chloride concentrations in aquifers underlying the Baton Rouge area. In response to this need, the U.S. Geological Survey (USGS), in cooperation with the Capital Area Ground Water Conservation Commission, began a study in 2004 to document chloride concentrations in selected wells in East and West Baton Rouge Parishes.

<sup>&</sup>lt;sup>1</sup>For the purposes of this report, saltwater is defined as water containing greater than 250 mg/L chloride. Concentrations of chloride greater than 250 mg/L exceed the Secondary Maximum Contaminant Level (SMCL) for drinking water (U.S. Environmental Protection Agency, 2006). SMCLs are established for contaminants that can adversely affect the aesthetic quality of drinking water. At high concentrations or values, health implications as well as aesthetic degradation also may exist. SMCLs are not federally enforceable, but are intended as guidelines for the states.





Sand of the Baton Rouge area

**Figure 2.** Withdrawals from aquifers in East and West Baton Rouge Parishes, Louisiana, 2005 (B.P. Sargent, U.S. Geological Survey, written commun., 2007).

### **Purpose and Scope**

This report describes current (2004-05) chloride concentrations in ground water in East and West Baton Rouge Parishes. Data were collected from 152 wells, and selected data were collected and analyzed for quality-assurance and quality-control purposes. The data include wells sampled for routine chloride-monitoring purposes during the study period. This report documents and compares differences between historical and 2004-05 data. Well-construction information, specific conductance, and chloride concentrations for wells sampled during 2004–05 are presented by aquifer in a table. In addition, chloride concentrations in water from wells screened in the aquifers are presented on maps. Long-term changes in chloride concentrations at selected wells are presented in graphs. All data presented are stored in the USGS National Water Information System data base and are available at the USGS office in Baton Rouge, La. Information in this report may be useful to State and local water managers and planners and may help improve understanding of water-quality conditions in similar hydrogeologic settings in other areas of the United States.

## **Description of Study Area**

The study area in southeasern Louisiana extends across about 645 mi<sup>2</sup> and includes East and West Baton Rouge Parishes, which are separated by the Mississippi River (fig. 1). East Baton Rouge Parish had an estimated population of 412,000 in 2004 (U.S. Census Bureau, 2005), and large areas of the parish are residential and commercial. West Baton Rouge Parish had an estimated population of 21,880 in 2004 (U.S. Census Bureau, 2005), and much of the Parish is rural with large areas of forested wetlands. Baton Rouge, the largest city in the study area, and several industrial facilities are located along the Mississippi River (fig. 1). The climate in the study area is generally warm and temperate with high humidity and frequent rain. At Baton Rouge, the average annual temperature is 68 °F, and the average annual rainfall is about 60 in. (National Oceanic and Atmospheric Administration, 1995, p. 5 and 8).

## Methods

Wells generally were selected to sample based on their proximity to the Baton Rouge fault or areas of saltwater delineated by Tomaszewski (1996). Many wells were sampled multiple times to determine whether chloride concentrations were changing during the study at the wells. Chloride data collected during this study were compared to historical data to determine whether chloride concentrations were changing over longer periods of time at the wells.

Water samples were collected from wells at a spigot or other discharge outlet; specific conductance and water temperature were measured in the field using methods described in U.S. Geological Survey (1997–present). Samples were sent to the USGS National Water Quality Laboratory in Denver, Colo. for analysis of specific conductance and dissolved chloride concentration using laboratory methods described in Fishman and Friedman (1989). For quality-assurance and quality-control purposes, sequential replicates were collected from 18 wells. Several of the replicates were analyzed for major inorganic ions in addition to specific conductance, temperature, and chloride concentrations. Quality-assurance data for chloride analyses are presented in table 1. Other data are on file at the USGS office in Baton Rouge.

#### 4 Chloride Concentrations in Ground Water in East and West Baton Rouge Parishes

 Table 1.
 Comparison of chloride concentrations in samples and sequential replicates collected for quality assurance purposes.

|             |              | Chloride | concentration, i        | n milligrams per liter  | Deve ent difference 1   |
|-------------|--------------|----------|-------------------------|---|---|
| Well number | Date sampled | Sample   | Sequential<br>replicate | Absolute value of the<br>difference between<br>sample and sequential<br>replicate | Percent difference <sup>1</sup><br>between chloride<br>concentrations in sample<br>and sequential replicate |
| EB- 151     | 11-17-05     | 2.41     | 2.56                    | 0.15  | 6.00  |
| EB- 772     | 9-02-04      | 4.18     | 4.17                    | 0.01  | 0.31  |
| EB- 813     | 9-03-04      | 2.04     | 2.08                    | 0.04  | 2.04  |
| EB- 851     | 9-29-04      | 2.19     | 2.18                    | 0.01  | 0.37  |
| EB- 874     | 9-03-04      | 2.19     | 2.19                    | 0.00  | 0.00  |
| EB- 917     | 12-05-05     | 64.8     | 69.2                    | 4.40  | 6.55  |
| EB- 978     | 9-30-04      | 11.5     | 11.5                    | 0.00  | 0.21  |
| EB- 995     | 9-17-04      | 4.72     | 4.65                    | 0.07  | 1.52  |
| EB-1004     | 4-13-05      | 2.3      | 2.26                    | 0.04  | 1.58  |
| EB-1016B    | 4-13-05      | 2.52     | 2.57                    | 0.05  | 1.85  |
| EB-1123     | 4-13-05      | 5.36     | 4.77                    | 0.59  | 11.61   |
| EB-1150     | 9-02-04      | 167      | 167                     | 0.00  | 0.22  |
| EB-1187     | 9-24-04      | 2.98     | 2.99                    | 0.01  | 0.37  |
| EB-1278     | 11-10-05     | 2.66     | 2.47                    | 0.19  | 7.53  |
| EB-1303     | 9-02-04      | 4.58     | 4.53                    | 0.05  | 1.05  |
| WBR- 110    | 12-23-04     | 3.27     | 3.42                    | 0.15  | 4.51  |
| WBR- 113    | 12-19-05     | 221      | 221                     | 0.00  | 0.07  |
| WBR- 152    | 7-14-05      | 5.07     | 5.09                    | 0.02  | 0.35  |

<sup>1</sup> Percent difference was calculated by multiplying 100 by the absolute value of the difference between the sample and sequential replicate chloride concentrations divided by the average of the sample and sequential replicate chloride concentrations.

In the Baton Rouge area, wells often have multiple screened intervals. In some instances, wells are screened in more than one aquifer. In this report, wells screened in more than one aquifer are included in the discussions and on maps for both aquifers in which the wells are screened, but are listed under separate subheadings that include both aquifer names in the tables.

#### **Acknowledgments**

The author gratefully acknowledges the assistance of public-water suppliers, industries, and private well owners who allowed samples to be collected from their wells. A special thanks is given to the Baton Rouge Water Company and Parish Water Company for providing access and knowledgeable escorts to their numerous wells. Thanks to U.S. Geological Survey employees, Michael L. Ross and Robert B. Fendick, Jr., who assisted with sample collection. Thanks also to Zahir "Bo" Bolourchi, Chief, Public Works and Water Resources Section, Louisiana Department of Transportation and Development, for providing well information that was used during this study.

## Hydrogeology

Ten freshwater-bearing aquifers beneath the study area were named for their general depth below land surface in the Baton Rouge industrial district (fig. 3) (Meyer and Turcan, 1955, p. 13). These aquifers primarily consist of beds of unconsolidated sand that generally thicken and dip to the south. Although the aquifers vary in thickness and pinch out locally, the aquifers generally are at least 75 ft thick and can be more than 200 ft thick. The confining units between the aquifers consist of clay and silt, and generally are at least 100 ft thick, but may be 500 ft thick in some areas (Tomaszewski, 1996).

Precipitation north of the study area in Louisiana and Mississippi is the primary source of recharge to the aquifers (Morgan, 1963, p. 11–13). Generally, water moves downdip

| System     | Series   |        | Stratigraphic unit                   | Aquifer <sup>1</sup> or confining unit |                           |
|------------|--|--------|--------------------------------------|--|---------------------------|
| Å          | Holocene Mississippi River and o alluvial deposits |        |                                      |  | sippi River<br>al aquifer |
| Quaternary |  | Linn   | amed Pleistocene deposits            | Shall                                  | ow sands                  |
| Quat       | Pleistocene  |        | amed i leistocene deposits           | Upland terrace                         | "400-foot" sand           |
|            |  |        |                                      | aquifer                                | "600-foot" sand           |
|            |  |        |                                      | "800-1                                 | foot" sand                |
|            | Pliocene   |        |                                      | "1,000-                                | foot" sand                |
|            |  |        | Blounts Creek<br>Member              | "1,200-foot" sand                      |                           |
|            | ?  | ion    |                                      | "1,500-                                | -foot" sand               |
|            |  | format | Castor Creek Member                  | "1,700-                                | foot" sand                |
| Tertiary   |  | ming H |                                      | Unnamed                                | confining unit            |
| Ter        |  | Flei   | Williamson Creek<br>Member           | "2,000-                                | -foot" sand               |
|            | Miocene  |        | Dough Hills Member<br>Carnahan Bayou | "2,400-                                | -foot" sand               |
|            |  |        | Member                               | "2,800-                                | foot" sand                |
|            |  |        | Lena Member                          | Unnamed                                | confining unit            |
|            | Oligocene  | Cata   | houla Formation                      | Cataho                                 | ula aquifer               |

<sup>1</sup>Clay units separating aquifers in the Baton Rouge area are discontinuous and unnamed.

**Figure 3.** Hydrogeologic units in the Baton Rouge area, southeastern Louisiana (modified from Stuart and others, 1994, fig. 5; Lovelace and Lovelace, 1995, fig. 1).

in a southerly direction through the aquifers at rates that range from a few tens of feet per year to several hundreds of feet per year (Buono, 1983, p. 24). The southern limit of freshwater in the aquifers generally is considered to be at or near the Baton Rouge fault (Tomaszewski, 1996, p. 6).

The Baton Rouge fault is a leaky hydrologic barrier to ground-water flow. Strata on the south side of the fault are downthrown, with displacement increasing with depth from a few feet or tens of feet near the surface to about 350 ft at the top of the "2,000-foot" sand (Durham and Peeples, 1956; Whiteman, 1979). Prior to development, which began in the late 1800's (Meyer and Turcan, 1955, p. 51), the Baton Rouge fault impeded southward flow of freshwater. However, by 1960, large cones of depression had developed in several aquifers north of the fault, creating a gradient for northward flow across the fault (Morgan and Winner, 1964). Test drilling and pump tests conducted across the fault in the "600-foot" sand in the early 1970's determined that ground water could move across the fault in response to withdrawals near the fault (Whiteman, 1979).

## **Chloride Concentrations**

Background concentrations of chloride in fresh ground water in the Baton Rouge area north of the fault generally are less than 10 mg/L. A chloride concentration exceeding 10 mg/L often indicates the presence of saltwater near a well, especially when the well is located near the Baton Rouge fault. An exception to this is the "2,800-foot" sand that contains naturally occurring saltwater in the southern half of East Baton Rouge Parish and all of West Baton Rouge Parish. Chloride concentrations in the "2,800-foot" sand near a freshwatersaltwater transition zone in the sand often exceed 10 mg/L but are usually less than 15 mg/L.

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| Altitude of Definition of Altitude of Definition Definition of Conditude I and surface, Well depth, Intert I above I in feet science of Altitude of Altitude of Condition of C | Latitude<br>(NAD 27) | Longitude<br>(NAD 27) | Altitude of<br>land surface,<br>in feet<br>above<br>NGVD 29 | Well depth,<br>in feet                               | Depth to<br>top of<br>screen(s),<br>in feet | Depth to<br>bottom of<br>screen(s),<br>in feet | Date<br>sampled | Specific<br>conductance, field,<br>in microsiemens<br>per centimeter<br>at 25° Celsius | Chloride<br>concentration,<br>in milligrams<br>per liter |
|--|----------------------|-----------------------|---|--|---|--|-----------------|--|--|
|  |                      |                       | M   | Wells screened in the "400-foot"                     | the "400-foot" s                            | sand   |                 |  |  |
| EB- 499  | 302914               | 911023                | 65  | 430  | 330   | 430  | 9-29-04         | 234  | 8.05   |
| EB- 825  | 302553               | 910920                | 33.57   | 475  | 469   | 475  | 11-23-04        | 269  | 3.49   |
|  |                      |                       |   |  |   |  | 11-14-05        | 270  | 3.50   |
| EB-1017C   | 302406               | 910212                | 36  | 567  | 447   | 567  | 9-03-04         | 302  | 3.50   |
|  |                      |                       |   |  |   |  | 12-17-04        | 298  | 3.40   |
|  |                      |                       |   |  |   |  | 4-13-05         | 302  | 3.49   |
|  |                      |                       |   |  |   |  | 11-17-05        | 287  | 3.38   |
| EB-1132  | 302435               | 910142                | 43  | 590  | 412   | $590^{a}$                                      | 9-08-04         | 265  | 3.61   |
| EB-1278  | 302501               | 910526                | 31  | 547  | 537   | 547  | 12-01-04        | 317  | 2.55   |
|  |                      |                       |   |  |   |  | 11-10-05        | 306  | 2.66   |
| EB-1298  | 302105               | 905600                | 15  | 695  | 560   | 069  | 9-17-04         | 377  | 19.1   |
|  |                      |                       |   |  |   |  | 12-21-05        | 377  | 17.1   |
|  |                      |                       | Well scree  | Well screened in the "400-foot" and "600-foot" sands | foot" and "600-                             | foot" sands                                    |                 |  |  |
| EB- 991B   | 302508               | 910354                | 44  | 565  | 445   | 565  | 9-08-04         | 263  | 3.29   |
|  |                      |                       | Ň   | Wells screened in the "600-foot"                     | the "600-foot" s                            | sand   |                 |  |  |
| EB- 434  | 302619               | 911040                | 45.44   | 611  | 551   | 611  | 12-14-04        | 437  | 49.4   |
| EB- 473  | 302928               | 911034                | 61  | 692  | 492   | 692  | 9-29-04         | 272  | 4.99   |
| EB- 490  | 302927               | 911045                | 62  | 069  | 545   | 069  | 9-29-04         | 285  | 4.45   |
| EB- 793  | 302719               | 911032                | 35.3  | 687  | 683   | 687  | 11-29-04        | 408  | 29.2   |
| EB- 824  | 302553               | 910920                | 33.56   | 581  | 575   | 581  | 6-30-05         | 282  | 3.05   |
| EB- 870  | 302729               | 911006                | 50  | 692  | 687   | 692  | 11-22-04        | 290  | 3.01   |
|  |                      |                       |   |  |   |  | 11-15-05        | 307  | 8.96   |
| EB- 879  | 302402               | 910052                | 38  | 664  | 596   | 664  | 9-17-04         | 300  | 2.79   |
|  |                      |                       |   |  |   |  | 1-05-05         | 302  | 2.85   |
|  |                      |                       |   |  |   |  | 12-22-05        | 293  | 2.91   |
| EB-1018  | 302426               | 905907                | 40  | 803  | 622   | 803 <sup>a</sup>                               | 9-17-04         | 287  | 4.09   |
| EB-1171  | 303327               | 911148                | 72  | 445  | 420   | 445  | 9-30-04         | 268  | 12.9   |
| EB-1228  | 302428               | 910013                | 30  | 760  | 650   | 760  | 9-17-04         | 289  | 2.95   |
| EB-1300  | 302813               | 911035                | 60  | 585  | 555   | 585  | 12-30-05        | 252  | 4.21   |
| EB-1318  | 302856               | 911055                | 69  | 607  | 499   | 607  | 9-29-04         | 296  | 3.24   |
| WBR- 161   | 302958               | 911248                | 26  | 650  | 640   | 650  | 6-29-05         | 287  | 3.03   |
|  |                      |                       |   |  |   |  |                 |  |  |

