EVALUATION OF PUMPAGE DATA FURNISHED BY SELECTED PUBLIC WATER SUPPLIERS IN ARKANSAS, MAY 1990 THROUGH MARCH 1991

by Terrance W. Holland and Nancy T. Baker

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CONVERSION FACTORS

Multiply	By	To obtain
inch (in.)	2.54	millimeter
mile (mi)	1.609	kilometer
gallon (gal)	3.785	liter
gallon per minute (gal/min)	0.06308	liter per second
gallon per day (gal/d)	0.003785	cubic meter per day
million gallons per day (Mgal/d)	0.04381	cubic meter per second
acre-foot (acre-ft)	1,233	cubic meter

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ABSTRACT

Comparisons between water pumpage calculated from noninvasive pipeflow measurements and pump running times, and pumpage reported to the Arkansas Soil and Water Conservation Commission (ASWCC) and the Arkansas Department of Health reveal variation between measured and reported data. Less variation exists between pumpage calculated from noninvasive pipeflow measurements and amounts calculated from inline measurements. Variation in reporting accuracy among water-supply facilities is to be expected. Each facility has a different level of capability to determine the amount of water it withdraws. However, at some facilities that are equipped with inline flowmeters there are significant differences between measured and reported pumpage. The average percent difference between pumpage measured by noninvasive flowmeter and that reported to the ASWCC is about 26 percent.

Variation between measured and reported pumpage ranged from -253.6 percent to 85.4 percent. Variation between pumpage measured by noninvasive flowmeter and inline flowmeter ranged from -125.4 percent to 90.2 percent. Overall there was significantly less variation between pumpage measured by noninvasive and inline meters.

Percent differences between pumpage measured by noninvasive flowmeter and reported to the ASWCC were the smallest for facilities serving fewer than 500 people, and largest for facilities serving between 500-900 people. Percent differences between pumpage measured by noninvasive flowmeter and reported by facilities were lower for those facilities that reported to both agencies than for those facilities that reported only to the ASWCC.

INTRODUCTION

Site-specific public-supply data are available for most states where permits are required or where water-use reporting is mandatory. However, little is known about the accuracy of the reported data and few studies have assessed the accuracy of water-use information reported by individual public-supply facilities. As competition for water resources increases, so does the demand for accurate water-use information. Accurate and reliable public-supply data are essential for defining existing problems and anticipating future water needs. Because the accuracy of these data are not known, the Arkansas Soil and Water Conservation Commission (ASWCC) and the U.S. Geological Survey (USGS) are working cooperatively to evaluate water-use information reported by public suppliers.

Background

Public-supplied water includes water withdrawn by public or private water suppliers and delivered to groups of users. Public suppliers provide water for a variety of uses, such as domestic, commercial, thermoelectric power, industrial, and public water use (Solley and others, 1988, p. 10). Public supply also is referred to as municipal water supply, public water supply, or water supply.

In Arkansas, public-supply facilities are required to obtain a permit from the Arkansas Department of Health (ADH), and to report the amount of water used to the ASWCC. In accordance with the public Drinking Water Regulations, enacted in the early 1930's (H. Seifert, Arkansas Department of Health, oral commun., 1992), the ADH require reporting of municipal water use. According to ADH, a municipal supplier must serve either 15 people annually or 25 people 60 days per year. Monthly municipal water-use reports include daily pumpage, chemical treatment, type of treatment, population served, and other information. These data are used by ADH for several purposes: monitoring chemical treatment of municipal waters, evaluation of consumption rates, and notification of facilities when they withdraw water in excess of 80 percent of the plant's peak capacity.

Arkansas Act 180 of 1969 requires the diversions of water from streams, lakes, and ponds (except natural lakes owned by individuals) to be reported annually to ASWCC. This report must include the amount, the purpose, and the location of the use. The purpose of reporting surface-water diversions is to provide data to the ASWCC for water- resources planning and management. Act 1051 of 1985, as amended by Act 460 of 1987, requires the reporting of all water withdrawals of ground water, except water withdrawals exclusively for domestic use or from wells that have a potential yield of less than 50,000 gallons per day. The ASWCC uses this information inconjunction with the surface-water diversion data to determine the requirements of all water users of the State. These data also are evaluated in the State Water Plan to project future water needs.

During 1989, 697 Arkansas water-supply facilities were listed in the U.S. Geological Survey Site-Specific Water Use Data System (SSWUDS) (Baker and others, 1991). Of those facilities, 507 withdrew their water from a ground- or surface-water source (the other 190 facilities purchase their water). Of the 507 facilities, 435 withdraw from ground-water sources and 72 withdraw from surface-water sources. Facilities withdrawing from ground-water sources serve a population of 0.9 million, while those withdrawing from surface-water sources serve about 1.1 million (Baker and others, 1991).

In 1990, a study was begun by the USGS, in cooperation with the Arkansas Soil and Water Conservation Commission, to assess the accuracy of these reported pumpage data. The objective of the study was to evaluate the accuracy of reported water-use data. This information will be used to refine water-resources planning and management needs.

Purpose and Scope

This report describes an analysis of the accuracy of pumpage data reported by selected public and private water suppliers in Arkansas. Water withdrawals reported to ASWCC and ADH are compared with calculated withdrawals using two types of noninvasive flowmeters and pump operation times. Other analyses included comparisons of (1) data from noninvasive flowmeters with data from inline flowmeters, (2) data reported to ASWCC with data reported to ADH, and (3) data by population group.

The study area includes the entire State of Arkansas (fig. 1). Data were collected during 1990-91 for 41 selected facilities that met criteria for selection as a study site. Selected study sites represented about 10 percent of the facilities that meet the selection criteria.

Acknowledgments

The authors express appreciation to personnel associated with those public supply facilities that participated in the study. Appreciation is also extended to Mr. Harold Seifert, Director, Division of Engineering, Arkansas Department of Health, for providing water-withdrawal information for those public suppliers that reported water withdrawals to the ADH, and to the Arkansas Soil and Water Conservation Commission for providing water withdrawal information for those public suppliers that reported to the ASWCC. Appreciation is extended to Dr. Kenneth F. Steele, Director, Arkansas Water Resources Research Center, and Dr. James Dunn and Dr. Ronald McNew of the Agricultural Statistics Laboratory, University of Arkansas, for reviewing the project proposal and making suggestions for determining sampling population.

Figure 1.--Location of Arkansas public water supplies selected for this study.

DATA-COLLECTION PROCEDURE

The absolute accuracy of measured or reported pumpage data is difficult to assess. All methods of measuring total water withdrawals require either obtaining an instantaneous pipeflow measurement and a measure of pump running times during the period of interest, or using an accumulative flowmeter, which records each gallon of water that passes the meter. If an instantaneous flow measurement is made, flow rates must not fluctuate substantially during the period of interest for an accurate estimate of total water withdrawals to be obtained. Even when an accumulative inline flowmeter is available, it is difficult to know the condition of the flowmeter. Mineral buildup or corrosion on the meter can decrease its accuracy.

It is significantly more difficult to assess the accuracy of reported pumpage data. Reported data are often derived from various sources, and each facility may use a different procedure to obtain water-use volumes. Some facilities calculate monthly water withdrawals from inline flowmeter readings. Others estimate water withdrawals based upon the amount of water sold to customers. Some facilities multiply an average daily volume by the number of customers served by that facility. Many facilities estimate a total annual withdrawal and divide by 12 to obtain monthly water withdrawals.

Measured and reported pumpage data were collected between May 1990 and March 1991 for 41 selected public-supply facilities. A few facilities required additional site visits to obtain the required number of measurements. Instantaneous pipe-flow measurements (using a noninvasive flowmeter) were made and pump operation times were recorded monthly at most of the sites. Measured data were compiled and monthly water-use volumes were computed for comparison with monthly reported data.

Facility Selection

Of the 507 facilities cited above, 423 facilities met criteria for selection as a potential study site. These criteria included: (1) the facility furnishes water to at least 25 people, (2) the facility must have a minimum of 15 hookups, and (3) the facility must withdraw the majority of the water used by the population, rather than purchase the majority of water used (some facilities withdraw water only as a backup to purchased water).

Approximately 10 percent of the 423 facilities were selected for the investigation. Potential sites were selected by first arranging the 423 facilities into four groups based on the population served by each facility. Population ranges for each group include facilities serving (1) fewer than 500 people, (2) between 500 and 900 people, (3) between 901 and 3,000 people, and (4) more than 3,000 people. Initially 11 facilities were selected randomly from each population group. Through the course of the investigation three facilities were eliminated from the study. Additional facilities were not added because of the brief time frame available for data collection and because, even with the loss of three facilities, an approximate 10 percent sample was maintained. Only one of the facilities included in the investigation reported water withdrawals to neither the ASWCC nor the ADH.

Instrumentation

Pipeflow measurements were made with portable, noninvasive pipe flowmeters. Two types of meters were used during the course of the investigation--the Cross Correlation flowmeter and the Polysonics flowmeter[1]. The measurement situation at each particular site determined the type of meter used. In most cases, the same type of meter was used for each site throughout the investigation.

[1] Use of trade names in this report is for identification purposes only and does not constitute endorsement by the U.S. Geological Survey.

The Cross Correlation flowmeter is a "time-of-flight" instrument that measures the time it takes a fluid to move from one position in the pipe to a second position downstream (E.H. Cordes, U.S. Geological Survey, written commun., 1989). The Cross Correlation flowmeter works well in situations where disturbances occur in the flow (generally caused by an elbow, pipe seam, or flange, or where flow velocities are rapid enough to create turbulence).