| Wells screened in the "800-foot" and "800-foot" and "800-foot" and "800-foot" and "800-foot" and "100-foot" and "100-f | Weil<br>number | Latitude<br>(NAD 27) | Longitude<br>(NAD 27) | Altitude of<br>land surface,<br>in feet<br>above<br>NGVD 29 | Well depth,<br>in feet | Depth to<br>top of<br>screen(s),<br>in feet | Depth to<br>bottom of<br>screen(s),<br>in feet | Date<br>sampled | Specific<br>conductance, field,<br>in microsiemens<br>per centimeter<br>at 25° Celsius | Chloride<br>concentration,<br>in milligrams<br>per liter |
|---|----------------|----------------------|-----------------------|---|------------------------|---|--|-----------------|--|--|
|   |                |                      |                       | Well scre   | ened in the "600-      | foot" and "800-                             | foot" sands                                    |                 |  |  |
| wells screened in the "800-foot" sand           0         30257         905943         37         882         800         882         903-04           8         302243         910046         40         800         790         882         9.03-04           8         302347         911302         23         800         830         50.714.05           8         302343         911302         23         800         800         71.10.05           8         302343         911302         51         1.0071         820         71.10.05           9         302317         910133         51         1.0071         820         71.205           9         302317         910107         54         1.0071         82.0         90.04           8         302317         910133         51         1.006         90.0         10.171         1.1705           9         302318         910338         50         92.3         10.171         90.3         1.1705           9         302319         910338         50         92.3         10.171         90.3         1.1705           9         302319         910338         50  | EB-1261        | 302430               | 910022                | 40  | 850                    | 650   | $850^{a}$                                      | 9-17-04         | 292  | 3.04   |
| 0         30227         903943         37         882         800         820         903-04           8         30243         91046         40         800         790         890         7-14-05           8         302927         911302         23         800         830         7-14-05           8         302927         911302         23         860         870         7-14-05           8         302927         910325         40         1,071         822         1,071         9-17-04           8         302717         910513         51         1,007         822         1,071         9-08-04           9         302717         910513         51         1,007         860         1,070         12-77-04           8         302910         910336         51         1,007         1,006         10.00         12-77-04           8         302910         910336         51         1,072         1,073         12-704           8         302910         910336         51         1,072         1,072         12-704           8         302910         910336         51         1,072         1,072         12-77-04 <td></td> <td></td> <td></td> <td>N</td> <td>'ells screened in t</td> <td>the "800-foot" s</td> <td>and</td> <td></td> <td></td> <td></td>  |                |                      |                       | N   | 'ells screened in t    | the "800-foot" s                            | and  |                 |  |  |
| 3         302438         910046         40         890         790         817-04           5         302927         911302         23         902         712-05         712-05           64         302934         911302         23         902         71-14-05         71-14-05           7         302934         911302         20         902         7-14-05         7-12-05           7         302836         91107         54         1.071         8160         9-06         1.071         8-16-05           302335         91107         54         1.021         80         9-02-04         12-17-04           302428         910513         51         1.060         960         1.072         12-17-04           1-1-7-05         1.060         960         1.072         12-17-04         12-17-04           1-1-7-05         1.072         1.060         960         1.072         12-17-04           1-1-7-05         1.072         1.060         960         1.072         12-17-04           1-1-7-05         1.072         1.060         960         1.072         12-17-04           1-1-1-705         9103019         910338         50  | EB-1279        | 302527               | 905943                | 37  | 882                    | 800   | 882  | 9-03-04         | 279  | 3.90   |
| 52         30297         911302         23         902         72         902         7-14-05           84         302934         911328         27         860         830         860         7-12-05           7         302602         910025         40         1,071         822         1,071*         9-08-04           6         302217         910313         51         1,000-foot" and "1,000-foot" sand         9-08-04           7         302317         910313         51         1,001         960         1,071         9-08-04           800         302717         910313         51         1,060         960         1,072         12-17-04           17         302428         910335         51         1,060         960         1,072         12-17-04           17         302910         910335         51         973         982         940         11-17-05           8         302910         910335         50         973         940         11-17-05           9         302910         910338         51         932         932         940         11-17-05           8         302910         910348         71         107  | EB-1288        | 302438               | 910046                | 40  | 890                    | 062   | 890  | 9-17-04         | 306  | 2.65   |
| 84         302934         911328         27         860         830         800         7.12.05           5         302602         910025         40         1.071         822         1.071*         9.08.04           5         302612         910025         40         1.071         822         1.071*         9.08.04           5         302717         910513         51         1.006         960         1.071         9.08.04           302317         910513         51         1.021         968         1.072         9.08.04           302317         910513         51         1.060         960         1.072         9.08.04           302428         910350         46         1.072         1.068         9.02.04           302318         910335         50         973         823         9.03.04           302910         910335         51         973         9.03.04           8         302910         910335         50         973         9.03.04           8         302910         910335         51         973         9.03.04           8         302910         910340         17.17.04         11.17.05         12.13   | WBR- 152       | 302927               | 911302                | 23  | 902                    | 792   | 902ª   | 7-14-05         | 283  | 5.07   |
| Well screened in the "300-foot" and "1,000-foot" sands           Well screened in the "1,000-foot" sands           Well screened in the "1,000-foot" sand           Well screened in the "1,000-foot" sand           S02826         911107         54         1,071         8-16-05           302826         911107         54         1,021         968         1,021         8-16-05           302826         911107         54         1,021         968         1,021         8-16-05           302826         911107         54         1,021         968         900         900         900           302910         910338         51         1,072         1,068         900         900         900           302910         910348         51         973         863         973         903-04           8         302910         910348         51         940         1,015         903-04           8         302910         910144         47         1,017         913-04         913-04           8         302910         910348         51         940         1,015         940-04           9         302910         910341         47         1,017         913-04  | WBR- 184       | 302934               | 911328                | 27  | 860                    | 830   | 860  | 7-12-05         | 275  | 5.47   |
| 5         302602         910025         40         1,071         822         1,071*         9-08-04           7         302826         911107         54         1,021         968         1,021         8-16-05           302816         911107         54         1,021         968         1,021         8-16-05           302817         910513         51         1,060         960         1,060         9-02-04           302910         910335         51         1,072         1,072         1,217-04         1,17-05           302910         910335         50         980         900         980         903-04           302910         910335         50         973         907-04         12-17-04           302910         910335         50         973         907-04         12-17-05           8         302910         910335         50         973         903-04           8         302910         910335         50         983         913-04           8         302910         910344         47         1,015         903-04           8         302910         910344         47         1,016         903-04 <t< td=""><td></td><td></td><td></td><td>Well scree</td><td>ned in the "800-f</td><td>oot" and "1,000</td><td>-foot" sands</td><td></td><td></td><td></td></t<>  |                |                      |                       | Well scree  | ned in the "800-f      | oot" and "1,000                             | -foot" sands                                   |                 |  |  |
| Wells screened in the "1,000-foot" sand           302826         911107         54         1,021         968         1,021         8-16-05           302717         910513         51         1,000         960         1,001         9.02-04           302717         910513         51         1,005         960         1,021         8-16-05           302717         910513         51         1,005         960         1,022         8-16-05           302910         910338         50         960         1,072         12-17-04         11-17-05           302910         910335         50         980         900         980         903-04           8         302910         910335         50         983         973         903-04           8         302910         910348         51         923         973         903-04           8         302917         910840         47         1,015         913-04         143-05           8         302719         910841         47         1,017         1,015         903-04           8         302719         910841         47         1,017         1,0173*         903-04   | EB-1135        | 302602               | 910025                | 40  | 1,071                  | 822   | 1,071ª   | 9-08-04         | 286  | 3.95   |
| 302826         911107         54         1,021         968         1,021         8-16-05           302717         910513         51         1,060         960         1,060         9-02-04           302717         910513         51         1,060         960         1,072         12-17-04           302712         910350         46         1,072         1,068         1,072         12-13-04           302428         910335         50         980         900         980         902-04           302910         910335         50         973         863         973         9-03-04           302910         910348         51         982         973         9-03-04           8         302910         910348         51         923         9-03-04           8         302910         910348         51         923         9-03-04           8         302910         910348         51         923         9-03-04           8         302911         91044         47         1,073         9-03-04           8         302719         910841         47         1,070         1,073         9-03-04           8   |                |                      |                       | We  | ells screened in th    | ne "1,000-foot"                             | sand   |                 |  |  |
| 302717         910513         51         1,060         960         1,060         9-02-04           11-17-05         11-17-05         11-17-05         11-17-05         11-17-05           302428         910350         46         1,072         12-17-04         11-17-05           302910         910338         50         980         900         980         9-08-04           302910         910338         50         973         9-03-04         12-07-05           302910         910348         51         982         863         973         9-03-04           302910         910348         51         982         872         982         9-03-04           302317         910340         47         1,070         1,005         1,073         9-03-04           302317         910440         47         1,070         1,005         1,073         9-03-04           302317         910840         47         1,070         1,073         9-03-04           302317         910840         47         1,070         1,073         9-02-04           302317         910434         47         1,070         1,073         9-02-04           302031   | EB- 467        | 302826               | 911107                | 54  | 1,021                  | 968   | 1,021  | 8-16-05         | 327  | 2.67   |
| $ \begin{array}{c c c c c c c c c c c c c c c c c c c $   | EB- 632        | 302717               | 910513                | 51  | 1,060                  | 096   | 1,060  | 9-02-04         | 318  | 2.11   |
| $ \begin{array}{c c c c c c c c c c c c c c c c c c c $   |                |                      |                       |   |                        |   |  | 12-17-04        | 314  | 2.10   |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$  |                |                      |                       |   |                        |   |  | 11-17-05        | 303  | 2.03   |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$  | EB- 805        | 302428               | 910350                | 46  | 1,072                  | 1,068                                       | 1,072  | 12-13-04        | 25,400   | 9,050  |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$   |                |                      |                       |   |                        |   |  | 12-07-05        | 25,600   | 9,140  |
| 5         302938         910335         50         973         863         973         9.03-04           8         302910         910348         51         982         872         982"         9.03-04           1         302910         910348         51         982         872         982"         9.03-04           1         1         1         9114         47         1,015         9.03-04         4.13.05           1         302717         910840         47         1,015         940         1,015         9.03-04           1         302719         910841         47         1,070         1,073         9.02-04         9.02-04           1         302719         910841         47         1,070         1,073         9.02-04           1         302437         910143         42         1,140         1,073         9.02-04           1         302437         910143         42         1,140         1,033         1,1073         9.02-04           1         302437         910143         42         1,140         1,034         7.14-05         12.21-05           1         30302         911254         20         1,03   | EB- 926        | 302910               | 910338                | 50  | 980                    | 006   | 980  | 9-08-04         | 281  | 4.65   |
| 3 $302910$ $910348$ $51$ $982$ $872$ $982^{a}$ $9-08-04$ BB $302818$ $910114$ $47$ $1,015$ $9-03-04$ $4.13-05$ BB $302717$ $910840$ $47$ $1,015$ $940$ $1,073$ $9-03-04$ BB $302719$ $910841$ $47$ $1,070$ $1,073$ $9-02-04$ S0 $302719$ $910841$ $47$ $1,070$ $1,073$ $9-02-04$ S0 $302437$ $910143$ $42$ $1,140$ $1,030$ $1,1130$ $9-02-04$ S0 $302437$ $910143$ $42$ $1,140$ $1,030$ $1,1130$ $9-02-04$ S0 $302827$ $911254$ $20$ $1,030$ $1,130$ $9-02-04$ S0 $302841$ $911259$ $20$ $1,030$ $1,130$ $9-02-04$ S0 $302841$ $911209$ $20$ $1,005$ $1,0165$ $7-14-05$ S0 $3$  | EB-1035        | 302938               | 910335                | 50  | 973                    | 863   | 973  | 9-03-04         | 267  | 4.43   |
| B $302818$ $910114$ $47$ $1,015$ $940$ $1,015$ $9-03-04$ 5 $302717$ $910840$ $47$ $1,073$ $913$ $1,073$ $9-02-04$ 8 $302719$ $910841$ $47$ $1,070$ $1,005$ $1,073$ $9-02-04$ 8 $302437$ $910143$ $42$ $1,140$ $1,030$ $1,130$ $9-08-04$ 8 $302437$ $910143$ $42$ $1,140$ $1,030$ $1,130$ $9-08-04$ 8 $302327$ $911254$ $20$ $1,034$ $7-14-05$ $12-21-05$ 64 $303002$ $911858$ $20$ $920$ $1,034^{a}$ $7-14-05$ 64 $303002$ $911858$ $20$ $920$ $1,034^{a}$ $7-14-05$ 64 $302841$ $911209$ $27$ $1,005$ $910$ $7-14-05$ 7 $7-14-05$ $7-14-05$ $7-14-05$ $7-14-05$ $7-14-05$ $7-14-05$ 902341 $91029$ $27$ $1,005$ $915$ $1,005$ $7$  | EB-1123        | 302910               | 910348                | 51  | 982                    | 872   | $982^{a}$                                      | 9-08-04         | 282  | 4.86   |
| B $302818$ $910114$ $47$ $1,015$ $940$ $1,015$ $9-03-04$ $302717$ $910840$ $47$ $1,073$ $913$ $1,073$ $9-02-04$ $8$ $302719$ $910841$ $47$ $1,070$ $1,065$ $9-02-04$ $8$ $302437$ $910143$ $42$ $1,140$ $1,030$ $1,130$ $9-08-04$ $8$ $302437$ $910143$ $42$ $1,140$ $1,030$ $1,130$ $9-08-04$ $8$ $302827$ $911254$ $20$ $1,034$ $7-1405$ $12-21-05$ $64$ $303002$ $911254$ $20$ $1,034$ $7-14.05$ $7-14.05$ $64$ $303002$ $911858$ $20$ $920$ $11-9.04$ $7-14.05$ $902841$ $911209$ $27$ $1,005$ $912$ $1,005$ $7-14-05$ $902841$ $911209$ $27$ $1,005$ $915$ $1,005$ $7-14-05$ $902741$ $91$   |                |                      |                       |   |                        |   |  | 4-13-05         | 282  | 5.36   |
| $ \begin{array}{ c c c c c c c c c c c c c c c c c c c$   | EB-1220B       | 302818               | 910114                | 47  | 1,015                  | 940   | 1,015  | 9-03-04         | 276  | 4.66   |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$   | EB-1276        | 302717               | 910840                | 47  | 1,073                  | 913   | $1,073^{a}$                                    | 9-02-04         | 318  | 2.83   |
| $ \begin{array}{ c c c c c c c c c c c c c c c c c c c$   | EB-1308        | 302719               | 910841                | 47  | 1,070                  | 1,005                                       | 1,065  | 9-02-04         | 316  | 2.84   |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$  | EB-1328        | 302437               | 910143                | 42  | 1,140                  | 1,030                                       | 1,130  | 9-08-04         | 989  | 222  |
| 50     302827     911254     20     1,034     7-14-05       64     303002     911858     20     920     860     920     11-19-04       7     7     7     7     7     7     7       09     302841     911209     27     1,005     915     1,005     7-14-05       Well screened in the "1,000-foot" and "1,200-foot sands       302721     910549     50     1.214     984     1.214*     9-02-04  |                |                      |                       |   |                        |   |  | 12-21-05        | 1,110  | 153  |
| 64         303002         911858         20         920         860         920         11-19-04           09         302841         911209         27         1,005         915         7-14-05           Well screened in the "1,000-foot" and "1,200-foot sands           30271         910549         50         1.214         984         1.214*         9-02-04   | WBR- 150       | 302827               | 911254                | 20  | 1,034                  | 922   | $1,034^{a}$                                    | 7-14-05         | 327  | 6.20   |
| 70         7-14-05           09         302841         911209         27         1,005         915         7-14-05           Well screened in the "1,000-foot" and "1,200-foot sands           302721         910549         50         1,214         94         1,214 <sup>a</sup> 9-02-04   | WBR- 164       | 303002               | 911858                | 20  | 920                    | 860   | 920  | 11-19-04        | 285  | 4.74   |
| 09         302841         911209         27         1,005         7-14-05           Well screened in the "1,000-foot" and "1,200-foot sands         Mell screened in the "1,000-foot" and "1,200-foot sands         9-02-04   |                |                      |                       |   |                        |   |  | 7-14-05         | 281  | 4.93   |
| Well screened in the "1,000-foot" and "1,200-foot sands           302721         910549         50         1.214         984         1.214*         9-02-04   | WBR- 209       | 302841               | 911209                | 27  | 1,005                  | 915   | 1,005  | 7-14-05         | 289  | 3.32   |
| $302721$ $910549$ $50$ $1.214$ $984$ $1.214^{a}$ $9-02-04$  |                |                      |                       | Well scree  | ned in the "1,000-     | -foot" and "1,20                            | 0-foot sands                                   |                 |  |  |
|   | EB- 772        | 302721               | 910549                | 50  | 1,214                  | 984   | $1,214^{a}$                                    | 9-02-04         | 323  | 4.18   |

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|---|-----------------|----------------------|-----------------------|---|------------------------|---|--|-----------------|--|--|
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$   |                 |                      |                       | We  | Ils screened in th     | he "1,200-foot" :                           | sand   |                 |  |  |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$   | EB- 403         | 302936               | 911022                | 64  | 1,270                  | 1,118                                       | 1,270  | 9-29-04         | 266  | 4.69   |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$   | EB- 523         | 303021               | 910800                | 59  | 1,206                  | 1,086                                       | $1,206^{a}$                                    | 9-03-04         | 272  | 4.39   |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$   | EB- 557         | 302957               | 911035                | 57  | 1,250                  | 1,160                                       | 1,250  | 9-29-04         | 223  | 5.20   |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$   | EB- 567         | 302935               | 911017                | 63  | 1,245                  | 1,115                                       | 1,245  | 9-29-04         | 280  | 3.99   |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$   | EB- 576         | 302917               | 911032                | 68  | 1,270                  | 1,170                                       | 1,270  | 9-29-04         | 269  | 4.84   |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$   | EB- 580         | 302903               | 911018                | 65  | 1,242                  | 1,182                                       | 1,242  | 9-29-04         | 301  | 3.38   |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$   | EB- 584         | 302634               | 910222                | 40  | 1,414                  | 1,285                                       | 1,414  | 9-08-04         | 284  | 2.79   |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$   | <b>EB-</b> 621  | 302500               | 910525                | 33  | 1,487                  | 1,387                                       | 1,487  | 9-03-04         | 756  | 135  |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$   |                 |                      |                       |   |                        |   |  | 12-17-04        | 697  | 117  |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$   |                 |                      |                       |   |                        |   |  | 4-13-05         | 668  | 101  |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$   |                 |                      |                       |   |                        |   |  | 11-17-05        | 788  | 157  |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$   | <b>EB-</b> 629  | 303343               | 911225                | 69  | 1,025                  | 870   | 1,025  | 9-30-04         | 526  | 12.1   |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$   | <b>3B-</b> 649  | 302947               | 911023                | 62  | 1,250                  | 1,110                                       | 1,250  | 9-29-04         | 245  | 5.13   |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$   | <b>EB- 653</b>  | 303019               | 910748                | 58  | 1,153                  | 1,030                                       | 1,153  | 9-03-04         | 279  | 3.83   |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$   | 3 <b>B-</b> 756 | 303019               | 910737                | 57  | 1,168                  | 1,083                                       | 1,168  | 9-03-04         | 276  | 3.88   |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$  | <b>EB-</b> 925  | 302602               | 910025                | 40  | 1,470                  | 1,326                                       | $1,470^{a}$                                    | 9-08-04         | 283  | 3.06   |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$   | <b>EB-</b> 990  | 302509               | 910353                | 44  | 1,450                  | 1,310                                       | $1,450^{a}$                                    | 9-08-04         | 312  | 2.25   |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$   |                 |                      |                       |   |                        |   |  | 12-17-04        | 309  | 2.25   |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$   |                 |                      |                       |   |                        |   |  | 4-13-05         | 315  | 2.26   |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$   |                 |                      |                       |   |                        |   |  | 11-17-05        | 297  | 2.33   |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$  | <b>EB-1</b> 003 | 302635               | 910222                | 40  | 1,431                  | 1,305                                       | $1,431^{a}$                                    | 9-08-04         | 285  | 2.90   |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$   | EB-1016B        | 302537               | 910330                | 47  | 1,465                  | 1,325                                       | $1,465^{a}$                                    | 9-08-04         | 304  | 2.54   |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$   |                 |                      |                       |   |                        |   |  | 4-13-05         | 305  | 2.52   |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$  | <b>EB-1287</b>  | 302522               | 910419                | 45  | 1,510                  | 1,320                                       | 1,500  | 9-03-04         | 303  | 2.58   |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$  |                 |                      |                       |   |                        |   |  | 4-13-05         | 301  | 2.52   |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$  | EB-1301         | 302830               | 911106                | 55  | 1,260                  | 1,178                                       | 1,260  | 8-16-05         | 314  | 3.16   |
| $302833$ $911245$ $23$ $1,247$ $1,187$ $1,247$ $7-12.05$ $303$ $302733$ $911254$ $20$ $1,322$ $1,218$ $1,223.04$ $285$ $302712$ $911457$ $20$ $1,305$ $1,217$ $1,305^a$ $11-19.04$ $284$ $12-06-04$ $12-20-05$ $278$ $12-20-05$ $278$   | <b>EB-1312</b>  | 302436               | 910142                | 42  | 1,515                  | 1,370                                       | 1,510  | 9-08-04         | 296  | 2.23   |
| $302833$ $911245$ $23$ $1,247$ $7.12.05$ $279$ $302733$ $911254$ $20$ $1,322$ $1,218$ $1,322^{a}$ $12-23.04$ $285$ $302712$ $911457$ $20$ $1,305$ $1,217$ $1,305^{a}$ $11-19.04$ $284$ $302712$ $911457$ $20$ $1,305$ $1,217$ $1,305^{a}$ $11-19.04$ $284$ $302712$ $911457$ $20$ $1,305$ $1,217$ $1,305^{a}$ $11-19.04$ $284$ $302712$ $911457$ $20$ $1,217$ $1,305^{a}$ $11-19.04$ $284$ $205$ $1,217$ $1,305^{a}$ $1,206.04$ $286$ $12-06-04$ $286$  |                 |                      |                       |   |                        |   |  | 12-21-05        | 303  | 2.33   |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$  | WBR- 44         | 302833               | 911245                | 23  | 1,247                  | 1,187                                       | 1,247  | 7-12-05         | 279  | 4.43   |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$  | WBR- 110        | 302733               | 911254                | 20  | 1,322                  | 1,218                                       | $1,322^{a}$                                    | 12-23-04        | 285  | 3.27   |
| 286 278   | WBR- 136        | 302712               | 911457                | 20  | 1,305                  | 1,217                                       | $1,305^{a}$                                    | 11-19-04        | 284  | 3.19   |
| 278   |                 |                      |                       |   |                        |   |  | 12-06-04        | 286  | 3.20   |
|   |                 |                      |                       |   |                        |   |  | 12-20-05        | 278  | 3.29   |