The Polysonics flowmeter is a reflective-doppler type flowmeter that uses a continuous, ultrasonic signal transmitted from a stationary transducer to a particle in the stream (in some cases an air bubble). A receiving transducer detects the frequency shifts of the reflected signal. The frequency shifts are then processed to determine the velocity of the fluid (Arvin, 1992). The Polysonics flowmeter works best for flows that contain some particulate matter (as in untreated water).

Although it is difficult to assess the accuracy of measured data, success has been reported by Arvin (1992) in the performance of two types of noninvasive flowmeters for measuring flow in closed systems. A noninvasive flowmeter is an instrument that can measure the flow of a fluid through a pipe without having to come in direct contact with the fluid. Arvin found that the "time-of-flight" type flowmeter had a mean log-percent difference from inline measurements of 7.5 and a standard deviation of 3.7. The reflective-doppler type meter had a mean log-percent difference from inline measurements of -14 and a standard deviation of 18. Noninvasive flow measurements made by a time-of-flight type flowmeter and the Hydra flowmeter (a reflective-doppler type flowmeter) are related to inline flow measurements in figure 2. Measurements made with the noninvasive flowmeters provide data to which reported data from one or more sources can be compared.

Following the reconnaissance visits, data were collected approximately every month until at least six valid measurements were obtained at each facility. During the site visit, noninvasive pipeflow measurements were made to obtain an instantaneous flow for each primary withdrawal site. Accumulative pump operation times were recorded, and inline pipeflow measurements were recorded for those sites where these flowmeters were available. The ability to collect the required number of measurements was affected by variable conditions at each facility. These conditions include (1) the layout of the flow distribution system, (2) the water storage capacity of the facility (which determines the frequency of pump operation), and (3) the availability of plant personnel. Variability in any of these conditions limits the ability to make a flow measurement at the facility during the monthly site visit.

Data Collection

Reconnaissance visits were made to each public-supply facility selected for the investigation to: (1) obtain permission from the water superintendent to collect the necessary data, (2) gain access to the well or intake structure, (3) evaluate the measuring conditions at each site, (4) locate the electric meter associated with each pumping plant or determine a suitable location for installation of time totalizers (instruments to measure pump running times), and (5) document pertinent information about the pump and electric meter.

Accumulative pump running times were obtained from the electric meter associated with a particular pumping plant, vibration time totalizer, or from log books maintained by the plant operator. Most of the pumping plants in the study have an individual electric watt-hour meter connected to the pump. The watt-hour meter records the energy consumption of the pump. Pumping times were calculated by the following equation (Hurr and Litke, 1989):

$$t\ (\text{hours}) = \text{energy (kilowatt hours)/power (kilowatts)} \quad (1)$$

To apply this equation, energy consumption (recorded from watt-hour meters) and power demand (the rate of energy consumption) were determined and recorded. Vibration time totalizers were placed on pumps where watt-hour meters were connected to more than one pump or to lights, chlorinators, and outlets. The vibration time totalizer is activated by the vibration of the pump and keeps a cumulative total of pump operation time. Many plant operators keep a chronological log of pump operations by recording each time the pump is turned on and off. If the plant operator kept a log book, entries were recorded during the site visit.

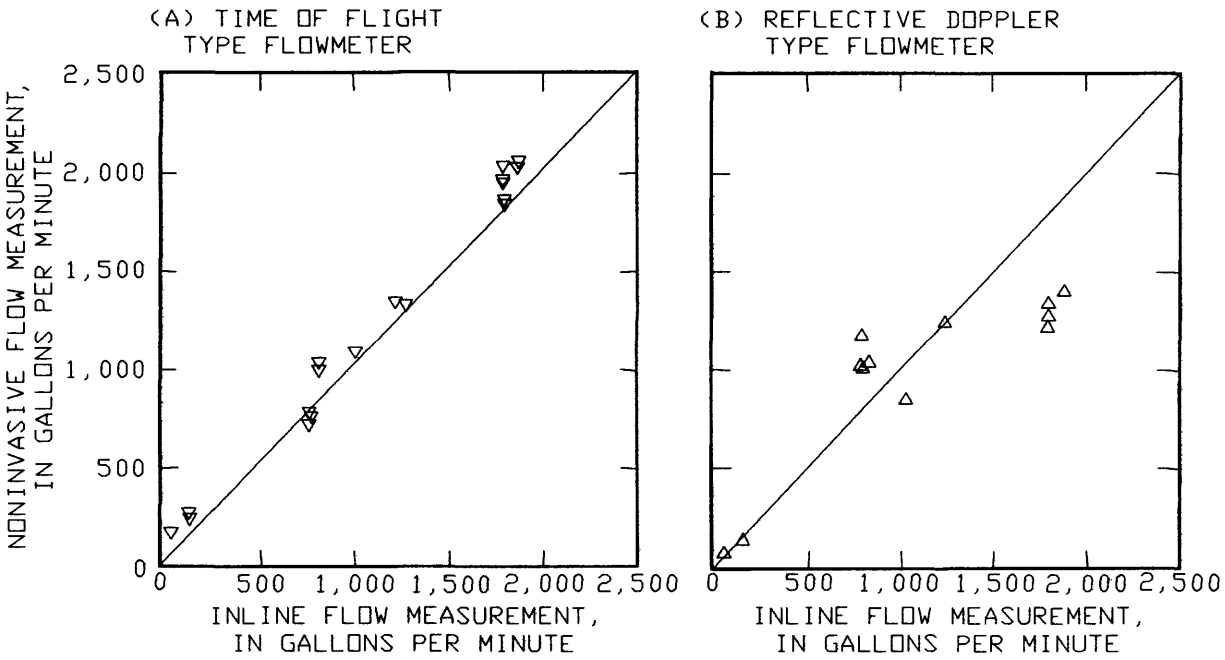

Figure 2.--Relation of noninvasive flow measurement by (A) a time of flight type flowmeter, and (B) a reflective doppler type flowmeter to inline measurement. Source: Arvin, 1992.

A general description of each measurement site and some of the ancillary data collected are provided in table 1 at the end of the report. In this table, an evaluation of the measuring conditions at each site is given in the "Measurement condition rating" in terms of good, fair, or poor. Sites were classified as having good measuring conditions based on the availability of a sufficient length of unrestricted pipe to make flow measurements. Sites rated fair or poor are described in greater detail with respect to measurement problems in the "Comments" section. At most sites, the reflective-doppler type flowmeter was used because of limited lengths of unrestricted pipeflow due to presence of cutoff valves, elbows, or venturi. But at sites where acceptable lengths of discharge pipe were available, where there were extremely high flow rates, or there were multiple pumps feeding a common discharge pipe, the cross-correlation flowmeter was used.

Data Computation and Compilation

Data collected during the site visits to each facility were compiled and monthly water-use volumes were computed for comparison with monthly data reported to the ASWCC and ADH. Calculated and reported water-withdrawal data are summarized in table 2 at end of report. Water withdrawals are usually reported by public water-supply facilities to the ASWCC and ADH as monthly values for each month. It should be noted that some facilities group withdrawal data for more than one well (for example Yorktown, wells 1 and 2, table 2) prior to reporting to ASWCC or ADH.

Data significant to the dates of the measurements for both water withdrawal readings (noninvasive and inline), and the period of record represented are presented at the end of the report in tables 3 and 4. Therefore, hourly pumping rates can not be transposed to table 2, which represents total number of hours pumped per calendar month for the period of record. Although data were collected approximately every month at each of the sites, they were not collected at precisely 30- or 31-day intervals, nor were data collected on the same day in every month. However, monthly pump running times were needed, along with instantaneous flow measurements, to compute monthly water-use volumes that were comparable with the monthly data reported to the ASWCC and ADH. At those facilities where pump running times were recorded only from electric watt-hour meters or vibration time totalizers, the values were summarized to whole monthly values. Adjustments to pump running times (column 2, table 2) were made by determining the pumping rate (in hours per day) for each measurement period (table 4) and multiplying it by the number of days in each month for which that rate applied. For example, to determine the adjusted monthly pump running time at Arkansas City for July 1990 using table 4:

July 1-24 = 24 days

24 days × 10.1 hours/day = 242.4 hours pump running time

July 24-31 = 7 days

7 days × 4.7 hours/day = 32.9 hours pump running time

Adjusted monthly pump running time = 275 hours (rounded)

For those facilities that used chronological log records to determine the number of hours pumped per month (table 3), the pump running times were extracted directly from these records and computed for each calendar month (table 2). Where monthly pump running times were available from chronological logs maintained by the plant operator, these data were preferentially used whenever possible to compute water withdrawals, even when electric watt-hour meter and vibration time totalizer data were available.

Pipeflow measurements at most sites did not fluctuate substantially from one measurement to the next. However, minor fluctuations, due to local conditions at the time of measurement, did occur at all sites. For this reason, instantaneous pipeflow measurements collected during the investigation were averaged (tables 3 and 4) for each site before water-withdrawal amounts were calculated (table 2).

EVALUATION OF PUMPAGE DATA

Withdrawals calculated from noninvasive pipeflow measurements and pump running times were compared to monthly pumpage reported to the ASWCC and ADH in order to evaluate the accuracy of the reported data. Inline pipeflow measurements were compared to the noninvasive pipeflow measurements and reported data for those sites where inline flowmeters were present. Comparisons were made by grouping the results by population range, and the presence of inline flowmeters at these facilities. Comparisons were also made between water withdrawals reported to the ASWCC and those amounts reported to the ADH, and between water withdrawals reported to the ASWCC and the amounts measured by inline flowmeter.