| Well<br>number | Latitude<br>(NAD 27) | Longitude<br>(NAD 27) | Altitude of<br>land surface,<br>in feet<br>above<br>NGVD 29 | Well depth,<br>in feet                   | Depth to<br>top of<br>screen(s),<br>in feet | Depth to<br>bottom of<br>screen(s),<br>in feet | Date<br>sampled | Specific<br>conductance, field,<br>in microsiemens<br>per centimeter<br>at 25º Celsius | Chloride<br>concentration<br>in milligrams<br>per liter |
|----------------|----------------------|-----------------------|---|--|---|--|-----------------|--|---|
|                |                      |                       | Wells sc  | Wells screened in the "1,200-foot" sand- |   | -Continued                                     |                 |  |   |
| WBR- 148       | 302702               | 911851                | 14  | 1,304                                    | 1,294                                       | 1,304  | 11-19-04        | 343  | 2.42  |
|                |                      |                       |   |  |   |  | 11-22-05        | 334  | 2.47  |
| WBR- 207       | 302732               | 911224                | 26  | 1,332                                    | 1,235                                       | $1,330^{a}$                                    | 12-23-04        | 298  | 2.77  |
|                |                      |                       |   |  |   |  | 7-20-05         | 300  | 2.69  |
|                |                      |                       |   |  |   |  | 12-20-05        | 292  | 2.90  |
|                |                      |                       | Well scree  | Well screened in the "1,200-foot"        |   | and "1,500-foot" sands                         |                 |  |   |
| EB-1297        | 302521               | 910417                | 45  | 1,635                                    | 1,405                                       | $1,630^{a}$                                    | 9-03-04         | 327  | 2.65  |
|                |                      |                       |   |  |   |  | 12-17-04        | 323  | 2.57  |
|                |                      |                       |   |  |   |  | 4-13-05         | 328  | 2.52  |
|                |                      |                       |   |  |   |  | 11-17-05        | 311  | 2.78  |
|                |                      |                       | N   | Wells screened in the "1,500-foot" sand  | ",1,500-foot"                               | sand   |                 |  |   |
| EB- 413        | 302642               | 910832                | 49  | 1,745                                    | 1,511                                       | $1,745^{a}$                                    | 9-02-04         | 355  | 11.5  |
|                |                      |                       |   |  |   |  | 12-17-04        | 353  | 12.3  |
|                |                      |                       |   |  |   |  | 4-13-05         | 365  | 13.6  |
|                |                      |                       |   |  |   |  | 11-17-05        | 347  | 14.8  |
| EB- 510        | 302751               | 910925                | 57  | 1,605                                    | 1,525                                       | 1,605  | 9-02-04         | 312  | 11.2  |
|                |                      |                       |   |  |   |  | 4-13-05         | 316  | 11.2  |
| EB- 657        | 302751               | 910932                | 59  | 1,618                                    | 1,512                                       | $1,618^{a}$                                    | 9-02-04         | 299  | 2.89  |
|                |                      |                       |   |  |   |  | 4-13-05         | 290  | 2.99  |
| EB- 658        | 302745               | 910924                | 59  | 1,604                                    | 1,497                                       | 1,604  | 9-02-04         | 448  | 51.1  |
|                |                      |                       |   |  |   |  | 4-13-05         | 470  | 55.8  |
| EB- 726        | 302746               | 910917                | 55  | 1,601                                    | 1,495                                       | 1,601  | 9-02-04         | 294  | 3.50  |
|                |                      |                       |   |  |   |  | 4-13-05         | 296  | 3.49  |
| EB- 771        | 302646               | 910838                | 48  | 1,739                                    | 1,641                                       | $1,739^{a}$                                    | 9-02-04         | 338  | 6.46  |
|                |                      |                       |   |  |   |  | 12-17-04        | 333  | 7.07  |
|                |                      |                       |   |  |   |  | 4-13-05         | 344  | 8.06  |
|                |                      |                       |   |  |   |  | 11-17-05        | 328  | 9.14  |
| EB- 773        | 303132               | 911032                | 57  | 1,395                                    | 1,298                                       | $1,395^{a}$                                    | 9-03-04         | 276  | 3.09  |
| EB- 917        | 302614               | 910830                | 47  | 1,736                                    | 1,731                                       | 1,736  | 12-15-04        | 455  | 50.5  |
|                |                      |                       |   |  |   |  | 12-05-05        | 496  | 64.8  |
| EB- 918        | 302547               | 910744                | 40  | 1,834                                    | 1,829                                       | 1,834  | 12-16-04        | 3,020  | 915   |
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|  | Well<br>number  | Latitude<br>(NAD 27) | Longitude<br>(NAD 27) | Altitude of<br>land surface,<br>in feet<br>above<br>NGVD 29 | Well depth,<br>in feet | Depth to<br>top of<br>screen(s),<br>in feet | Depth to<br>bottom of<br>screen(s),<br>in feet | Date<br>sampled | Specific<br>conductance, field,<br>in microsiemens<br>per centimeter<br>at 25º Celsius | Chloride<br>concentration,<br>in milligrams<br>per liter |
|--|-----------------|----------------------|-----------------------|---|------------------------|---|--|-----------------|--|--|
| 302717         910839         47         1,511         1,431         1,511         9,02.04           302749         910928         56         1,599         1,512         1,599         9,02.04           302750         910920         54         1,592         1,497         1,599         9,02.04           302717         910920         54         1,592         1,497         1,592         9,02.04           303335         911222         71         1,340         1,592         9,02.04           303335         911222         71         1,340         1,592         9,02.04           303356         911241         25         2,105         2,306         1,1405           303550         911241         25         2,105         2,1206         1,1405           302560         911241         25         2,105         2,1206         1,1405           302561         911241         25         2,205         2,194         9,204           302562         911241         25         2,205         2,194         1,205           302563         911241         25         2,205         1,206         1,146           302564         911232   |                 |                      |                       | Wells scr   | eened in the "1,5      | 00-foot" sand—                              | -Continued                                     |                 |  |  |
| 302749       910928       56       1,599       1,512       1,599       902.04         302750       910920       54       1,592       9.02.04       11-7.05         302771       910914       50       1,497       1,592       9.02.04         302772       910920       54       1,592       1,417       17-105         302375       911241       50       1,441       1,541       9.02.04         30335       911222       71       1,340       1,250       9.42.04         303355       911241       25       2,105       2,306       9.12.04         302550       911221       27       1,340       1,250       1,414       1,241         302550       911221       25       2,105       2,305       9,12.04         302550       911221       25       2,105       1,1406       1,1406         302557       911232       28       2,2148       2,242*       10,206         302565       911232       28       2,148       2,1904       1,1406         302565       911302       20       2,148       2,1904       1,1406         302456       911302       20       2,124  | EB- 927         | 302717               | 910839                | 47  | 1,511                  | 1,431                                       | 1,511  | 9-02-04         | 315  | 2.70   |
| 302749       910928       56       1,599       1,512       1,599       1,1705         302750       910920       54       1,592       1,599       9,02.04         302750       910920       54       1,592       1,27.04       4,13.05         302750       910920       54       1,592       1,17.05       1,17.05         302355       911241       50       1,541       9,02.04       4,13.05         303355       911241       25       1,340       1,340       9,20.04         303355       911241       25       2,105       1,340       9,20.04         303355       911241       25       2,205       1,340       9,20.04         302550       911241       25       2,105       1,240       1,1405         302547       911241       25       2,105       1,200       1,1405         302547       911241       25       2,104       2,124       1,1405         302547       911232       28       2,242       1,2105       1,1405         302547       911232       28       2,242       1,2105       1,205         302545       911302       20       2,148       2,242   |                 |                      |                       |   |                        |   |  | 12-17-04        | 311  | 2.70   |
| 302749     910928     56     1,599     1,512     1,599     902.04       302750     910920     54     1,592     1,497     1,592     9.02.04       302717     910920     54     1,592     1,497     1,592     9.02.04       302717     910514     50     1,541     1,411     1,541     9.02.04       303335     911222     71     1,340     1,550     9.30.04       303355     911241     25     2,205     1,320     9.30.04       303356     911148     72     1,320     1,230     9.30.04       303550     911241     25     2,205     1,230     9.30.04       302547     911241     25     2,205     1,240     1,1405       302547     911232     28     2,242     2,105     1,1405       302547     911232     28     2,242     2,148     2,242     1,2405       302547     911232     28     2,148     2,242     1,2405       302548     911302     20     2,014     2,126       302545     911302     20     2,014     2,126       302545     911302     20     2,012     2,024       302456     911302     25   |                 |                      |                       |   |                        |   |  | 4-13-05         | 317  | 2.69   |
| 302749     910928     56     1,599     902.04       302750     910920     54     1,592     1,595     9.02.04       302717     910514     50     1,592     9.02.04       302355     911222     71     1,411     1,541     9.02.04       303355     911222     71     1,340     1,531     9.02.04       303356     911148     72     1,320     1,340     9.30.04       303355     911221     71     1,340     1,250     9.30.04       303356     911141     25     2,205     1,320     9.30.04       3033550     911221     71     1,230     1,230     9.30.04       302550     911241     25     2,205     1,206     7.12.05       3025547     911232     28     2,242     2,148     2,242       302547     911320     20     2,042     2,148     2,242       302547     911320     20     2,044     2,126       302547     911322     28     2,242     2,148     2,242       302565     911320     20     2,044     2,126       302565     911302     20     2,044     2,126       302456     911302     20 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>11-17-05</td><td>300</td><td>2.84</td></td<>   |                 |                      |                       |   |                        |   |  | 11-17-05        | 300  | 2.84   |
| 302750       910920       54       1,592       1,497       1,592       913.06         302717       910514       50       1,497       1,592       912.04         302335       911222       71       1,340       1,541       902.04         303335       911222       71       1,340       1,541       902.04         303335       911231       72       1,320       1,340       9.30.04         303356       911241       25       2,205       2,105       2,303         302547       911241       25       2,205       2,105       2,304         302550       911241       25       2,205       2,105       2,1406         302547       911231       25       2,205       1,220       1,1405         302547       911232       28       2,242       1,250       1,1405         302547       911232       28       2,242       1,250       1,1405         302547       911232       28       2,148       2,242*       10,2504         302545       911302       20       2,032       1,2106       1,1405         302456       911302       20       2,194       2,124       2,1   | EB- 938         | 302749               | 910928                | 56  | 1,599                  | 1,512                                       | 1,599  | 9-02-04         | 394  | 14.6   |
| 302750       910920       54       1,592       1,497       1,592       91.17.05         302717       910514       50       1,541       1,541       9.02.04         302335       911222       71       1,541       1,541       9.02.04         303335       911222       71       1,340       1,340       9.30.04         303356       911241       25       2.205       2,105       2,205       10.28.04         302560       911241       25       2,205       2,105       2,205       10.28.04         302561       911241       25       2,205       2,105       2,12.05       11.440         302561       911241       25       2,205       2,105       2,12.05       1.1.405         302562       911232       28       2,242       1,2.05       1.1.405       1.1.405         302561       911232       28       2,242       1,2.90       1.1.405       1.1.405         302562       911320       20       2,012       2,194       2,12.05       1.1.405       1.1.205         302456       911302       20       2,194       2,124       2,194       1.2.02.04       7.11.05       1.1.05      3  |                 |                      |                       |   |                        |   |  | 12-17-04        | 396  | 17.5   |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$   |                 |                      |                       |   |                        |   |  | 4-13-05         | 407  | 18.6   |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$   |                 |                      |                       |   |                        |   |  | 11-17-05        | 433  | 32.4   |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$   | EB- 939         | 302750               | 910920                | 54  | 1,592                  | 1,497                                       | 1,592  | 9-02-04         | 289  | 3.52   |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$   |                 |                      |                       |   |                        |   |  | 4-13-05         | 292  | 3.53   |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$   | EB- 961         | 302717               | 910514                | 50  | 1,541                  | 1,441                                       | 1,541  | 9-02-04         | 279  | 3.96   |
| 303326         911148         72         1,320         1,232         1,320*         9-30-04           302550         911241         25         2,205         2,105         2,205         10-28-04           302551         911241         25         2,205         2,105         2,205         10-28-04           1-14-05         1-14-05         1-14-05         1-14-05         1-14-05         1-12-05           302547         911232         28         2,242         10-28-04         1-12-05           302505         911320         28         2,242         10-28-04         1-12-05           302505         911320         20         2,012         2,012         2,024           302505         911320         20         2,012         2,082         12-10-05           302456         911302         20         2,012         2,082         12-10-05           302456         911302         25         2,194         2,194         2,19-05           302456         911302         25         2,194         2,194         2,10-05           302456         910219         40         1,500-foot" and "1,700-foot" sands         1,1-05           302405         910219 <td>EB- 977</td> <td>303335</td> <td>911222</td> <td>71</td> <td>1,340</td> <td>1,250</td> <td>1,340</td> <td>9-30-04</td> <td>252</td> <td>3.58</td>  | EB- 977         | 303335               | 911222                | 71  | 1,340                  | 1,250                                       | 1,340  | 9-30-04         | 252  | 3.58   |
| 302550     911241     25     2.205     10-28-04       302547     911231     25     2.205     10-28-04       1-14:05     7712-05     10-12-05       302547     911232     28     2.242     10-12-05       302547     911232     28     2.242     2.148     2.2404       302505     911320     20     2082     2.148     2.242*       302505     911320     20     2082     2.148     2.242*       302456     911320     20     2.082     2.012     2.095       302456     911302     20     2.082     2.194     2.19.65       302456     911302     25     2.194     2.124     2.19.65       302456     911302     25     2.194     2.124     2.19.65       302456     911302     25     2.194     2.124     2.19.65       302455     910302     40     1.500-foot* and "1.700-foot* and "1.700-foot* and "1.700-foot* and "1.700-foot* and to 1.830     9.03.04  | E <b>B-</b> 984 | 303326               | 911148                | 72  | 1,320                  | 1,232                                       | $1,320^{a}$                                    | 9-30-04         | 249  | 3.15   |
| 1-14-05       1-14-05         302547       911232       28       2,242       2,148       2,12-05         10-12-05       10-12-05       10-12-05       10-12-05         302505       911320       28       2,242       2,148       2,242*       10-28-04         302505       911320       20       2,082       2,012       2,020       11-105         302456       911302       20       2,082       2,012       2,082       12-006         302456       911302       25       2,194       2,124       2,194       12-00-65         302456       911302       25       2,194       2,104       7-11-05         302456       911302       25       2,194       12-00-65         302405       910319       40       1,800-foot" and "1,700-foot" sands       7-11-05         302405       910219       40       1,840       1,655       1,837*       903-04  | WBR- 112        | 302550               | 911241                | 25  | 2,205                  | 2,105                                       | 2,205  | 10-28-04        | 680  | 88.3   |
| 415.05       7.12.05         302547       911232       28       2,242       2,148       2,242       10-2.05         302505       911320       20       2,042       2,148       2,242       10-2.05         302505       911320       20       2,082       2,012       2,905       7.12.05         302505       911320       20       2,082       2,012       2,082       12-19.05         302456       911302       25       2,194       2,124       2,194       2.10.65         302456       911302       25       2,194       2,124       2,194       12.202.04         302456       911302       25       2,194       2,124       2,194       12.202.04         302456       911302       25       2,194       2,104       12.202.04         302405       911302       25       2,194       2,194       2,1024         302405       910319       40       1,605       7,11.05       2,11.05         302405       910219       40       1,840       1,655       1,837*       9.03.04   |                 |                      |                       |   |                        |   |  | 1-14-05         | 685  | 90.4   |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$  |                 |                      |                       |   |                        |   |  | 4-15-05         | 670  | 86.6   |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$   |                 |                      |                       |   |                        |   |  | 7-12-05         | 099  | 80.7   |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$  |                 |                      |                       |   |                        |   |  | 10-12-05        | 634  | 81.8   |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$   |                 |                      |                       |   |                        |   |  | 12-19-05        | 640  | 82.7   |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$   | WBR- 113        | 302547               | 911232                | 28  | 2,242                  | 2,148                                       | $2,242^{a}$                                    | 10-28-04        | 1,260  | 247  |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  |                 |                      |                       |   |                        |   |  | 4-15-05         | 1,280  | 257  |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  |                 |                      |                       |   |                        |   |  | 7-12-05         | 1,230  | 235  |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  |                 |                      |                       |   |                        |   |  | 10-12-05        | 1  | 220  |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$   |                 |                      |                       |   |                        |   |  | 12-19-05        | 1,170  | 221  |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$   | WBR- 132        | 302505               | 911320                | 20  | 2,082                  | 2,012                                       | 2,082  | 12-02-04        | 467  | 43.6   |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$   |                 |                      |                       |   |                        |   |  | 7-11-05         | 436  | 37.0   |
| 302456     911302     25     2,194     12-02-04       7-11-05     7-11-05       Well screened in the "1,500-foot" and "1,700-foot" sands       302405     910219     40     1,840     1,655     1,837 <sup>a</sup> 9-03-04   |                 |                      |                       |   |                        |   |  | 12-20-05        | 414  | 34.2   |
| 7-11-05<br>7-11-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05<br>12-20-05 | WBR- 173        | 302456               | 911302                | 25  | 2,194                  | 2,124                                       | 2,194  | 12-02-04        | 461  | 38.1   |
| 12-20-05           Well screened in the "1,500-foot" and "1,700-foot" sands           302405         910219         40         1,840         1,655         1,837 <sup>a</sup> 9-03-04  |                 |                      |                       |   |                        |   |  | 7-11-05         | 480  | 48.3   |
| Well screened in the "1,500-foot" and "1,700-foot" sands           302405         910219         40         1,840         1,655         1,837 <sup>a</sup> 9-03-04   |                 |                      |                       |   |                        |   |  | 12-20-05        | 478  | 50.5   |
| $302405$ $910219$ $40$ $1,840$ $1,655$ $1,837^{a}$ $9-03-04$ $4.13-05$   |                 |                      |                       | Well screer   | 1,500- in the "1,500-  | foot" and "1,700                            | )-foot" sands                                  |                 |  |  |
|  | EB-1295C        | 302405               | 910219                | 40  | 1,840                  | 1,655                                       | 1,837 <sup>a</sup>                             | 9-03-04         | 532  | 44.3   |
|  |                 |                      |                       |   |                        |   |  | 4-13-05         | 552  | 50.3   |