The percent difference between the monthly noninvasive flowmeter measurements and monthly water withdrawals reported to the ASWCC ranged from -151.4 to 85.4. The percent difference between the monthly noninvasive flowmeter measurements and monthly water withdrawals reported to the ADH ranged from -253.6 to 61.7. The percent difference between the monthly noninvasive flowmeter measurement and the monthly inline flowmeter measurement ranged from -125.4 to 90.2 (table 2). The distributions of the percent differences show that there is significant variation between withdrawals measured by noninvasive flowmeter and withdrawals reported to the ASWCC or to the ADH (figs. 3 and 4). Although the reported pumpages of some facilities (Bennett Acres, 30543) were consistently higher than measured amounts and the reported pumpages of some facilities (Arkansas City Waterworks, 30523) were consistently lower than measured pumpages, most of the facilities reported a wide range of pumpage compared to the measured usage. Somewhat less variation in percent differences occurred between water withdrawals measured by noninvasive flowmeter and measured by inline flowmeter (fig. 5). Comparisons of noninvasive pipe-flow measurements and inline pipeflow measurements indicate that for most sites the two measurements were similar (table 5 at end of report) and within the ranges reported by Arvin (1992) for the noninvasive pipeflow meters that were tested against inline flowmeters.

The absolute average percent difference between pumpage measured by noninvasive flowmeter and pumpages reported to the ASWCC ranges from 2.4 to 83.7 with an overall average of 25.4 percent. The range between the noninvasive measurement and that reported to the ADH was from 2.5 to 49.4 with an overall average of 18.8. For those facilities that report to both the ASWCC and ADH the average absolute percent difference between pumpage measured onsite by noninvasive flowmeter and amounts reported to the ASWCC was 21.3 percent. For those same facilities the average absolute percent difference between pumpage measured onsite by noninvasive flowmeter and amounts reported to the ADH was 20.3 percent. For those facilities that reported only to the ASWCC the average absolute percent difference between pumpage measured onsite by noninvasive flowmeter and amounts reported was 29.9 percent. The comparison of water withdrawals measured by noninvasive and inline flowmeters ranged from 2.0 to 46.4 with an overall average of 15.2 (table 6 at end of report).

When the absolute average percent difference for each site is arranged by population group, the results show that facilities serving fewer than 500 people reported withdrawals to the ASWCC and to the ADH that were closer to withdrawals measured by noninvasive flowmeter than did facilities serving more than 500 people (fig. 6A and 6B). The absolute average percent difference between withdrawals measured by noninvasive flowmeter and inline flowmeter was significantly lower for facilities serving more than 900 people than for facilities serving fewer than 900 people (fig. 6C). The largest absolute average percent difference (32.9) was between withdrawals measured by noninvasive flow and those reported to the ASWCC for facilities serving between 500-900 people (table 6). Facilities serving more than 3,000 people also had larger absolute average percent differences for both the "reported data" comparisons. It is difficult to determine the reasons for the variation between measured and reported water withdrawals for the different population groups. Perhaps it is easier to obtain an accurate measurement on water-supply systems that serve less than 500 people. Larger systems often have multiple wells or intakes and elaborate water-treatment equipment that can interfere with flow measurements and time totalizer devices.

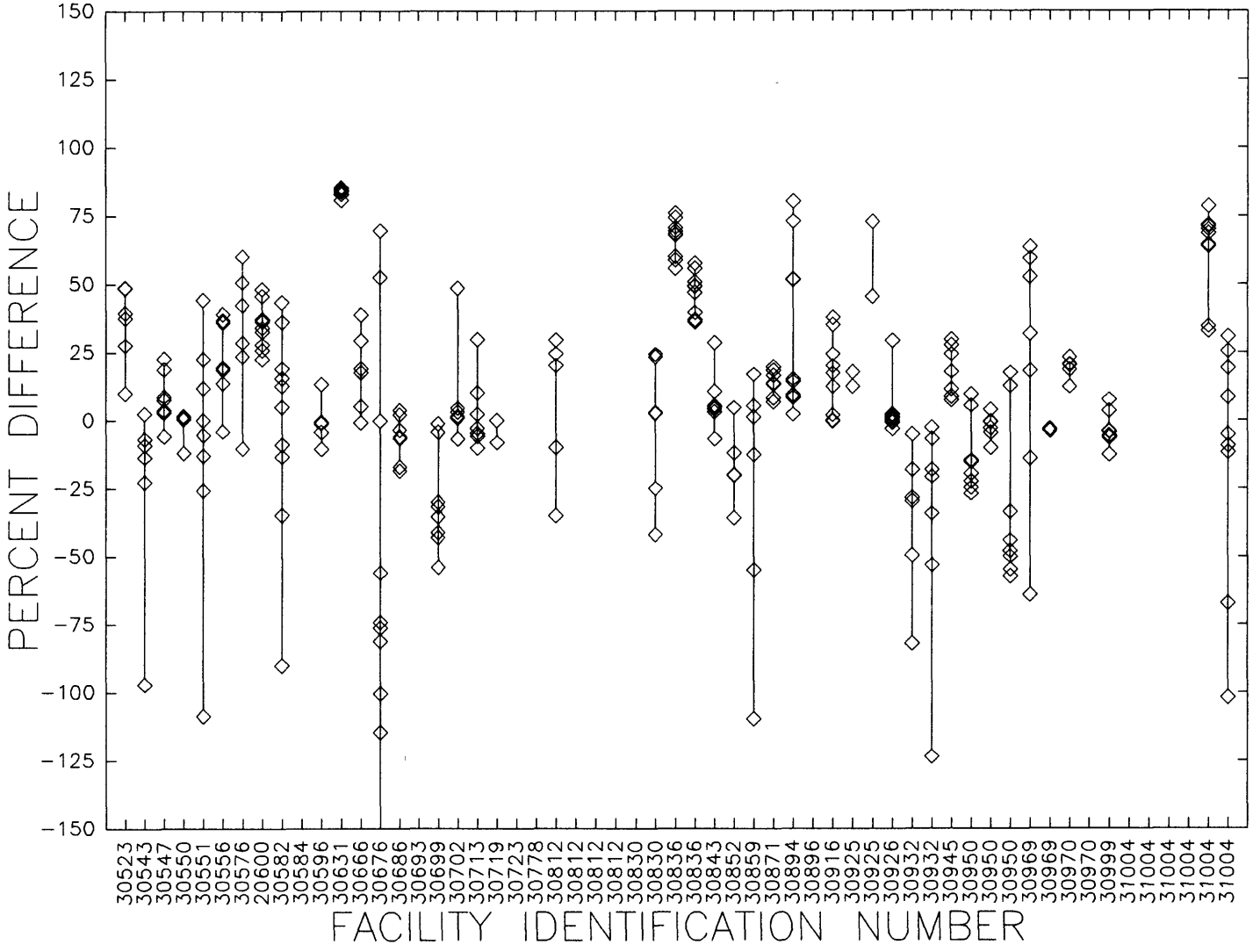

Figure 3.--Percent difference between pumpage measured by noninvasive flowmeter and pumpage reported to the Arkansas Soil and Water Conservation Commission.

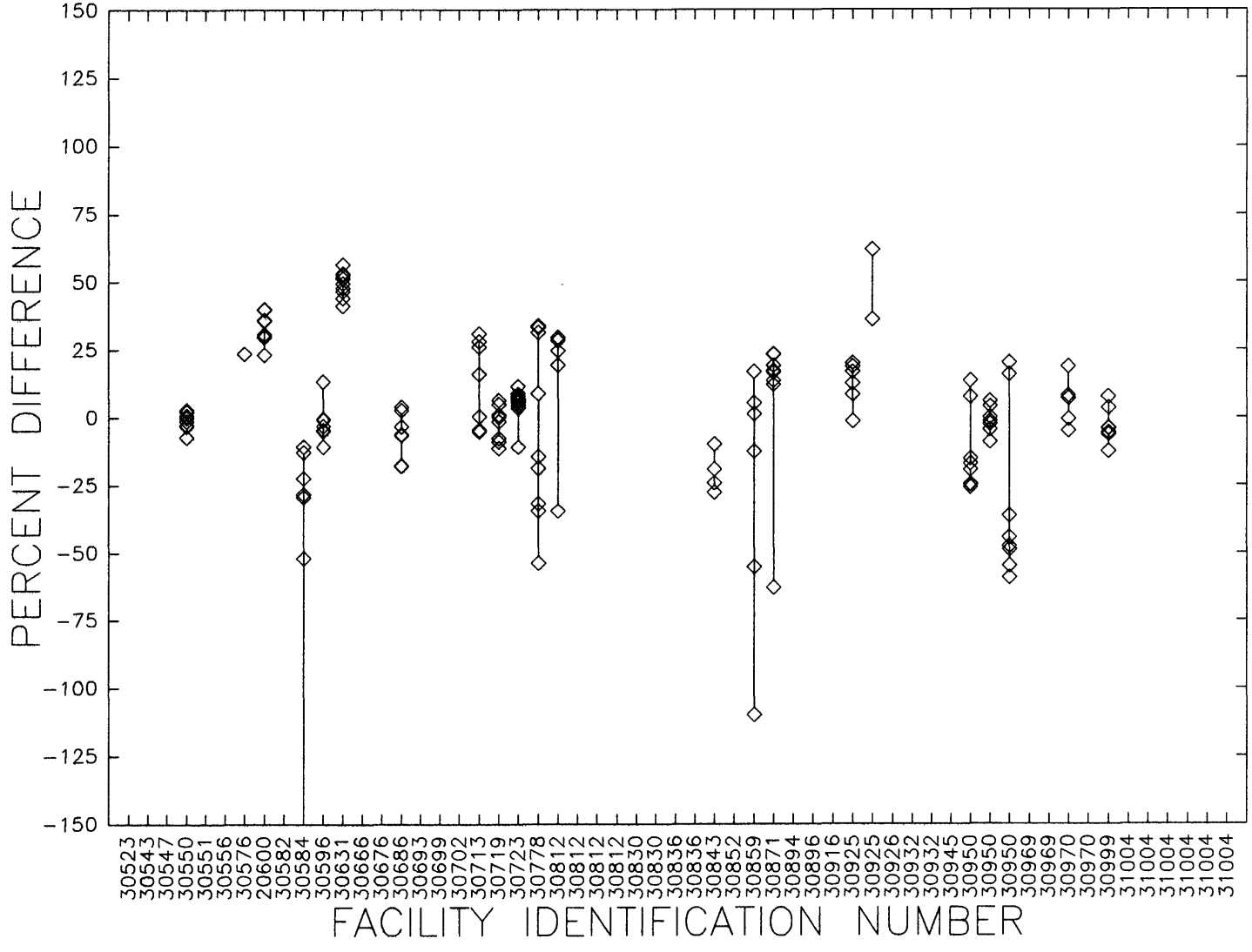

Figure 4.--Percent difference between pumpage measured by noninvasive flowmeter and pumpage reported to the Arkansas Department of Health.

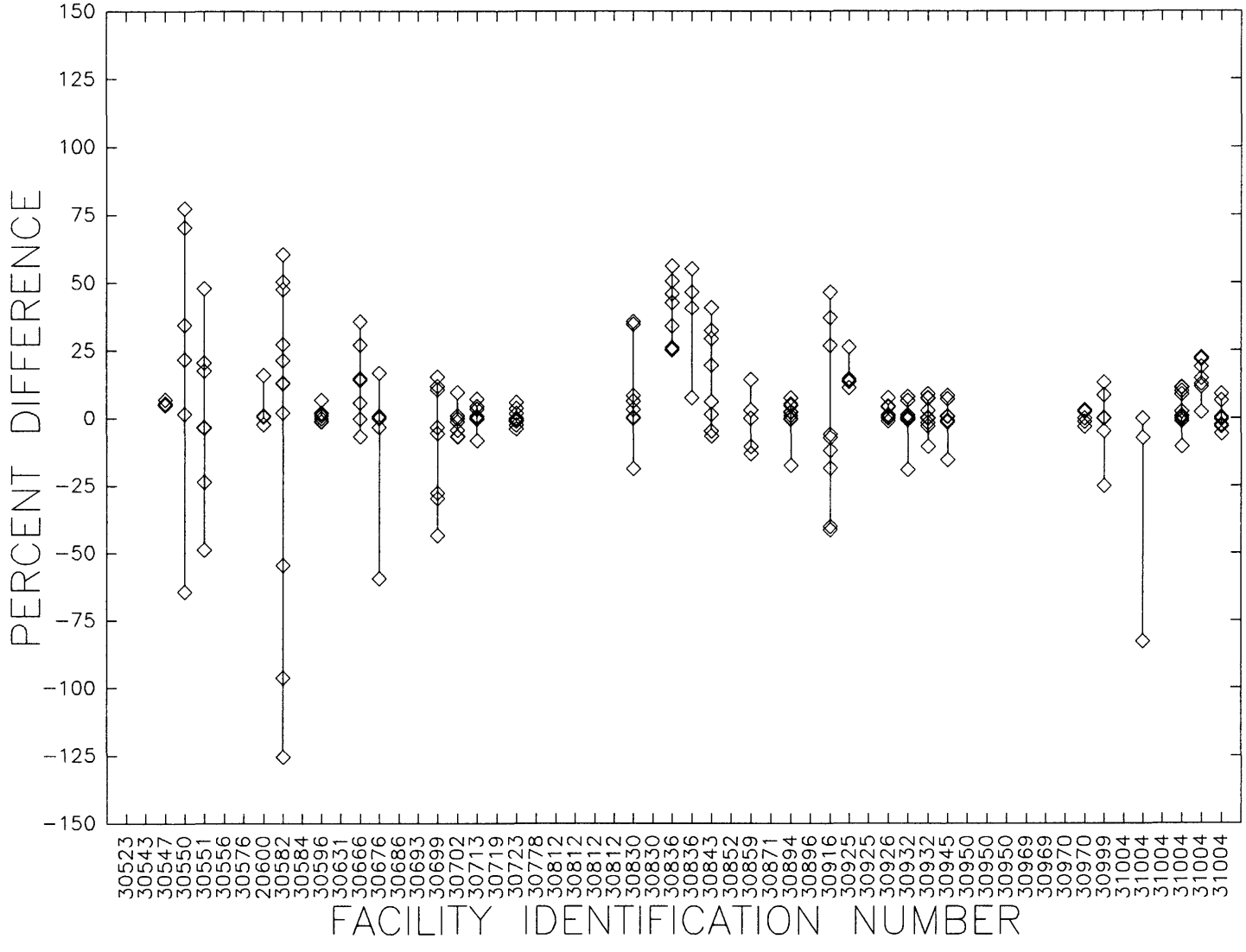

Figure 5.--Percent difference between pumpage measured by noninvasive flowmeter and pumpage measured by inline flowmeter.

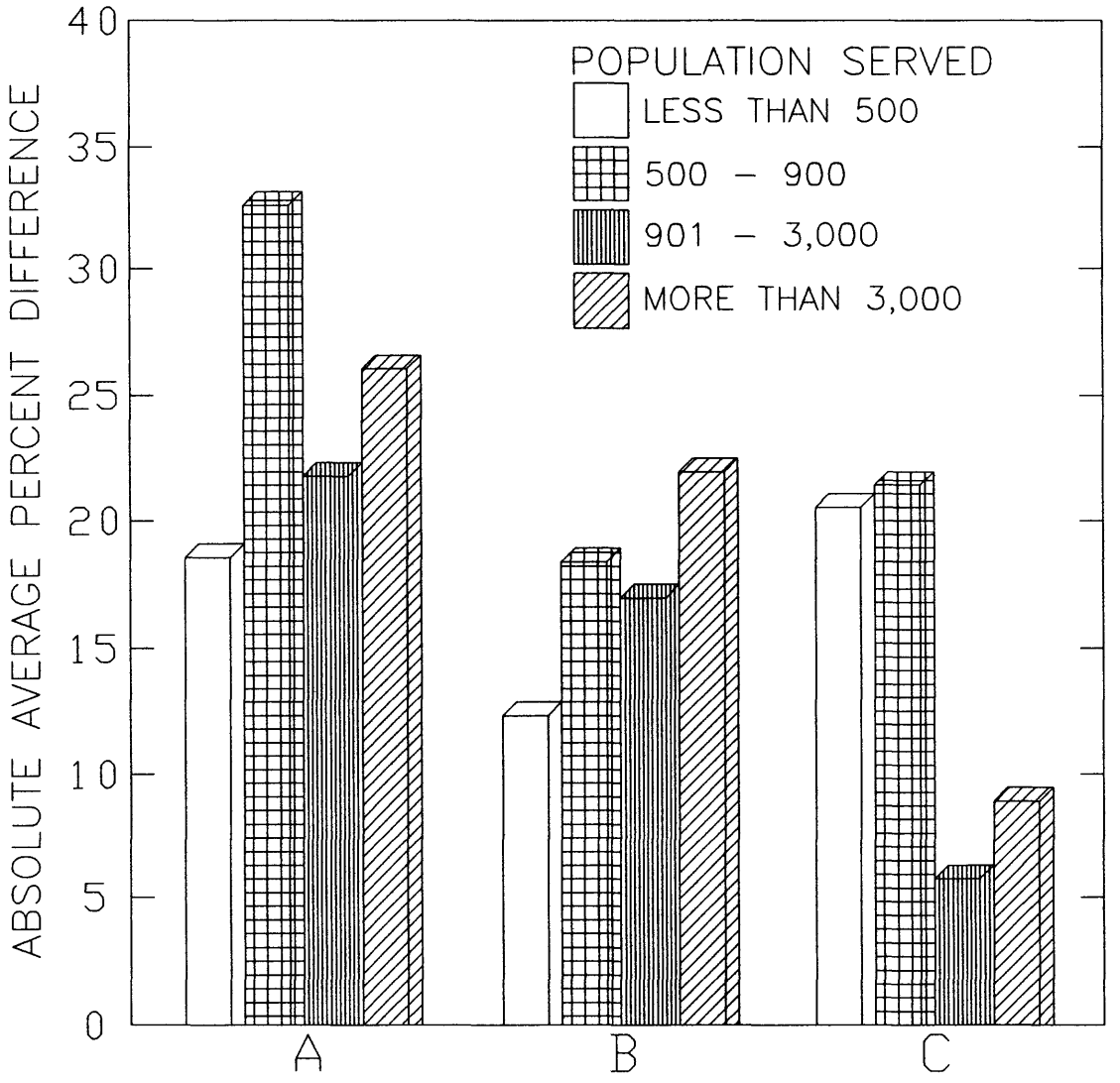

Figure 6.--Absolute average percent difference between pumpage measured by noninvasive flowmeter and withdrawals (A) reported to the Arkansas Soil and Water Conservation Commission, (B) reported to the Arkansas Department of Health, and (C) measured by inline flowmeter for facilities serving population less than 500, between 500 – 900, between 901 – 3,000, and more than 3,000.