| A       302428       910350       46         3       302721       910540       50         39       302324       910540       50         76       303503       912047       29         77       303229       912146       20         78       303227       912146       20         79       303227       912144       23         81       302544       911212       28         81       302544       911212       28         81       302544       911212       28         302900       911126       52       33         81       302561       911035       58         302518       910339       47       45         8       302202       911136       55         8       302354       910306       45         8       3023554       910306       45         8       302354       910316       55         910316       910316       55         302354       910016       55         302901       911011       67         302901       911016       55   | Altitude of<br>Longitude land surface,<br>in feet<br>above<br>NGVD 29 | Well depth,<br>in feet                  | Depth to<br>top of<br>screen(s),<br>in feet | Depth to<br>bottom of<br>screen(s),<br>in feet | Date<br>sampled | Specific<br>conductance, field,<br>in microsiemens<br>per centimeter<br>at 25° Celsius | Chloride<br>concentration,<br>in milligrams<br>per liter |
|--|---|---|---|--|-----------------|--|--|
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$   | >   | Wells screened in the "1,700-foot" sand | ne "1,700-foot"                             | sand   |                 |  |  |
| 302721         910548         50           39         303603         912047         29           76         303229         912146         20           71         303227         912146         20           77         303227         912144         23           81         302544         911212         28           81         302544         911212         28           81         302544         911212         28           81         302540         911126         52           302900         911056         65           302918         911035         58           302551         911126         55           8         302502         911136         55           8         302502         911136         55           9         302874         910306         45           8         302205         910306         55           8         302205         910306         55           9         302844         91037         67           9         302905         911037         67           302905         9100166         55         56 |   | 1,950                                   | 1,946                                       | 1,950  | 12-8-05         | 372  | 2.34   |
| 302824     910540     50       303603     912047     29       303229     912146     20       303227     912146     20       303227     912414     23       303227     912414     23       302544     911212     28       302565     911126     52       302900     911056     65       302916     911124     45       3025718     911035     58       302918     911035     58       302502     911136     26       302503     911136     55       302505     911117     55       302565     911035     55       302565     9110135     55       302505     9110136     55       302505     9110136     55       302505     910916     55       302854     910916     55       302847     911056     67  |   | 1,884                                   | 1,764                                       | 1,884  | 9-02-04         | 308  | 4.07   |
| 303603     912047     29       303229     912146     20       303227     912144     23       303227     912414     23       303257     912414     23       302644     911212     28       302900     911126     52       302900     911056     65       302916     911056     65       302900     911035     58       302918     911035     58       302918     911035     58       302918     911035     56       302918     911035     55       302918     911035     55       302925     911117     55       302854     911037     67       302854     911036     55       302901     911016     55       302901     911056     55  |   | 1,707                                   | 1,600                                       | 1,700  | 9-02-04         | 290  | 4.58   |
| 303229     912146     20       303227     912414     23       303227     912414     23       302644     911212     28       3025651     911126     52       302900     911126     52       302916     911126     52       302916     911056     65       302918     911056     65       302918     911035     58       302925     911035     56       302925     911035     55       302854     911037     67       302854     911037     67       302854     911037     67       302847     911056     55       302847     911056     65  |   | 1,375                                   | ł   | 1  | 11-19-04        | 324  | 2.50   |
| 303229     912146     20       303227     912414     23       3032644     911212     28       302645     911126     28       302900     911126     52       302916     911126     52       302916     911126     52       302916     911056     65       302916     911056     65       302918     911035     58       302925     911136     26       302925     911136     26       302925     911037     67       302854     911036     45       302854     910916     55       302847     910916     55       302847     911056     67  |   |   |   |  | 7-14-05         | 1  | 2.59   |
| 303227     912414     23       302644     911212     28       302906     911126     52       302900     911056     65       302946     911124     45       302946     911124     45       302502     911126     52       302946     911035     58       302946     911035     58       302502     911136     26       302502     9111136     26       302503     911037     67       302504     911037     67       302505     910806     45       302505     911037     67       302847     911036     55       302847     911056     67  |   | 1,458                                   | 1,295                                       | $1,458^{a}$                                    | 11-19-04        | 341  | 2.22   |
| 303227     912414     23       302644     911212     28       302564     911126     52       302900     911056     65       302916     911126     52       302946     911124     45       302946     911126     52       302946     911136     26       302946     911136     26       302946     911136     26       302946     911035     58       302946     911035     58       302502     911136     26       302503     911136     26       302504     911037     67       302854     911037     67       302911     911036     55       302911     911036     55       302911     911056     67   |   |   |   |  | 7-14-05         | 342  | 2.22   |
| 302644     911212     28       302926     911126     52       302900     911056     65       3029146     911056     65       302946     911035     58       302946     911035     58       302502     911136     26       302502     911136     26       302503     911136     26       302504     911037     67       302505     911037     67       302505     911037     67       302505     911037     67       302505     911037     67       302847     911056     55       302847     911056     65   |   | 1,444                                   | 1,384                                       | 1,444  | 11-19-04        | 341  | 2.45   |
| 302644     911212     28       302926     911126     52       302900     911056     65       302914     911124     45       302551     911124     45       302946     911035     58       302718     910839     47       302502     911136     26       302503     911136     26       302505     910806     45       302505     911037     67       302505     911037     67       302505     911037     67       302844     911037     67       302847     911056     55       302847     911056     65  |   |   |   |  | 7-14-05         | 343  | 2.44   |
| 302926     911126     52       302900     911056     65       302651     911124     45       302651     911124     45       302651     911124     45       302718     91035     58       302502     911136     26       302503     911136     26       302654     911035     55       302502     911117     55       302605     910806     45       302854     911037     67       302911     910916     55       302911     911017     55       302847     911056     67       302847     911056     65   |   | 1,900                                   | 1,768                                       | $1,900^{a}$                                    | 12-06-04        | 301  | 2.61   |
| 302926       911126       52         302900       911056       65         302651       911124       45         302051       911124       45         302051       911124       45         302052       911035       58         302502       911136       26         302503       910839       47         302504       910836       45         302505       910806       45         302265       910806       45         302854       91037       67         302916       910916       55         30291       911037       67         302847       910916       55         302847       911056       65  |   |   |   |  | 1-13-05         | 299  | 2.62   |
| 302926       911126       52         302900       911056       65         302651       911124       45         302651       911124       45         302718       911035       58         302502       911035       58         302502       911136       26         302505       910839       47         302505       910806       45         302505       910806       45         302854       91037       67         302906       910016       55         302847       910056       65  |   |   |   |  | 12-19-05        | 299  | 2.71   |
| 302926       911126         302900       911056         302651       911056         302511       911124         302946       911035         302718       910839         302502       911136         302502       911136         302505       911037         302654       911037         302205       911037         302844       911037         302847       911056  | >   | Wells screened in the "2,000-foot" sand | ne "2,000-foot"                             | sand   |                 |  |  |
| 302900       911056         302651       911124         302946       911035         302718       910839         302502       911136         302502       911117         302505       911037         302605       910806         302505       911037         302505       911037         302854       911037         3023854       911037         302847       911056   |   | 2,079                                   | 1,859                                       | 2,079  | 8-02-05         | 373  | 1.97   |
| 302651     911124       302946     911035       302718     910839       302502     911136       302505     911117       302605     911037       302854     911037       302847     911016       302847     911056  |   | 2,110                                   | 1,990                                       | 2,110  | 9-29-04         | 278  | 3.38   |
| 302946       911035         302718       911035         302502       911136         302925       911117         302605       910806         302854       911037         302854       911037         302847       911016         302847       911056  |   | 2,253                                   | 2,015                                       | $2,253^{\rm a}$                                | 9-03-04         | 1,030  | 205  |
| 302946       911035         302718       910839         302502       911136         302505       911117         302605       910806         302854       911037         302749       910916         302847       911056  |   |   |   |  | 12-08-04        | 1,000  | 185  |
| 302946       911035         302718       910839         302502       911136         302505       911117         302605       910806         302854       911037         302901       911016         302847       911056  |   |   |   |  | 4-13-05         | 780  | 125  |
| 302946       911035         302718       910839         302502       911136         302925       911117         302605       910806         302854       911037         302921       911037         302854       911037         302847       911016         302847       911056  |   |   |   |  | 11-17-05        | 1,100  | 245  |
| 302718     910839       302502     911136       302925     911117       302605     910806       302854     911037       302749     910916       302847     911056  |   | 2,059                                   | 1,915                                       | 2,059  | 9-29-04         | 282  | 3.46   |
| 302502       911136         302925       911117         302605       910806         302854       911037         302749       910916         302847       911056  |   | 2,143                                   | 2,033                                       | $2,143^{\mathrm{a}}$                           | 9-02-04         | 289  | 2.93   |
| 302502     911136       302925     911117       302605     910806       302854     911037       302749     910916       302901     911111       302847     911056  |   |   |   |  | 4-13-05         | 290  | 2.86   |
| 302925       911117         302605       910806         302854       911037         302749       910916         302847       9110156   |   | 2,675                                   | 2,670                                       | 2,675  | 12-01-04        | 3,440  | 755  |
| 302925     911117       302605     910806       302854     911037       302749     910916       302901     911111       302847     911056  |   |   |   |  | 11-14-05        | 3,310  | 759  |
| 302605     910806       302854     911037       302749     910916       302901     911111       302847     911056  |   | 2,150                                   | 1,913                                       | $2,150^{a}$                                    | 8-02-05         | 345  | 2.27   |
| 302854     911037       302749     910916       302901     911111       302847     911056  |   | 2,286                                   | 2,282                                       | 2,286  | 12-14-04        | 386  | 2.10   |
| 302854     911037       302749     910916       302901     911111       302847     911056  |   |   |   |  | 12-06-05        | 373  | 2.22   |
| 302749         910916           302901         911111           302847         911056  |   | 2,130                                   | 2,030                                       | 2,130  | 9-29-04         | 276  | 3.31   |
| 302901 911111<br>302847 911056   |   | 2,168                                   | 2,040                                       | 2,168  | 9-02-04         | 292  | 2.95   |
| 302901 911111<br>302847 911056   |   |   |   |  | 4-13-05         | 294  | 2.90   |
| 302847 911056  |   | 2,119                                   | 1,984                                       | 2,119  | 9-29-04         | 324  | 2.19   |
|  |   | 2,208                                   | 2,042                                       | $2,208^{a}$                                    | 9-29-04         | 295  | 2.86   |
|  | 911017 55   | 2,040                                   | 1,900                                       | $2,040^{a}$                                    | 9-29-04         | 287  | 3.50   |

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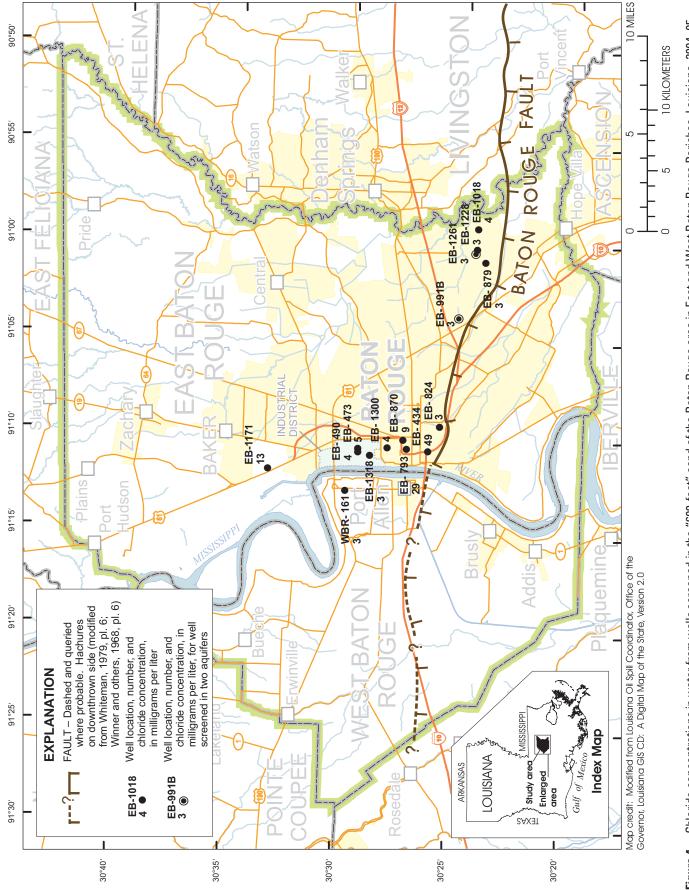
| Altitude of Altitude of Datitude of Altitude of D<br>Well Latitude Longitude land surface, Well depth, in feet in feet sc<br>number (NAD 27) (NAD 27) above in feet sc<br>NGVD 29 | Latitude<br>(NAD 27) | Longitude<br>(NAD 27) | Altitude of<br>land surface,<br>in feet<br>above<br>NGVD 29 | Well depth,<br>in feet                                    | Depth to<br>top of<br>screen(s),<br>in feet | Depth to<br>bottom of<br>screen(s),<br>in feet | Date<br>sampled | Specific<br>conductance, field,<br>in microsiemens<br>per centimeter<br>at 25° Celsius | Chloride<br>concentration,<br>in milligrams<br>per liter |
|---|----------------------|-----------------------|---|---|---|--|-----------------|--|--|
|   |                      |                       | Wells scr   | Wells screened in the "2,000-foot" sand—Continued         | 00-foot" sand—                              | -Continued                                     |                 |  |  |
| EB- 874   | 302750               | 911110                | 50  | 2,250   | 2,121                                       | 2,250a   | 9-03-04         | 372  | 2.19   |
|   |                      |                       |   |   |   |  | 12-08-04        | 377  | 2.23   |
|   |                      |                       |   |   |   |  | 4-13-05         | 415  | 2.14   |
|   |                      |                       |   |   |   |  | 5-10-05         | 420  | 2.11   |
|   |                      |                       |   |   |   |  | 6-16-05         | 424  | 2.1  |
|   |                      |                       |   |   |   |  | 11-17-05        | 348  | 2.17   |
| EB- 878   | 302721               | 910547                | 50  | 2,178   | 2,000                                       | $2,178^{\mathrm{a}}$                           | 9-02-04         | 289  | 2.93   |
| EB- 884   | 302904               | 911018                | 65  | 2,120   | 1,985                                       | 2,120  | 9-29-04         | 275  | 3.51   |
| EB- 962   | 302943               | 911023                | 60  | 2,066   | 1,916                                       | 2,066  | 9-29-04         | 286  | 3.46   |
| EB-1028   | 302605               | 911009                | 40  | 2,238   | 2,223                                       | 2,238  | 12-15-04        | 1,170  | 257  |
|   |                      |                       |   |   |   |  | 12-09-05        | 1,210  | 266  |
| EB-1150   | 302653               | 911037                | 57  | 2,242   | 2,186                                       | 2,242  | 9-02-04         | 904  | 167  |
|   |                      |                       |   |   |   |  | 12-08-04        | 927  | 164  |
|   |                      |                       |   |   |   |  | 12-29-05        | 914  | 167  |
| EB-1151   | 302930               | 911115                | 62  | 2,042   | 1,888                                       | $2,042^{a}$                                    | 8-02-05         | 336  | 2.44   |
| EB-1306   | 303234               | 910115                | 57  | 1,753   | 1,693                                       | 1,753  | 9-17-04         | 262  | 3.85   |
| EB-1313   | 302931               | 911110                | 65  | 2,080   | 1,885                                       | 2,080  | 8-02-05         | 304  | 3.10   |
| EB-1319   | 302108               | 905600                | 15  | 2,750   | 2,530                                       | $2,740^{a}$                                    | 9-17-04         | 438  | 7.85   |
|   |                      |                       |   |   |   |  | 12-21-05        | 464  | 7.87   |
| WBR- 102B   | 302806               | 911726                | 18  | 2,100   | 2,096                                       | 2,100  | 6-30-05         | 395  | 2.06   |
| WBR- 111  | 302550               | 911241                | 25  | 2,650   | 2,610                                       | 2,650  | 7-12-05         | 678  | 3.31   |
|   |                      |                       | Wells scree   | Wells screened in the "2,000-foot" and "2,400-foot" sands | -foot" and "2,40                            | 0-foot" sands                                  |                 |  |  |
| EB- 151   | 302641               | 910858                | 50  | 2,658   | 2,157                                       | $2,658^{a}$                                    | 9-02-04         | 347  | 2.43   |
|   |                      |                       |   |   |   |  | 12-17-04        | 343  | 2.44   |
|   |                      |                       |   |   |   |  | 4-13-05         | 350  | 2.41   |
|   |                      |                       |   |   |   |  | 11-17-05        | 333  | 2.41   |
| EB- 733   | 302647               | 910833                | 48  | 2,637   | 2,070                                       | $2,637^{\mathrm{a}}$                           | 9-04-04         | 354  | 2.53   |
|   |                      |                       |   |   |   |  | 12-17-04        | 349  | 2.49   |
|   |                      |                       |   |   |   |  | 4-13-05         | 358  | 2.47   |
| EB-1253   | 302652               | 911124                | 46  | 2,687   | 2,000                                       | $2,667^{a}$                                    | 9-03-04         | 424  | 2.82   |
|   |                      |                       |   |   |   |  | 12-08-04        | 438  | 2.83   |
|   |                      |                       |   |   |   |  | 11-17-05        | 401  | 3.06   |