Withdrawals reported to the ASWCC and withdrawals measured by inline flowmeter should be comparable. Facilities that used inline flowmeters to determine water use reported withdrawals within -4.4 of the measured values. Percent differences for this comparison ranged from -61.3 to 38.7 (table 7). In some instances, it is apparent (table 2) that an annual withdrawal values was divided by 12 months to arrive at a monthly value, even though an inline meter was present (Carthage, 30582; Harrell, 30699; Sidney, 30916; and Thornton, 30945).

Natural log percent difference comparisons also were made between withdrawals reported to the ASWCC and those reported to the ADH. This comparison shows that most of the facilities did report the same (or nearly the same) withdrawals to both agencies (table 8). The only sites that reported significantly different pumpages to the separate agencies were Dierks Waterworks (30631) and St. Paul Waterworks for their well 2 (30925). Discrepancies between withdrawals reported to the two agencies exist because of multiple conversions of the data reported to the ASWCC. Because the majority of data reported to the ASWCC are reported and stored in acre-feet, data collected by municipal suppliers (usually in gallons) are converted to acre-feet before storing to maintain consistency in the data base. Data retrieved from the data base were converted back to gallons for this investigation.

Some error may have been introduced when pumpage volumes were calculated from measured pipeflow (for both inline and noninvasive meters) for those sites where pump running times were obtained from electric meter or vibration time totalizer. These errors were created in some locations by other equipment within the pump house (such as chlorinators, fans, and heaters). These types of equipment operate during and many times beyond the period of time in which pumping occurs, thus distorting pump running times.

SUMMARY

Site-specific, public-supply data are available for most States where permits are required or where water-use reporting is mandatory. However, little is known about the accuracy of the reported data. Because the accuracy of these data are not known Arkansas Soil and Water Conservation Commission (ASWCC) and the U.S. Geological Survey (USGS) are working cooperatively to evaluate water-use information reported by public suppliers.

Measured and reported pumpage data were collected between May 1990 and March 1991 for 41 selected public-supply facilities in Arkansas. Instantaneous pipeflow measurements (using a noninvasive flowmeter) were made and pump operation times were recorded monthly at most of the sites. Measured data were computed for comparison with monthly reported data.

Comparisons between water pumpage calculated from noninvasive pipe-flow measurements and pump running times, and water pumpage reported to the ASWCC or ADH reveals variation between the measured and reported data. Less variation exists between water withdrawals calculated from noninvasive pipe-flow measurements and amounts calculated from inline flowmeter measurements. Variation in reporting accuracy among the water-supply facilities is to be expected. Each facility has a different level of capability to determine the amount of water it withdraws. However, at some facilities that are equipped with inline flowmeters there are still significant differences between measured and reported pumpage. It is considerably more difficult to determine the source of variation between measured and reported pumpage for a particular facility.

The variation between water pumpage measured by noninvasive flowmeters and reported to State agencies ranged from -253.6 percent to 85.4 percent. The variation between water pumpage measured by noninvasive flowmeter and by inline flowmeter ranged from -125.4 percent to 90.2 percent. Overall there was significantly less variation between pumpage measured by the noninvasive and inline flowmeters. Ironically, there was virtually no difference in the average percent difference between amounts measured by noninvasive flowmeter and reported to the ASWCC for those sites equipped with an inline flowmeter, and those sites where an inline meter was not present. Even when an inline meter was present, some sites reported exactly the same water-use amount for each month during the investigation.

Percent differences between water withdrawals measured by noninvasive flowmeter and amounts reported to the ASWCC and ADH were lower (21.3 percent for ASWCC; 20.3 percent for ADH) for those facilities that reported to both agencies than for those facilities that reported only to the ASWCC (29.9 percent). There were only three facilities that reported only to ADH. Facilities that report to both agencies probably keep current records of pump running times and calculate water withdrawals periodically, and are therefore more likely to report water usage when requested by the individual agencies. Overall, facilities that reported to both agencies, reported equal or nearly equal amounts to both agencies.

Although it is difficult to assess the absolute accuracy of the reported data, it is apparent that considerable variation exists in the reported data. The average percent difference between water withdrawals measured by noninvasive meter and that reported to the ASWCC is about 26 percent. More information is needed to determine the source of variation between measured and reported water withdrawals.

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Table 1.--*Description of selected public water-supply facilities in Arkansas and flow-measurement conditions at these sites, 1990*

[Number in parentheses is facility identification number (fig. 1); **, not applicable; hp, horsepower; DVTT, digital vibration time totalizer]

Arkansas City Waterworks (30523)
Location: Desha County
Population served: 606
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 6.77 inches
Pipe thickness: 0.23 inch
Transducer spacing: **
Measurement condition rating: good
Comments: Arkansas City Waterworks has one 1.5-hp electric powered pump. Flow measurements were made at the pump with the reflective-doppler meter. Flow at the measurement point was horizontal. There is no inline flowmeter available at this location. Pump running times were calculated from metered energy consumption of the pump.

Bennett Acres Mobile Home Park (30543)
Location: Saline County
Population served: 81
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 1.43 inches
Pipe thickness: 0.15 inch
Transducer spacing: **
Measurement condition rating: good to fair
Comments: Bennett Acres Mobile Home Park has two electric powered pumps (0.75- and 1.5-hp). There is no inline flowmeter available at either location. Flow measurements were made at the 1.5-hp pump with the reflective-doppler flowmeter because the 0.75-hp pump was used only as a backup pump. Flow at the measurement point was horizontal. A timer was placed on the pump by the operator to limit pumping because of the size of the water storage tank. This condition limited the amount for time available for making discharge measurements at this location. Pump running times were calculated from metered energy consumption of the pump.

Bergman Waterworks (30547)
Location: Boone County
Population served: 525
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 4.86 inches
Pipe thickness: 0.15 inch
Transducer spacing: **
Measurement condition rating: good
Comments: Bergman Waterworks has one 20-hp electric powered pump. There is an inline flowmeter available at this location. Flow measurements were made at the 20-hp pump with the reflective-doppler flowmeter near the inline flowmeter. Flow at the measurement point was vertical-down. Pump running times were calculated from metered energy consumption of the pump.

Bigelow Waterworks (30551)
Location: Perry County
Population served: 600
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 5.00 inches
Pipe thickness: 0.22 inch
Transducer spacing: **
Measurement condition rating: good
Comments: Bigelow Waterworks has one 25-hp electric powered pump. There was an inline flowmeter available at this location. Flow measurements were made at the pump with the reflective-doppler flowmeter. Flow at the measurement point was horizontal. Pump running times were obtained from a log book of pump running times maintained by the plant operator.

Big Flat Waterworks (30550)
Location: Baxter County
Population served: 189
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 7.00 inches
Pipe thickness: 0.22 inch
Transducer spacing: **
Measurement condition rating: good
Comments: Big Flat Waterworks has two electric powered pumps (10- and 50-hp). An inline flowmeter was available at each location. Flow measurements were made at the 50-hp pump with the reflective-doppler flowmeter. The 10-hp pump was not measured because it was used as a backup. Flow at the measurement point was horizontal. Pump running times were obtained from a log book of pump running times maintained by the plant operator.

Black Rock Waterworks (30556)
Location: Lawrence County
Population served: 912
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 3.25 inches
Pipe thickness: 0.21 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Black Rock Waterworks has one 25-hp electric powered pump. There was an inline flowmeter available at this location. Flow measurements were made at the pump with the reflective-doppler flowmeter. Flow at the measurement point was horizontal. Pump running times were calculated from metered energy consumption of the pump.

Calico Rock Waterworks (30576)
Location: Izard County
Population served: 1,500
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 3.75 inches
Pipe thickness: 0.75 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Calico Rock Waterworks has two 25-hp electric powered pumps. There was no inline flowmeter available at these locations. Flow measurements were near the pumps on a common pipe for both pumps with the reflective-doppler flowmeter. Flow at the measurement points was horizontal. Pump running time was obtained from a log book of pump running times maintained by the plant operator.

Camden Waterworks (20600)
Location: Ouachita County
Population served: 18,134
Source of water: Surface water, Ouachita River
Pipe material: Ductile iron
Pipe diameter: 12.82 inches
Pipe thickness: 0.38 inch
Transducer spacing: **
Measurement condition rating: Good to poor
Comments: Camden Waterworks has three 50-hp electric powered pumps. Two of the pumps were used as primary sources of water, and the other was used as a standby. The original measurement point selected for making pumpage measurements at Camden was located at the water plant. At this measurement location the inflow pipe contained the cumulative flow of the three surface-water withdrawals. After making three measurements at this location and comparing them to measurements recorded within the plant, it was evident that our measurements discharge were well below those recorded within the plant. After discussion with the water superintendent, it was determined that the measurement location was close to the venturi located approximately 3 feet further down the discharge pipe. Therefore, on following site visits the flow was measured from three pumps (two primary, one standby) with the reflective-doppler flowmeter. These measurement locations worked well until January through April 1991 when the road from the back of the water plant toward the Ouachita River and the three pumps were flooded. After the river receded, data collection resumed. Flow at these measurement points was horizontal. Pump running times were obtained from a log book of pump running times maintained by the plant operator.

Carthage Waterworks (30582)
Location: Dallas County
Population served: 600
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 5.62 inches
Pipe thickness: 0.37 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Carthage Waterworks has one 15-hp electric powered pump. There is an inline flowmeter available at the plant. Flow measurements were made at the plant near the inline flowmeter with the reflective-doppler flowmeter. Flow at the measurement point was horizontal. Access to the plant became a problem at times because of security reasons. Unless the water superintendent could be located, the data-collection personnel could not gain admission. Pump running times were obtained from a log book of pump running times maintained by the plant operator.

Cass Waterworks (30584)
Location: Franklin County
Population served: 250
Source of water: Surface water, Fane Creek
Pipe material: PVC
Pipe diameter: 3.50 inches
Pipe thickness: 0.25 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Cass Waterworks has one 15-hp electric powered pump. During the last 3 months of the data collection period (January through March 1991) an inline flowmeter was installed at this location. Flow measurements were made with the reflective-doppler flowmeter at the plant near the inline flowmeter. Flow at the measurement point was vertical-up. Pump running time was obtained from a log book of pump running times maintained by the plant operator.

Collins Water Association (30596)
Location: Drew County
Population served: 250
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 3.50 inches
Pipe thickness: 0.32 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Collins Water Association has one 20-hp electric powered pump. Flow measurements were made at the pump near the inline flowmeter with the reflective-doppler flowmeter. Flow at the measurement point was horizontal. Pump running times were calculated from metered energy consumption of the pump.

Dierks Waterworks (30631)
Location: Howard County
Population served: 1,850
Source of water: Surface water, Dierks Lake
Pipe material: Ductile iron
Pipe diameter: 9.00 inches
Pipe thickness: 0.35 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Dierks Waterworks has two 15-hp electric powered pumps and an inline flowmeter. Both pumps run simultaneously. Flow measurements were made on a single pipe at the plant near the inline flowmeter with the reflective-doppler flowmeter. Flow at the measurement point was horizontal. Pump running time was obtained from a log book of pump running times maintained by the plant operator.

Franklin Waterworks (30666)
Location: Izard County
Population served: 253
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 2.25 inches
Pipe thickness: 0.20 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Franklin Waterworks has one 30-hp electric powered pump. Flow measurements were made at the pump near the inline flowmeter with the reflective-doppler flowmeter. Flow at the measurement point was horizontal. Pump running times were calculated from metered energy consumption of the pump.

Gilmore Waterworks (30676)
Location: Crittenden County
Population served: 600
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 3.50 inches
Pipe thickness: 0.25 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Gilmore Waterworks has one 15-hp electric powered pump. Flow measurements were made at the pump near the inline flowmeter with the reflective-doppler flowmeter. Flow at the measurement point was horizontal. Pump running times were calculated from metered energy consumption of the pump. Access to the pump became a problem at times because of security reasons; unless the water superintendent could be located, the data-collection personnel could not gain admission.

Green Forest Waterworks (30686)
Location: Carroll County
Population served: 4,731
Source of water: Surface water, Anderson Spring
Pipe material: Ductile iron
Pipe diameter: 9.00 inches
Pipe thickness: 0.40 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Green Forest Waterworks has two 100-hp electric powered pumps. Flow measurements were made at the pumps near Anderson Spring with the reflective-doppler flowmeter. Flow at the measurement points was horizontal. There was an inline flowmeter available at the plant. Pump running times were calculated from metered energy consumption of the pumps.

Guy Waterworks (30693)
Location: Faulkner County
Population served: 200
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 2.43 inches
Pipe thickness: 0.25 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Guy Waterworks has two 10-hp electric powered pumps. Flow measurements were made at the plant near the inline flowmeter with the reflective-doppler flowmeter. Flow at the measurement point was horizontal. Pump running time was obtained from a log book of pump running times maintained by the plant operator.

Harrell Waterworks (30699)
Location: Calhoun County
Population served: 351
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 4.86 inches
Pipe thickness: 0.40 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Harrell Waterworks has one 20-hp electric powered pump. Flow measurements were made at the pump near the inline flowmeter with the reflective-doppler flowmeter. Flow at the measurement point was horizontal. Pump running times were obtained from a log book of pump running times maintained by the plant operator.

Haskell Waterworks (30702)
Location: Saline County
Population served: 1,200
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 3.58 inches
Pipe thickness: 0.36 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Haskell Waterworks has two 15-hp electric powered pumps. Flow measurements were made at each pump near inline flowmeters with the reflective-doppler flowmeter. Flow at the measurement point was horizontal. Pump running times were obtained from a log book of pump running times maintained by the plant operator.

Holly Grove Waterworks (30713)
Location: Monroe County
Population served: 840
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 7.00 inches
Pipe thickness: 0.41 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Holly Grove Waterworks has one 25-hp electric powered pump. Flow measurements were made at the plant near inline flowmeter with the reflective-doppler flowmeter. Flow at the measurement point was horizontal. Pump running times were obtained from a log book of pump running times maintained by the plant operator.

Hoxie Waterworks (30719)
Location: Lawrence County
Population served: 2,961
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 7.00 inches
Pipe thickness: 0.41 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Hoxie Waterworks has two 25-hp electric powered pumps. There was no inline flowmeter available at either location. Flow measurements were made at the 25-hp pump near the Hoxie Service Center with the reflective-doppler flowmeter. The other 25-hp pump behind the water tower was not measured because it was used as a backup. Flow at the measurement point was horizontal. Pump running times were calculated from metered energy consumption of the pump.

Huntsville Waterworks (30723)
Location: Madison County
Population served: 3,890
Source of water: Surface water, War Eagle Creek
Pipe material: Ductile iron
Pipe diameter: 12.00 inches
Pipe thickness: 0.34 inch
Transducer spacing: 12.00 inches
Measurement condition rating: Good
Comments: Huntsville Waterworks has two 125-hp electric powered pumps. Flow measurements were made at the plant near the inline flowmeter with the time-of-flight type flowmeter. Flow at the measurement point was horizontal. Pump running time was obtained from a log book of pump running times maintained by the plant operator.

Marianna Waterworks (30778)
Location: Lee County
Population served: 12,915
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 13.86 inches
Pipe thickness: 0.23 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Marianna Waterworks has four 50-hp natural gas powered pumps. Flow measurements were made at each pump with the reflective-doppler flowmeter. Flow at the measurement points was horizontal. There was an inline flowmeter available at the plant. DVTT's were used to record duration of pumping at each well.

Mountain Home Waterworks (30812)
Location: Baxter County
Population served: 15,943
Source of water: Surface water, Norfork Lake
Pipe material: Ductile iron
Pipe diameter: 12.00 inches
Pipe thickness: 0.56 inch
Transducer spacing: 8.00 inches
Measurement condition rating: Good to fair
Comments: Mountain Home Waterworks has three 125-hp electric powered pumps. Inline flow meters were not present on any of the pumps. Flow measurements were made at each pump near Norfork Lake with the time-of-flight flowmeter. Flow at each measurement point was horizontal. The discharge pipes for all three pumps merged to one main discharge pipe. This situation caused the DVTT's not to function as planned because when one pump was operating, the vibration of the pump was not only picked up by the DVTT on this pump but by DVTT's on the other pumps as well. DVTT records were compared with duration of pumping records maintained by the plant operator.

Norphlet Waterworks (30830, well 1)
Location: Union County
Population served: 1,000
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 6.60 inches
Pipe thickness: 0.13 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Norphlet Waterworks has two electric powered pumps (40- and 50-hp). Flow measurements were made at the 50-hp pump near the inline flowmeter with the reflective-doppler flowmeter. Flow at the measurement point was horizontal. Pump running times were calculated from metered energy consumption of the pump.

Norphlet Waterworks (30830, well 2)
Location: Union County
Population served: 1,000
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 7.00 inches
Pipe thickness: 0.21 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Norphlet Waterworks has two electric powered pumps (40- and 50-hp). Flow measurements were made at the 40-hp pump (near the inline flowmeter) and at the 50-hp pump (no inline meter) with the reflective-doppler flowmeter. Flow at the measurement point was horizontal. Pump running times were calculated from metered energy consumption of the pump.

Ogden Waterworks (30836)
Location: Little River County
Population served: 500
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 4.58 inches
Pipe thickness: 0.21 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Ogden Waterworks has two 10-hp electric powered pumps. Flow measurements were made at each 10-hp pump near the inline flowmeter with the reflective-doppler flowmeter. Flow at each measurement point was horizontal. Pump running times were calculated from metered energy consumption of the pump.

Oxford Waterworks (30843)
Location: Izard County
Population served: 520
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 3.25 inches
Pipe thickness: 0.51 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Oxford Waterworks has one 15-hp electric powered pump. Flow measurements were made at the 15-hp pump near the inline flowmeter with the reflective-doppler flowmeter. Flow at the measurement point was horizontal. Pump running times were calculated from metered energy consumption of the pump.

Parkin Waterworks (30852)
Location: Cross County
Population served: 2,100
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 7.00 inches
Pipe thickness: 0.26 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Parkin Waterworks has one 20- and one 25-hp electric powered pumps. There was no inline flowmeter available at either pump. Flow measurements were made at each pump with the reflective-doppler flowmeter. Flow at each measurement point was horizontal. Pump running times were calculated from metered energy consumption of the pump.

Perryville Waterworks (30859)
Location: Perry County
Population served: 3,988
Source of water: Surface water, Cedar Creek
Pipe material: Ductile iron
Pipe diameter: 7.00 and 6.00 inches
Pipe thickness: 0.55 and 0.52 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Perryville Waterworks has two 40-hp electric powered pumps. Flow measurements were made at each pump near the inline flowmeter with the reflective-doppler flowmeter. Flow at each measurement point was horizontal. Pump running time was obtained from a log book of pump running times maintained by the plant operator.