| Image: Mark Sectorend in the "2,400-foot" send         Molk sectorend in the "2,400-foot" send                             | Well<br>number | Latitude<br>(NAD 27) | Longitude<br>(NAD 27) | Altitude of<br>land surface,<br>in feet<br>above<br>NGVD 29 | Well depth,<br>in feet | Depth to<br>top of<br>screen(s),<br>in feet | Depth to<br>bottom of<br>screen(s),<br>in feet | Date<br>sampled | Specific<br>conductance, field,<br>in microsiemens<br>per centimeter<br>at 25° Celsius | Chloride<br>concentration,<br>in milligrams<br>per liter |
|---|----------------|----------------------|-----------------------|---|------------------------|---|--|-----------------|--|--|
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$  |                |                      |                       | Ň   | ells screened in t     | he "2,400-foot" :                           | sand   |                 |  |  |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$   | EB-351         | 302937               | 911023                | 60  | 2,434                  | 2,358                                       | 2,434ª   | 9-29-04         | 323  | 2.80   |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$   | EB- 654        | 303021               | 910748                | 58  | 2,382                  | 2,270                                       | 2,382  | 9-02-04         | 286  | 3.48   |
| B         30301         91037         5         2.362         2.302         9.334           B         302428         91037         5         2.362         2.362         902-04         237           B         302439         910370         55         2.362         2.362         903-04         371           B         302439         91011         59         2.536         2.440         2.536         903-04         371           B         302644         910251         60         2.375         2.440         2.536         903-04         371           B         302644         910221         40         2.604         2.635         2.440         2.536         902-04         371           B         302643         910221         40         2.604         2.635         2.644         2.635         2.636         902-04         327           B         302643         910221         40         2.643         2.635         2.644         902-04         2.76           B         302643         910221         62         325         62-04         2.669         902-04         2.66           B         302643         910212         73<  | EB- 751        | 302716               | 910838                | 48  | 2,595                  | 2,495                                       | 2,595  | 9-02-04         | 330  | 2.56   |
| 303021         91073         55         2.362         2.250         2.362         9.02.04         285           8         302249         91111         59         2.562         2.762         121-04         71         11           302749         91111         59         2.536         2.440         2.536         9.02.04         285           302149         91011         59         2.535         2.440         2.536         9.02.04         285           10         30254         910756         56         2.440         2.536         9.02.04         380           1         302531         910756         56         2.440         2.536         9.02.04         371           1         302531         91023         45         2.604         417         9.02.04         317           1         302543         910141         40         2.697         2.697         9.02.04         410           2         302553         910141         40         2.591         2.413.05         9.17.04         2.23           2         302653         910141         40         2.697         2.697         9.02.04         410           302653  |                |                      |                       |   |                        |   |  | 4-13-05         | 334  | 2.54   |
| B         302428         910350         46 $2.762$ $2.738$ $2.762$ $12.13.04$ $721$ 11           302749         91111         59 $2.536$ $2.440$ $2.536$ $9.03.04$ $721$ $11$ 302749         91111         59 $2.535$ $2.440$ $2.565$ $9.03.04$ $377$ 1         302634         910221 $40$ $2.605$ $2.415$ $2.375$ $9.02.04$ $2.86$ 302537         910231 $41$ $2.605$ $2.745$ $2.605$ $9.02.04$ $2.86$ 302537         91023 $41$ $2.5605$ $2.605$ $2.734$ $9.12.06$ $3.25$ 1 $302537$ 91012 $41$ $2.5694$ $2.534$ $9.17.04$ $2.96$ 302647         91013 $51$ $2.534$ $2.6044$ $9.16.04$ $416$ 902647         91037 $57$ $2.694$ $9.17.04$ $2.96$ $4.20$ 902647         91037 $57$ $2.69$   | EB- 769        | 303021               | 910737                | 55  | 2,362                  | 2,250                                       | 2,362  | 9-02-04         | 285  | 3.69   |
| $ \begin{array}{c c c c c c c c c c c c c c c c c c c $   | EB- 804B       | 302428               | 910350                | 46  | 2,762                  | 2,758                                       | 2,762  | 12-13-04        | 721  | 111  |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$   |                |                      |                       |   |                        |   |  | 12-07-05        | 748  | 129  |
| $ \begin{array}{ c c c c c c c c c c c c c c c c c c c$   | EB- 813        | 302749               | 911111                | 59  | 2,536                  | 2,440                                       | 2,536  | 9-03-04         | 377  | 2.18   |
| $ \begin{array}{ c c c c c c c c c c c c c c c c c c c$   |                |                      |                       |   |                        |   |  | 4-13-05         | 380  | 2.04   |
| $ \begin{array}{ c c c c c c c c c c c c c c c c c c c$   | EB- 928        | 303018               | 910756                | 56  | 2,375                  | 2,305                                       | 2,375  | 9-02-04         | 286  | 3.51   |
| 0         302537         910328         45 $2,674$ $2,569$ $2,674$ $2,334$ $4,17$ $5:10.05$ $4,17$ 0         303424         911229         73         1,926         9.8.04 $4,17$ 0         303424         911229         73         1,926         9.2404         2.53           1         30543         910414         40         2.697         2.597         2.694         9.17.04         253           1         302553         911037         57         2.694         2.550         2.694         416           1         302553         911037         57         2.694         2.550         2.694         416           1         3025647         910830         51         2.555         2.694         416           1         3025647         910830         51         2.6625         2.555         2.694         341           1         3025647         910830         51         2.6024         2.413.05         342           2         302643         910114         47         2.420         2.625         9.02.04         341           302643         91011   | EB-1004        | 302634               | 910221                | 40  | 2,605                  | 2,415                                       | $2,605^{a}$                                    | 9-08-04         | 322  | 2.25   |
| $ \begin{array}{ c c c c c c c c c c c c c c c c c c c$   |                |                      |                       |   |                        |   |  | 4-13-05         | 325  | 2.30   |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$  | B-1025         | 302537               | 910328                | 45  | 2,674                  | 2,569                                       | 2,674  | 9-08-04         | 417  | 3.56   |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$   |                |                      |                       |   |                        |   |  | 5-10-05         | 418  | 4.01   |
| $ \begin{array}{ c c c c c c c c c c c c c c c c c c c$   | B-1027         | 303424               | 911229                | 73  | 1,926                  | 1,883                                       | 1,926  | 9-24-04         | 298  | 3.63   |
| $ \begin{array}{ c c c c c c c c c c c c c c c c c c c$   | B-1032         | 303034               | 910023                | 47  | 2,334                  | 2,248                                       | 2,334  | 9-17-04         | 252  | 3.61   |
| $ \begin{tabular}{ c c c c c c c c c c c c c c c c c c c$   | B-1039         | 302518               | 910414                | 40  | 2,697                  | 2,597                                       | 2,697  | 9-03-04         | 416  | 2.36   |
| 0         302653         911037         57         2,694         2,550         2,694         9-02-04         394           1         <  |                |                      |                       |   |                        |   |  | 4-13-05         | 420  | 2.41   |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$  | B-1149         | 302653               | 911037                | 57  | 2,694                  | 2,550                                       | $2,694^{a}$                                    | 9-02-04         | 394  | 2.27   |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$  |                |                      |                       |   |                        |   |  | 12-08-04        | 410  | 2.27   |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$  |                |                      |                       |   |                        |   |  | 4-13-05         | 397  | 2.27   |
| 0         302647         910830         51         2,625         2,535         2,625         9-02-04         344           1         1         1         1         1         1         1         1         348           1         302818         910114         47         2,570         2,420         2,570         9-03-04         348           00B         302643         911216         29         2,448         2,444         2,448         11-22-04         377           00B         302643         911216         29         2,448         11-22-04         377           010         1         1         2,448         2,444         2,448         11-22-04         377           010         1         1         2,448         11-22-04         377         11-16-05         375           010         1         1         1         2,448         11-22-04         375         375           010         1         1         1         2,448         11-16-05         375         375           010         1         1         1         1         1         1         1         1         1           1  |                |                      |                       |   |                        |   |  | 11-17-05        | 375  | 2.42   |
| 2         302818         910114         47         2,570         2,420         2,570         9-03-04         279           00B         302643         911216         29         2,448         2,444         2,448         11-22-04         377           00B         302643         911216         29         2,448         11-22-04         377           01         X         X         X         X         373         375           11-16-05         373         X         X         X         373           X         X         X         X         X         373           X         X         X         X         X         X         X           X         X         X         X         X         X         X         X           X         X         X         X         X         X         X         X         X           X         X         X         X         X         X         X         X         X         X           X         X         X         X         X         X         X         X         X         X           X         X  | B-1252         | 302647               | 910830                | 51  | 2,625                  | 2,535                                       | 2,625  | 9-02-04         | 344  | 2.52   |
| 0         302818         910114         47         2,570         2,420         2,570         9-03-04         279           00B         302643         911216         29         2,448         2,444         2,448         11-22-04         377           00B         302643         911216         29         2,448         2,444         2,448         377           01         N         N         N         N         377         375           02         N         N         N         2,448         1,22-04         377           1         N         N         N         N         1,200         903-05         375           1         N         N         N         2,400-foot" and "2,800-foot" saids         373           1         303158         910337         57         2,520         2,155         2,520*         9-17-04         277           1         303314         910935         60         2,405         1,965         2,405*         9-24-04         458   |                |                      |                       |   |                        |   |  | 4-13-05         | 348  | 2.46   |
| 00B         302643         911216         29         2,448         2,444         2,448         11-22-04         377           0.0         2         4         2,444         2,448         11-22-04         377           0.0         2         4         2,444         2,448         11-22-04         377           0.0         2         1         6-29-05         375         375           0.0         2         1         1         1         1         1         1           0.0         2         1         2,500-foot" and "2,800-foot" and "2,800-foot" and "2,800-foot" and "3         373         1 </td <td>B-1262</td> <td>302818</td> <td>910114</td> <td>47</td> <td>2,570</td> <td>2,420</td> <td>2,570</td> <td>9-03-04</td> <td>279</td> <td>3.51</td> | B-1262         | 302818               | 910114                | 47  | 2,570                  | 2,420                                       | 2,570  | 9-03-04         | 279  | 3.51   |
| Mells screened in the "2,400-foot" and "2,800-foot" sands         6-29-05         375           Nells screened in the "2,400-foot" and "2,800-foot" sands         373         373           303158         910337         57         2,520         2,155         2,520 <sup>a</sup> 9-17-04         277           30314         910935         60         2,405         1,965         2,405 <sup>a</sup> 9-24-04         458  | VBR- 100B      | 302643               | 911216                | 29  | 2,448                  | 2,444                                       | 2,448  | 11-22-04        | 377  | 4.65   |
| II-16-05     373       Wells screened in the "2,400-foot" and "2,800-foot" sands     303158       910337     57     2,520       2,30314     910935     60       2,405     1,965     2,405 <sup>a</sup> 9-24-04     458  |                |                      |                       |   |                        |   |  | 6-29-05         | 375  | 5.47   |
| Wells screened in the "2,400-foot" and "2,800-foot" saids           303158         910337         57         2,520         2,155         2,520 <sup>a</sup> 9-17-04         277           7         303314         910935         60         2,405         1,965         2,405 <sup>a</sup> 9-24-04         458   |                |                      |                       |   |                        |   |  | 11-16-05        | 373  | 6.00   |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$  |                |                      |                       | Wells scree   | ined in the "2,400     | -foot" and "2,80                            | 0-foot" sands                                  |                 |  |  |
| 303314 910935 60 2,405 1,965 2,405 <sup>a</sup> 9-24-04 458   | B- 995         | 303158               | 910337                | 57  | 2,520                  | 2,155                                       | $2,520^{a}$                                    | 9-17-04         | 277  | 4.72   |
|   | B-1187         | 303314               | 910935                | 60  | 2,405                  | 1,965                                       | $2,405^{a}$                                    | 9-24-04         | 458  | 2.98   |

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|----------------|----------------------|-----------------------|---|---|---|--|-----------------|--|--|
|                |                      |                       | W   | Wells screened in the "2,800-foot" sand | ne "2,800-foot" ;                           | sand   |                 |  |  |
| EB- 568        | 303332               | 910758                | 70  | 2,457                                   | 2,377                                       | 2,457  | 9-24-04         | 419  | 2.21   |
| EB- 623        | 303233               | 910349                | 60  | 2,652                                   | 2,560                                       | 2,652ª   | 9-17-04         | 736  | 12.8   |
| EB- 700        | 303130               | 910731                | 62  | 2,557                                   | 2,507                                       | 2,557  | 9-24-04         | 566  | 8.03   |
|                |                      |                       |   |   |   |  | 1-05-05         | 570  | 8.05   |
|                |                      |                       |   |   |   |  | 12-22-05        | 550  | 8.20   |
| EB- 723        | 303313               | 911202                | 71  | 2,512                                   | 2,402                                       | $2,512^{a}$                                    | 8-08-05         | 562  | 6.20   |
| EB- 730        | 303305               | 910800                | 60  | 2,461                                   | 2,395                                       | 2,461  | 9-24-04         | 500  | 2.31   |
| EB- 750        | 303141               | 911148                | 60  | 2,643                                   | 2,563                                       | 2,643  | 9-03-04         | 742  | 67.2   |
|                |                      |                       |   |   |   |  | 12-17-04        | 733  | 67.2   |
|                |                      |                       |   |   |   |  | 4-13-05         | 763  | 68.3   |
|                |                      |                       |   |   |   |  | 11-17-05        | 708  | 66.8   |
| EB- 798        | 303133               | 911031                | 60  | 2,647                                   | 2,524                                       | $2,647^{a}$                                    | 9-03-04         | 1,280  | 240  |
|                |                      |                       |   |   |   |  | 12-17-04        | 1,230  | 230  |
|                |                      |                       |   |   |   |  | 4-13-05         | 1,240  | 227  |
|                |                      |                       |   |   |   |  | 11-17-05        | 1,280  | 262  |
| EB- 830        | 303814               | 910409                | 06  | 2,190                                   | 2,075                                       | $2,190^{a}$                                    | 9-24-04         | 448  | 2.68   |
| EB- 859        | 303311               | 911048                | 70  | 2,440                                   | 2,340                                       | 2,440  | 9-30-04         | 470  | 2.51   |
| EB- 860        | 303311               | 911050                | 70  | 2,435                                   | 2,334                                       | 2,435  | 9-30-04         | 534  | 4.08   |
| EB- 922        | 303259               | 910658                | 66  | 2,600                                   | 1   | 1  | 9-24-04         | 569  | 3.83   |
| EB- 978        | 303341               | 911225                | 70  | 2,540                                   | 2,430                                       | 2,540  | 9-30-04         | 525  | 11.5   |
| EB-1268        | 303335               | 911237                | 70  | 2,504                                   | 2,335                                       | $2,500^{a}$                                    | 9-30-04         | 530  | 12.9   |
| EB-1292        | 303327               | 911145                | 70  | 2.420                                   | 2.340                                       | 2.420  | 9-30-04         | 484  | 3.23   |

Multiple screened intervals.



#### 16 Chloride Concentrations in Ground Water in East and West Baton Rouge Parishes

Saltwater movement north of the fault is affected by aquifer permeability, depressions or ridges in the base of the aquifer, and the slope of the base of the aquifer (Tomaszewski, 1996, p. 6). Hydraulic gradients, which are affected by withdrawals in the study area, also affect the direction and rate of saltwater movement. Because saltwater is denser than freshwater, saltwater encroaches into a freshwater aquifer as a wedge, and the leading edge moves along the base of the aquifer as a thin layer. Because largediameter production wells typically have screens that are several tens of feet long, water withdrawn from the well is a mixture of water entering the screen at various depths along the screen. When chloride concentrations at such wells exceed 10 mg/L, it probably is an indication that a thin layer of saltwater with a higher chloride concentration is present at the base of the aquifer, but is being mixed in the well with overlying freshwater that also is entering the screen.

Of the 152 wells sampled during 2004–05, chloride concentrations exceeded 10 mg/L in samples from 23 wells located north of the Baton Rouge fault, which indicated the possible presence of saltwater in 8 of the 10 aquifers. Comparison of the sample results with historical data indicated that chloride concentrations are increasing at wells north of the Baton Rouge fault in seven of the aquifers. Summaries of findings for each aquifer are presented in the following sections. Selected well data and chloride concentrations from the

sampled wells are presented in table 2. For the purposes of this report, the last chloride concentration measured from a well was used on maps when multiple samples had been collected from that well during the study.

### "400-Foot" Sand

Samples were collected from five wells located just north of the Baton Rouge fault, one well in the Baton Rouge industrial district, and one well south of the fault (fig. 1, table 2). Chloride concentrations at wells north of the fault did not exceed background concentrations, and no increase in chloride concentrations was indicated at the wells. The downthrown sands on the south side of the fault, which oppose the "400-foot" sand on the north side of the fault, mostly contain freshwater in East Baton Rouge Parish, and the only real threat of saltwater encroachment into the "400-foot" sand north of the fault is from upward migration of saltwater from the underlying "600-foot" sand (Whiteman, 1979, p. 36). A large-diameter well, EB-1298, located south of the fault in the southeast corner of East Baton Rouge Parish, was sampled and had a chloride concentration of 17.1 mg/L. No increase in chloride concentrations was indicated at well EB-1298.

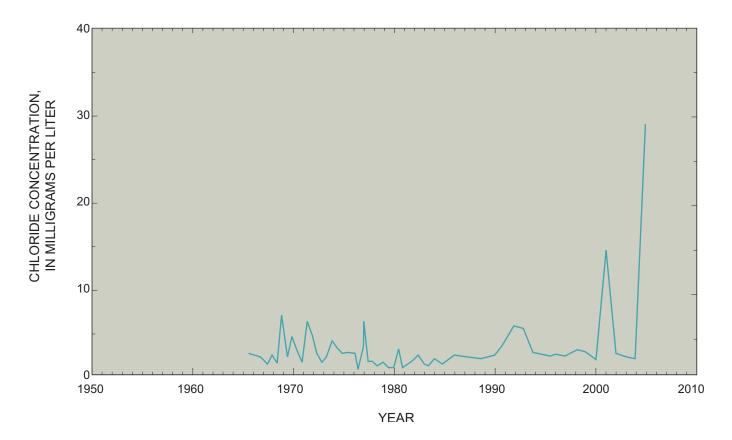


Figure 5. Chloride concentrations in water from well EB-793 screened in the "600-foot" sand of the Baton Rouge area, Louisiana (see fig. 4 for well location).

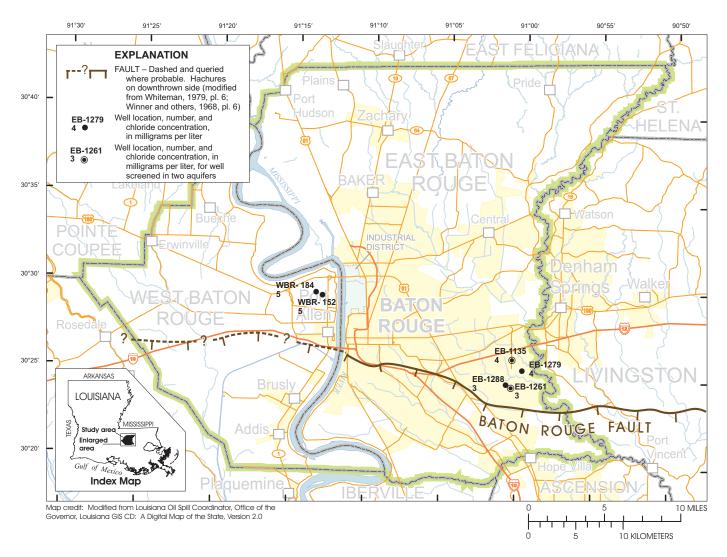


Figure 6. Chloride concentrations in water from wells screened in the "800-foot" sand of the Baton Rouge area in East and West Baton Rouge Parishes, Louisiana, 2004–05.

## "600-Foot" Sand

Samples were collected from 15 wells located north of the Baton Rouge fault. Chloride concentrations exceeded background concentrations at two wells, EB-434 (49.4 mg/L) and EB-793 (29.2 mg/L), located between the fault and the industrial district, and at well EB-1171, located north of the industrial district (fig. 4). Increasing chloride concentrations at well EB-793 (fig. 5), located at the leading edge of the saltwater defined by Whiteman (1979), could indicate northward advancement of saltwater toward the Baton Rouge industrial district.

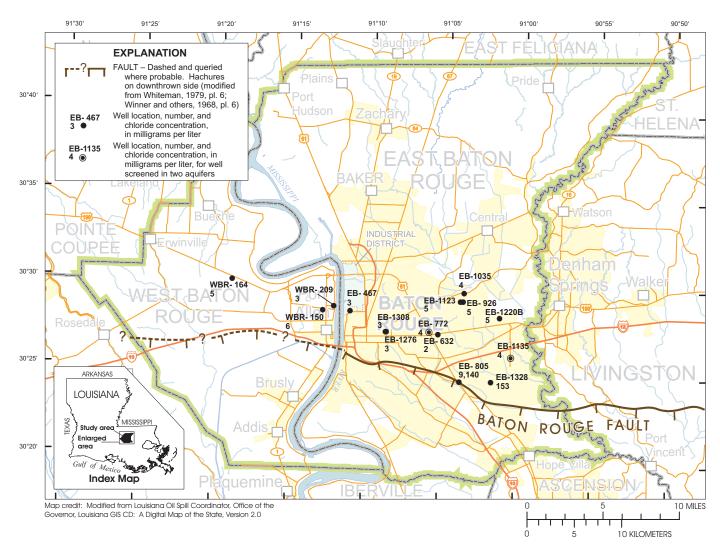
## "800-Foot" Sand

Samples were collected from two wells located near Port Allen, La., in West Baton Rouge Parish and four wells in southeastern East Baton Rouge Parish. Chloride concentrations did not exceed background concentrations at any sampled wells (fig. 6, table 2). No increase in chloride concentrations was indicated.

## "1,000-Foot" Sand

Chloride concentrations at 13 of 15 sampled wells did not exceed background concentrations (fig. 7, table 2). The chloride concentration at well EB-805, located just north of the Baton Rouge fault, was 9,140 mg/L, the highest chloride concentration determined during the study. Chloride concentrations at well EB-805 have increased continuously since 1965, indicating saltwater leakage across the fault (fig. 8). Chloride concentrations at well EB-1328, located about 2.5 mi east of well EB-805, were as high as 222 mg/L (table 2).

#### 18 Chloride Concentrations in Ground Water in East and West Baton Rouge Parishes



**Figure 7.** Chloride concentrations in water from wells screened in the "1,000-foot" sand of the Baton Rouge area in East and West Baton Rouge Parishes, Louisiana, 2004–05.



**Figure 8.** Chloride concentrations in water from well EB-805 screened in the "1,000-foot" sand of the Baton Rouge area, Louisiana (see fig. 7 for well location).

### "1,200-Foot" Sand

Chloride concentrations at 24 of 26 sampled wells did not exceed background concentrations (fig. 9, table 2). Chloride concentration at well EB-629, located north of the industrial district, was 12.1 mg/L. Chloride concentrations at well EB-621, located just north of the Baton Rouge fault, have exceeded background concentrations since the late 1970's, but had not exceeded 60 mg/L until 2004. Chloride concentrations at the well increased to more than 150 mg/L in 2005 (fig. 10). The increase in chloride concentrations at well EB-621 indicates continued saltwater leakage across the fault in the "1,200-foot" sand.

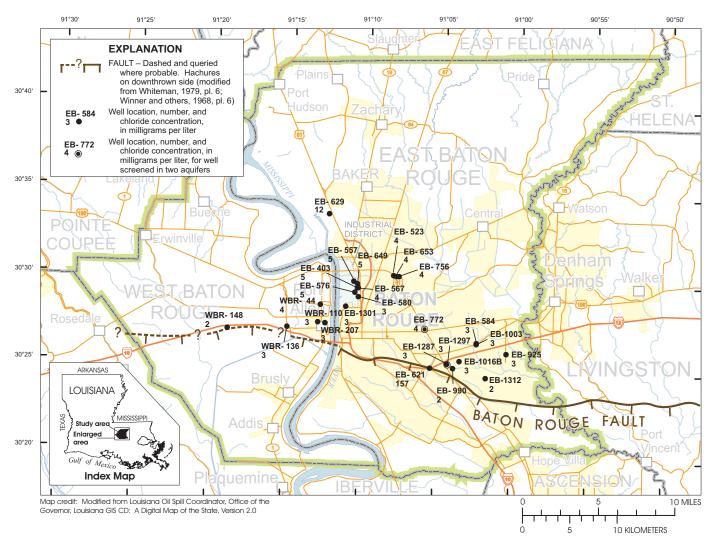
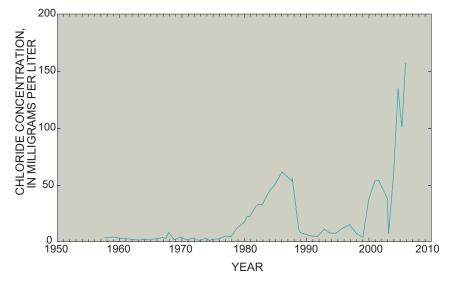


Figure 9. Chloride concentrations in water from wells screened in the "1,200-foot" sand of the Baton Rouge area in East and West Baton Rouge Parishes, Louisiana, 2004–05.



**Figure 10.** Chloride concentrations in water from well EB-621 screened in the "1,200-foot" sand of the Baton Rouge area, Louisiana (see fig. 9 for well location).

### "1,500-Foot" Sand

Chloride concentrations at 11 of 21 sampled wells exceeded background concentrations (fig. 11, table 2). In East Baton Rouge Parish, chloride concentrations exceeded background concentrations at wells EB-413, EB-510, EB-658, EB-917, EB-918, EB-938, and EB-1295C. Chloride concentrations at wells EB-917 and EB-918, located just north of the Baton Rouge fault, have continued to increase and currently (2004-05) are at 64.8 and 1,010 mg/L (fig. 12). Chloride concentrations also have increased at wells EB-413 (14.8 mg/L), EB-771 (9.14 mg/L), EB-510 (11.2 mg/L), and EB-658 (55.8 mg/L), indicating that saltwater is moving northward (figs. 13 and 14). Well EB-1295C is

#### 20 Chloride Concentrations in Ground Water in East and West Baton Rouge Parishes

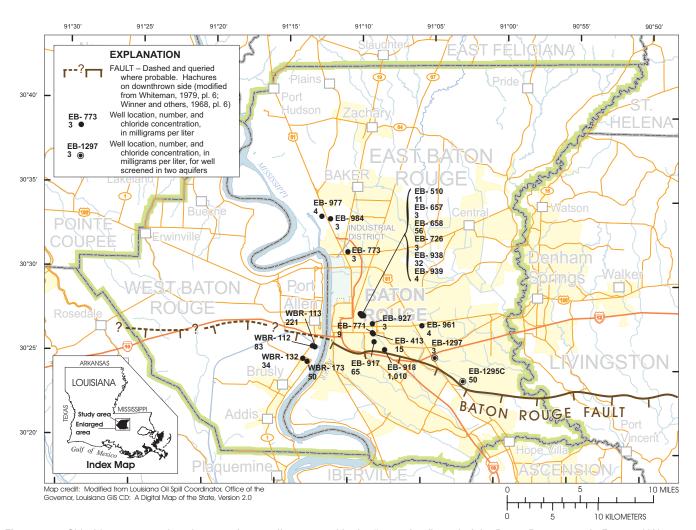
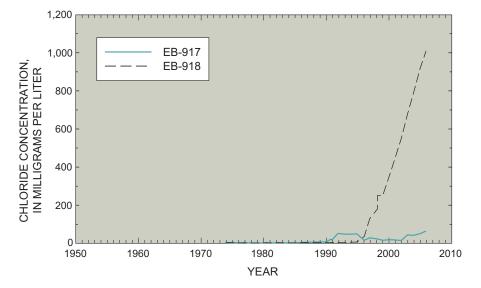


Figure 11. Chloride concentrations in water from wells screened in the "1,500-foot" sand of the Baton Rouge area in East and West Baton Rouge Parishes, Louisiana, 2004–05.



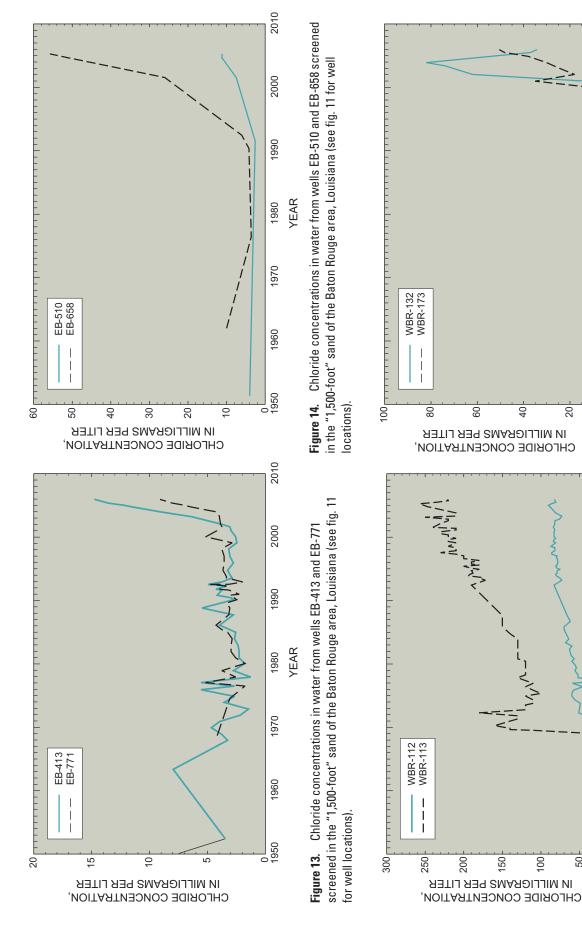
**Figure 12.** Chloride concentrations in water from wells EB-917 and EB-918 screened in the "1,500-foot" sand of the Baton Rouge area, Louisiana (see fig. 11 for well locations).

screened in both the "1,500-foot" sand and the deeper "1,700-foot" sand, and it is not known which aquifer is the source of the saltwater at the well.

Tomaszewski (1998) documented an area in West Baton Rouge Parish where the "1,500-foot" sand locally contains freshwater south of the fault. Chloride concentrations have increased at all four wells sampled in the area (figs. 15 and 16). Saltwater may be encroaching toward the wells from the surrounding saltwater areas (Tomaszewski, 1998, p. 13).

## "1,700-Foot" Sand

Chloride concentrations at seven of eight sampled wells did not exceed background concentrations (fig. 17,



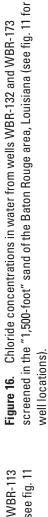


Figure 15. Chloride concentrations in water from wells WBR-112 and WBR-113 screened in the "1,500-foot" sand of the Baton Rouge area, Louisiana (see fig. 11 for well locations).