Prairie Grove Waterworks (30871)
Location: Washington County
Population served: 3,033
Source of water: Surface water, Cedar Creek
Pipe material: Ductile iron
Pipe diameter: 10.00 inches
Pipe thickness: 0.52 inch
Transducer spacing: 12.00 inches
Measurement condition rating: Good
Comments: Prairie Grove Waterworks has two 40-hp electric powered pumps. Flow measurements were made at the plant near the inline flowmeter with the time-of-flight flowmeter. Flow at the measurement point was horizontal. Pump running time was obtained from a log book of pump running times maintained by the plant operator.

Roe Waterworks (30894)
Location: Monroe County
Population served: 200
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 4.58 inches
Pipe thickness: 0.33 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Roe Waterworks has one 20-hp electric powered pump. Flow measurements were made at the pump near the inline flowmeter with the reflective-doppler flowmeter. Flow at the measurement point was horizontal. Pump running times were calculated from metered energy consumption of the pump.

Russell Waterworks (30896)
Location: Monroe County
Population served: 500
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 6.25 inches
Pipe thickness: 0.38 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Russell Waterworks has one 7.5-hp electric powered pump. Flow measurements were made at the pump with the reflective-doppler flowmeter. There was no inline flowmeter available at the pump. Flow at the measurement point was horizontal. Pump running times were calculated from metered energy consumption of the pump.

Sidney Waterworks (30916)
Location: Sharp County
Population served: 270
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 3.40 inches
Pipe thickness: 0.25 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Sidney Waterworks has one 10-hp electric powered pump. Flow measurements were made at the pump near the inline flowmeter with the reflective-doppler flowmeter. Flow at the measurement point was horizontal. Pump running times were calculated from metered energy consumption of the pump.

St. Paul Waterworks (30925)
Location: Madison County
Population served: 175
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 2.25 inches
Pipe thickness: 0.20 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: St. Paul Waterworks has one 1-hp and one 0.75-hp electric powered pumps. Flow measurements were made at each pump near the inline flowmeter with the reflective-doppler flowmeter. Flow at each measurement point was horizontal. Pump running times were calculated from metered energy consumption of the pump.

Stamps Waterworks (30926)
Location: Lafayette County
Population served: 2,897
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 4.85 inches
Pipe thickness: 0.44 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Stamps Waterworks has three 40-hp electric powered pumps. Flow measurements were made at the plant near the inline flowmeter with the reflective-doppler flowmeter. Flow at the measurement point was horizontal. Pump running time was obtained from a log book of pump running times maintained by the plant operator.

Stuttgart Waterworks - new water treatment plant (30932)
Location: Arkansas County
Population served: 17,250
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 11.15 inches
Pipe thickness: 0.29 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Stuttgart Waterworks (new water treatment plant) is served by two 100-hp electric powered pumps. Flow measurements were made at the plant near the inline flowmeter with the reflective-doppler flowmeter. Flow at the measurement point was horizontal. Pump running time was obtained from a log book of pump running times maintained by the plant operator.

Stuttgart Waterworks - old water treatment plant (30932)
Location: Arkansas County
Population served: 17,250
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 16.00 inches
Pipe thickness: 0.26 inch
Transducer spacing: 12.00 inches
Measurement condition rating: Good
Comments: Stuttgart Waterworks (old water treatment plant) is served by three electric powered pumps (two 125-hp and one 100-hp). Flow measurements were made at the plant near the inline flowmeter with the time-of-flight flowmeter. Flow at the measurement point was vertical-up. Pump running time was obtained from a log book of pump running times maintained by the plant operator.

Thornton Waterworks (30945)
Location: Calhoun County
Population served: 759
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 6.75 inches
Pipe thickness: 0.31 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Thornton Waterworks has one 20-hp electric powered pump. Flow measurements were made at the pump near the inline flowmeter with the reflective-doppler flowmeter. Flow at each measurement point was horizontal. Pump running time was obtained from a log book of pump running times maintained by the plant operator.

Trumann Waterworks - City Hall Well (30950)
Location: Poinsett County
Population served: 7,454
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 10.00 inches
Pipe thickness: 0.52 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Trumann Waterworks has two electric powered pumps and no inline flowmeters. Flow measurements were made at the 40-hp pump near City Hall with the reflective-doppler flowmeter. Flow at the measurement point was vertical-down. Pump running times were calculated from metered energy consumption of the pump.

Trumann Waterworks - Davis Street (30950)
Location: Poinsett County
Population served: 7,454
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 8.00 inches
Pipe thickness: 0.39 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Trumann Waterworks has two electric powered pumps and no inline flowmeters. Flow measurements were made at the 60-hp pump near the water plant with the reflective-doppler flowmeter. Flow at the measurement point was horizontal. Pump running times were calculated from metered energy consumption of the pump.

Ward Waterworks - Well 1 (30969)
Location: Lonoke County
Population served: 7,713
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 9.32 inches
Pipe thickness: 0.48 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Ward Waterworks has four electric powered pumps (15-, 20-, 25-, and 40-hp) and no inline flowmeter. Flow measurements were made at Well 1 (15-hp) with the reflective-doppler flowmeter. Well 1 was primarily used for backflushing of lines, and as a standby well. Flow at the measurement point was horizontal. Pump running times were calculated from metered energy consumption of the pump.

Ward Waterworks - Well 2 (30969)
Location: Lonoke County
Population served: 7,713
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 5.96 inches
Pipe thickness: 0.49 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Ward Waterworks has four electric powered pumps ((15-, 20-, 25-, and 40-hp) and no inline flowmeter. Flow measurements were made at Well 2 (25-hp) with the reflective-doppler flowmeter. Flow at the measurement point was horizontal. Pump running times were calculated from metered energy consumption of the pump.

Ward Waterworks - Well 3 (30969)
Location: Lonoke County
Population served: 7,713
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 7.00 inches
Pipe thickness: 0.50 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Ward Waterworks has four electric powered pumps (15-, 20-, 25-, and 40-hp) and no inline flowmeter. Flow measurements were made at Well 3 (20-hp) with the reflective-doppler flowmeter. Well 3 was primarily used for backflushing of lines and as a standby well. Flow at the measurement point was horizontal. Pump running times were calculated from metered energy consumption of the pump.

Ward Waterworks - Well 4 (30969)
Location: Lonoke County
Population served: 7,713
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 10.47 inches
Pipe thickness: 0.36 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Ward Waterworks has four electric powered pumps (15-, 20-, 25-, and 40-hp) and no inline flowmeter. Flow measurements were made at Well 4 (40-hp) with the reflective-doppler flowmeter. Flow at the measurement point was horizontal. Pump running times were calculated from metered energy consumption of the pump.

Warren Waterworks - Wells 1 and 2 (30970)
Location: Bradley County
Population served: 9,000
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 9.00 inches
Pipe thickness: 0.54 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Warren Waterworks has three electric powered pumps (two 20- and a 40-hp). Flow measurements were made at Wells 1 and 2 (20-hp pumps) with the reflective-doppler flowmeter. An inline flowmeter was not present at these pumps. Flow at the measurement point was horizontal. Pump running time was obtained from a log book of pump running times maintained by the plant operator.

Warren Waterworks - Well 3 (30970)
Location: Bradley County
Population served: 9,000
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 13.20 inches
Pipe thickness: 0.49 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Warren Waterworks has three electric powered pumps (two 20- and a 40-hp). Flow measurements were made at Well 3 (40-hp pump) with the reflective-doppler flowmeter. An inline flowmeter was present at Well 3. Flow at the measurement point was horizontal. Pump running time was obtained from a log book of pump running times maintained by the plant operator.

Wright-Pastoria Water Association (30999)]
Location: Jefferson County
Population served: 1,640
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 5.00 inches
Pipe thickness: 0.31 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Wright-Pastoria Water Association has one 15-hp electric powered pump. Flow measurements were made at the pump near the inline flowmeter with the reflective-doppler flowmeter. Flow at the measurement point was horizontal. Pump running times were calculated from metered energy consumption of the pump and from operator logs.

Yorktown Water Association - Well 1 (31004)
Location: Lincoln County
Population served: 7,500
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 7.00 inches
Pipe thickness: 0.41 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Yorktown Water Association has four electric powered pumps (one 50-, two 60-, and one 75-hp). Flow measurements were made at one 60-hp pump near the inline flowmeter with the reflective-doppler flowmeter. Flow at the measurement point was horizontal. Pump running times were calculated from metered energy consumption of the pump.

Yorktown Water Association - Well 2 (31004)
Location: Lincoln County
Population served: 7,500
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 7.00 inches
Pipe thickness: 0.46 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Yorktown Water Association has four electric powered pumps (one 50-, two 60-, and one 75-hp). Flow measurements were made at the 75-hp pump near the inline flowmeter with the reflective-doppler flowmeter. Flow at the measurement point was horizontal. Pump running times were calculated from metered energy consumption of the pump.

Yorktown Water Association - Well 3 (31004)
Location: Lincoln County
Population served: 7,500
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 7.00 inches
Pipe thickness: 0.36 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Yorktown Water Association has four electric powered pumps (one 50-, two 60-, and one 75-hp). Flow measurements were made at the 50-hp pump near the inline flowmeter with the reflective-doppler flowmeter. Flow at the measurement point was horizontal. Pump running times were calculated from metered energy consumption of the pump.