**Chloride Concentrations** 

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YEAR

#### 22 Chloride Concentrations in Ground Water in East and West Baton Rouge Parishes

table 2). The chloride concentration was 50.3 mg/L at well EB-1295C, which is screened in both the "1,500-foot" and "1,700-foot" sands. It is not known which aquifer is the source of the saltwater at the well, and historical data for the well are insufficient to determine whether chloride concentrations at the well are changing over time.

## "2,000-Foot" Sand

Samples were collected from 25 wells located north of the Baton Rouge fault and 3 wells located south of the fault (fig. 18, table 2). North of the fault, chloride concentrations exceeded background concentrations at three wells, EB-630, EB-1028, and EB-1150, located between the fault and the industrial district. Chloride concentrations at the wells exceeded 100 mg/L and have increased (fig. 19). Movement of saltwater in the "2,000-foot" sand toward withdrawal centers in the industrial district was documented by Tomaszewski (1996). The chloride concentration at well EB-783B, located



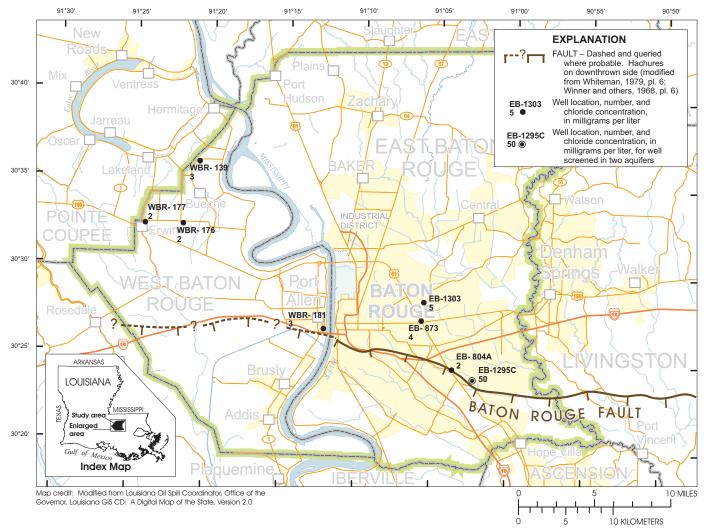
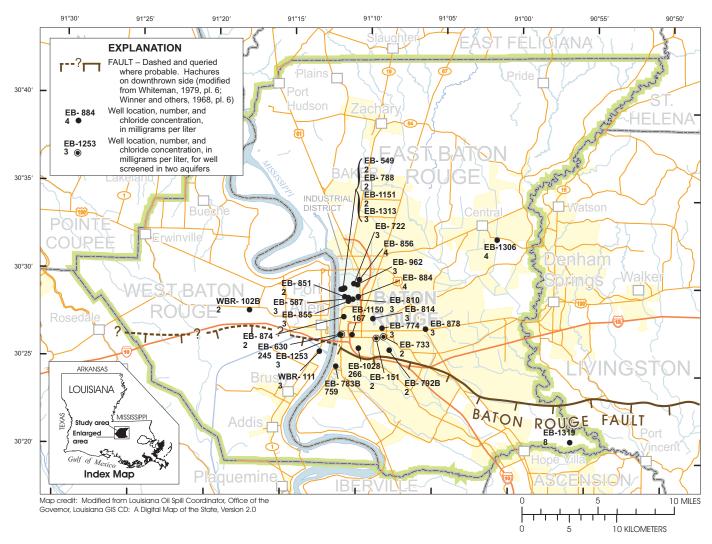
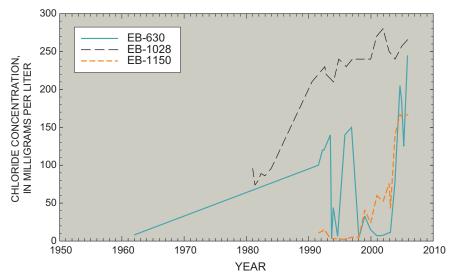


Figure 17. Chloride concentrations in water from wells screened in the "1,700-foot" sand of the Baton Rouge area in East and West Baton Rouge Parishes, Louisiana, 2004–05.



**Figure 18.** Chloride concentrations in water from wells screened in the "2,000-foot" sand of the Baton Rouge area in East and West Baton Rouge Parishes, Louisiana, 2004–05.



**Figure 19.** Chloride concentrations in water from wells EB-630, EB-1028, and EB-1150 screened in the "2,000-foot" sand of the Baton Rouge area, Louisiana (see fig. 18 for well locations).

about 2 mi south of well EB-630 and south of the Baton Rouge fault, was 759 mg/L.

## "2,400-Foot" Sand

Chloride concentrations at 20 of 21 sampled wells did not exceed background concentrations (fig. 20, table 2). Chloride concentrations at well EB-804B, located just north of the Baton Rouge fault in south-central East Baton Rouge Parish, exceeded 100 mg/L and have increased since about 1993, indicating that saltwater is moving across the fault in that area (fig. 21).

#### 24 Chloride Concentrations in Ground Water in East and West Baton Rouge Parishes

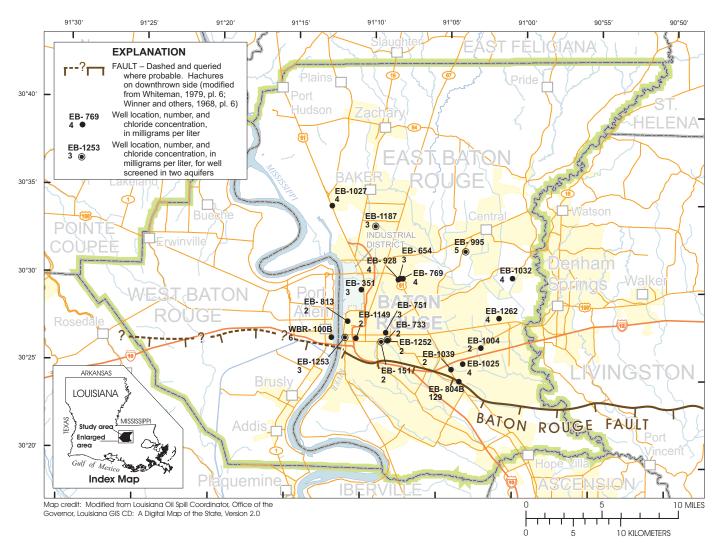
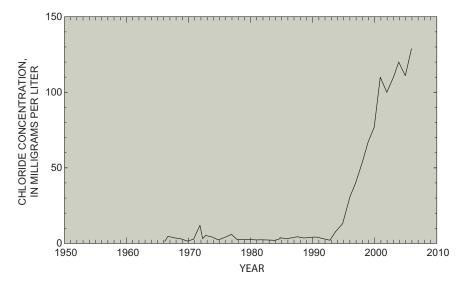


Figure 20. Chloride concentrations in water from wells screened in the "2,400-foot" sand of the Baton Rouge area in East and West Baton Rouge Parishes, Louisiana, 2004–05.



**Figure 21.** Chloride concentrations in water from well EB-804B screened in the "2,400-foot" sand of the Baton Rouge area, Louisiana (see fig. 20 for well location).

### "2,800-Foot" Sand

Wells screened in the "2,800foot" sand generally are located in the northern half of East Baton Rouge Parish because the "2,800foot" sand contains saltwater from the Baton Rouge fault to about 2 mi north of the fault. A zone of transition from saltwater to freshwater farther extends from about 2 to 7 mi north of the fault and ends just north of the Baton Rouge industrial district (Tomaszewski, 1996, p. 27). Chloride concentrations at 11 of 16 sampled wells located north of the transition zone did not exceed background

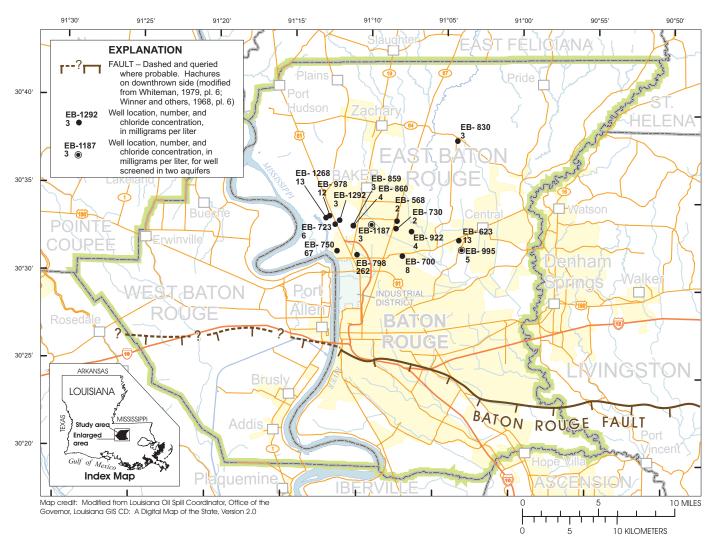
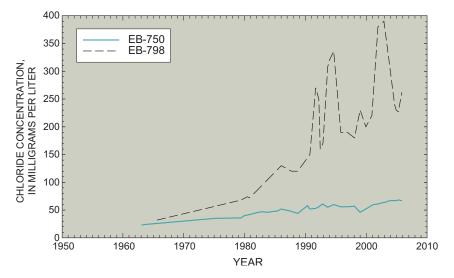


Figure 22. Chloride concentrations in water from wells screened in the "2,800-foot" sand of the Baton Rouge area in East and West Baton Rouge Parishes, Louisiana, 2004–05.



**Figure 23.** Chloride concentrations in water from wells EB-750 and EB-798 screened in the "2,800-foot" sand of the Baton Rouge area, Louisiana (see fig. 22 for well locations).

concentrations (fig. 22, table 2). Chloride concentrations at wells EB-623. EB-978, and EB-1268 ranged from 11.5 to 12.9 mg/L. Chloride concentrations at two of the southernmost wells, EB-750 and EB-798, were greater than background concentrations (67.2 and 262 mg/L) and increasing (fig. 23). Because these wells are located within the freshwater-saltwater transition zone (Tomaszewski, 1996, p. 29), the increasing chloride concentrations could be due to upconing of saltwater from the base and do not necessarily indicate that saltwater in the "2,800foot" sand is moving northward in the area.

## Summary

Increasing chloride concentrations are a threat to fresh ground-water sources in East and West Baton Rouge Parishes, Louisiana. Large withdrawals at Baton Rouge have lowered water levels and altered flow patterns in most of the 10 aquifers that underlie the area. Prior to development, freshwater flowed southward to the Baton Rouge fault, an east-west trending growth fault that extends through Baton Rouge and across southeastern Louisiana. Aquifers south of the fault generally contain saltwater. Ground-water withdrawals north of the fault have created gradients favorable for the movement of saltwater from south of the fault into freshwater areas north of the fault.

By 1992, saltwater encroachment had been documented in the "600-foot," "800-foot," "1,000-foot," "1,500-foot," and "2,000-foot" sands underlying East and West Baton Rouge Parishes. The presence of saltwater, but not encroachment, also had been documented in the "400-foot, "1,200-foot," and "2,800-foot" sands north of the Baton Rouge fault. Data collected from 1993 to 2003 from wells on a chloridemonitoring network indicate concentrations of chloride have increased in wells in the "1,000-foot," "1,500-foot," "2,000foot," "2,400-foot," and "2,800-foot" sands in East and West Baton Rouge Parishes.

Water samples were collected from 152 wells during 2004–05 to document chloride concentrations in aquifers underlying East and West Baton Rouge Parishes. Chloride concentrations exceeded 10 mg/L (milligrams per liter) in samples from 23 wells located north of the Baton Rouge fault and indicated the possible presence of saltwater in 8 of the 10 aquifers. Comparison of the sample results with historical data indicated that chloride concentrations are increasing at wells north of the Baton Rouge fault in seven of the aquifers.

Chloride concentrations at wells screened in the "400-foot" sand north of the Baton Rouge fault did not exceed background concentrations and no increase in chloride concentrations was indicated at the wells. A large-diameter well, EB-1298, screened in the "400-foot" sand south of the fault in the southeast corner of East Baton Rouge Parish, was sampled and had a chloride concentration of 17.1 mg/L. No increase in chloride concentrations was indicated at well EB-1298.

Chloride concentrations exceeded background concentrations at two wells, EB-434 (49.4 mg/L) and EB-793 (29.2 mg/L), screened in the "600-foot" sand and located between the fault and the industrial district, and at one well located north of the industrial district. Increasing chloride concentrations at well EB-793 could indicate northward advancement of saltwater toward the Baton Rouge industrial district.

The chloride concentration at well EB-805, screened in the "1,000-foot" sand and located just north of the Baton Rouge fault, was 9,140 mg/L, the highest chloride concentration determined during the study. Chloride concentrations at well EB-805 have increased continuously since 1965, indicating saltwater leakage across the fault. Chloride concentrations at well EB-1328, located about 2.5 miles east of well EB-805, were as high as 222 mg/L.

Chloride concentrations at well EB-621, located just north of the Baton Rouge fault, have exceeded background concentrations since the late 1970's, but had not exceeded 60 mg/L until 2004. Chloride concentrations at the well increased to more than 150 mg/L in 2005. The increase in chloride concentrations at well EB-621 indicates continued saltwater leakage across the fault in the "1,200-foot" sand.

Chloride concentrations at 11 of 21 sampled wells screened in the "1,500-foot" sand exceeded background concentrations. Chloride concentrations at wells EB-917 and EB-918, located just north of the Baton Rouge fault, have continued to increase and currently (2004–05) are at 65 and 1,010 mg/L. Chloride concentrations also have increased at wells EB-413 (14.8 mg/L), EB-771 (9.14 mg/L), EB-510 (11.2 mg/L), and EB-658 (55.8 mg/L), indicating that saltwater is moving northward in the "1,500-foot" sand. Chloride concentrations also increased in four wells sampled south of the fault in West Baton Rouge Parish in the area where the "1,500-foot" sand locally contains freshwater south of the fault.

Chloride concentrations in the "2,000-foot" sand exceeded background concentrations at three wells, EB-630, EB-1028, and EB-1150, located between the fault and the industrial district. Chloride concentrations at the wells exceeded 100 mg/L and have increased. Saltwater in the "2,000-foot" sand is moving toward withdrawal centers in the industrial district.

Chloride concentrations at well EB-804B, screened in the "2,400-foot" sand and located just north of the Baton Rouge fault in south-central East Baton Rouge Parish, exceeded 100 mg/L. Chloride concentrations at the well have increased since about 1993, indicating that saltwater is moving across the fault in that area.

Wells screened in the "2,800-foot" sand generally are located in the northern half of East Baton Rouge Parish because the "2,800-foot" sand contains saltwater from the Baton Rouge fault to about 2 miles north of the fault. A zone of transition from saltwater to freshwater farther extends from about 2 to 7 miles north of the fault and ends just north of the Baton Rouge industrial district. Chloride concentrations at two of the southernmost wells, EB-750 and EB-798, were greater than background concentrations (67.2 and 262 mg/L) and increasing. Because these wells are located within the freshwater-saltwater transition zone, the increasing chloride concentrations could be due to upconing of saltwater from the base and do not necessarily indicate that saltwater in the "2,800-foot" sand is moving northward in the area.

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