Yorktown Water Association - Well 5 (31004)
Location: Lincoln County
Population served: 7,500
Source of water: Ground water
Pipe material: Ductile iron
Pipe diameter: 7.00 inches
Pipe thickness: 0.38 inch
Transducer spacing: **
Measurement condition rating: Good
Comments: Yorktown Water Association has four electric powered pumps (one 50-, two 60-, and one 75-hp). Flow measurements were made at one 60-hp pump near the inline flowmeter with the reflective-doppler flowmeter. Flow at the measurement point was horizontal. Pump running times were calculated from metered energy consumption of the pump.

Table 2.--*Water withdrawals computed from noninvasive flowmeter measurements, reported to State agencies, and computed from inline flowmeter measurements*

(ASWCC, Arkansas Soil and Water Conservation Commission; ADH, Arkansas Department of Health; number in parentheses is facility identification number (fig. 1); **, data not available; --, no measurement)

Month	Adjusted monthly pump run time (hours)	Water use computed from average of noninvasive flowmeter measurements (a) (gallons)	Water use reported to ASWCC (b) (gallons)	Percent difference between a and b [(a-b)/a]x100	Water use reported to ADH (c) (gallons)	Percent difference between a and c [(a-c)/a]x100	Water use computed from average of inline flowmeter measurements (d) (gallons)	Percent difference between a and d [(a-d)/a]x100
Arkansas City Waterworks (30523)								
July 1990	275	3,894,000	2,000,000	48.6	**	**	**	**
August 1990	157	2,223,120	2,000,000	10.0	**	**	**	**
September 1990	225	3,186,000	1,926,000	39.5	**	**	**	**
October 1990	195	2,761,200	2,000,000	27.6	**	**	**	**
November 1990	218	3,086,880	1,926,000	37.6	**	**	**	**
December 1990	276	3,908,160	2,000,000	48.8	**	**	**	**
Bennett Acres Mobile Home Park (30543)								
August 1990	188	131,976	149,851	-13.5	**	**	**	**
September 1990	200	140,400	149,851	-6.7	**	**	**	**
October 1990	188	131,976	149,851	-13.5	**	**	**	**
November 1990	174	122,148	149,851	-22.7	**	**	**	**
December 1990	219	153,738	149,851	2.5	**	**	**	**
January 1991	264	185,328	202,000	-9.0	**	**	**	**
February 1991	146	102,492	202,000	-97.1	**	**	**	**
Bergman Waterworks (30547)								
August 1990	331	1,846,980	1,499,153	18.8	**	**	1,744,919	5.5
September 1990	329	1,835,820	1,694,694	7.7	**	**	1,735,128	5.5
October 1990	279	1,556,820	1,499,153	3.7	**	**	1,449,405	6.9
November 1990	259	1,445,220	1,401,382	3.0	**	**	1,369,170	5.3
December 1990	280	1,562,400	1,205,840	22.8	**	**	1,485,588	4.9
January 1991	284	1,584,720	1,677,000	-5.8	**	**	1,503,752	5.1
February 1991	252	1,408,160	1,282,000	8.8	**	**	1,335,845	5.0

Table 2.--*Water withdrawals computed from noninvasive flowmeter measurements, reported to State agencies, and computed from inline flowmeter measurements*--Continued

Month	Adjusted monthly pump run time (hours)	Water use computed from average of noninvasive flowmeter measurements (a) (gallons)	Water use reported to ASWCC (b) (gallons)	Percent difference between a and b [(a-b)/a]x100	Water use reported to ADH (c) (gallons)	Percent difference between a and c [(a-c)/a]x100	Water use computed from average of inline flowmeter measurements (d) (gallons)	Percent difference between a and d [(a-d)/a]x100
Bigelow Waterworks (30551)								
June 1990	156	1,787,760	2,020,100	-13.0	**	**	1,850,904	-3.5
July 1990	162	1,856,520	1,035,100	44.2	**	**	2,294,979	-23.6
August 1990	136	1,558,560	1,640,900	-5.3	**	**	2,318,701	-48.8
September 1990	162	1,856,520	1,438,900	22.5	**	**	1,473,560	20.6
October 1990	155	1,776,300	1,567,500	11.8	**	**	1,464,931	17.5
November 1990	140	1,604,400	2,017,000	-25.7	**	**	1,657,345	-3.3
December 1990	176	2,016,960	2,017,000	.0	**	**	1,048,819	48.0
January 1991	92	1,054,320	2,200,300	-108.7	**	**	--	--
Big Flat Waterworks (30550)								
May 1990	55	603,900	599,566	0.7	648,000	-7.3	--	--
June 1990	65	713,700	798,335	-11.9	722,400	-1.2	--	--
July 1990	74	812,520	798,335	1.7	795,000	2.2	799,340	1.6
August 1990	74	812,520	808,110	.5	837,700	-3.1	635,742	21.8
September 1990	83	911,340	899,349	1.3	904,100	.8	269,010	70.5
October 1990	55	603,900	599,566	.7	603,800	.0	136,152	77.5
November 1990	55	603,900	599,566	.7	620,200	-2.7	395,280	34.5
December 1990	74	812,520	798,335	1.7	789,300	2.9	1,335,168	-64.3
Black Rock Waterworks (30556)								
June 1990	275	3,729,000	3,001,564	19.5	**	**	**	**
July 1990	290	3,932,400	3,200,365	18.6	**	**	**	**
August 1990	241	3,267,960	3,399,166	-4.0	**	**	**	**
September 1990	239	3,240,840	2,799,505	13.6	**	**	**	**
October 1990	242	3,281,520	2,098,814	36.0	**	**	**	**
November 1990	245	3,322,200	2,098,814	36.8	**	**	**	**
December 1990	266	3,606,960	2,199,844	39.0	**	**	**	**

Table 2.--*Water withdrawals computed from noninvasive flowmeter measurements, reported to State agencies, and computed from inline flowmeter measurements*--Continued

Month	Adjusted monthly pump run time (hours)	Water use computed from average of noninvasive flowmeter measurements (a) (gallons)	Water use reported to ASWCC (b) (gallons)	Percent difference between a and b [(a-b)/a]×100	Water use reported to ADH (c) (gallons)	Percent difference between a and c [(a-c)/a]×100	Water use computed from average of inline flowmeter measurements (d) (gallons)	Percent difference between a and d [(a-d)/a]×100
Black Rock Waterworks (30556)--Continued								
January 1991	290	3,932,400	**	**	**	**	**	**
February 1991	240	3,254,400	**	**	**	**	**	**
March 1991	242	3,281,520	**	**	**	**	**	**
April 1991	219	2,969,640	--	--	**	**	**	**
May 1991	226	3,064,560	--	--	**	**	**	**
Calico Rock Waterworks (30576)								
August 1990	435	8,665,200	6,191,169	28.6	**	**	**	**
September 1990	630	12,549,600	6,191,169	50.7	**	**	**	**
October 1990	658	13,107,360	5,213,616	60.2	**	**	**	**
November 1990	267	5,318,640	5,865,318	-10.3	**	**	**	**
December 1990	284	5,657,280	3,258,510	42.4	**	**	**	**
January 1991	337	6,713,040	5,131,000	23.6	5,133,400	23.5	**	**
February 1991	312	6,215,040	3,584,000	42.3	**	**	**	**
March 1991	--	--	4,467,000	--	4,531,000	--	**	**
Camden Waterworks (20600)								
May 1990	--	--	63,015,800	--	--	--	--	--
June 1990	535	108,465,000	68,019,900	37.3	76,000,000	29.9	--	--
July 1990	740	150,027,000	99,029,020	34.0	115,368,000	23.1	149,157,800	0.6
August 1990	718	145,567,000	105,030,680	27.8	93,777,000	35.6	--	--
September 1990	593	120,224,000	93,027,360	22.6	83,371,000	30.7	123,124,000	-2.4
October 1990	657	133,200,000	69,020,720	48.2	--	--	112,188,200	15.8
November 1990	453	91,841,220	68,019,900	25.9	64,510,000	29.8	--	--
December 1990	509	103,194,000	65,020,700	37.0	65,982,000	36.1	102,176,900	1.0
January 1991	496	100,559,000	64,000,000	36.4	64,624,000	35.7	--	--
February 1991	462	93,665,880	63,000,000	32.7	56,072,000	40.1	--	--

Table 2.--*Water withdrawals computed from noninvasive flowmeter measurements, reported to State agencies, and computed from inline flowmeter measurements*--Continued

Month	Adjusted monthly pump run time (hours)	Water use computed from average of noninvasive flowmeter measurements (a) (gallons)	Water use reported to ASWCC (b) (gallons)	Percent difference between a and b [(a-b)/a]x100	Water use reported to ADH (c) (gallons)	Percent difference between a and c [(a-c)/a]x100	Water use computed from average of inline flowmeter measurements (d) (gallons)	Percent difference between a and d [(a-d)/a]x100
Camden Waterworks (20600)--Continued								
March 1991	517	104,816,000	57,000,000	45.6	63,013,000	39.9	--	--
April 1991	431	87,380,000	--	--	--	--	--	--
Carthage Waterworks (30582)								
May 1990	298	2,252,880	2,141,000	5.0	**	**	1,771,761	21.4
June 1990	324	2,449,440	2,141,000	12.6	**	**	2,131,920	13.0
July 1990	335	2,532,600	2,141,000	15.5	**	**	1,841,464	27.3
August 1990	210	1,587,600	2,141,000	-34.9	**	**	1,384,690	12.8
September 1990	250	1,890,000	2,141,000	-13.3	**	**	938,120	50.4
October 1990	500	3,780,000	2,141,000	43.4	**	**	1,497,787	60.4
November 1990	444	3,356,640	2,141,000	36.2	**	**	1,760,648	47.5
December 1990	149	1,126,440	2,141,000	-90.1	**	**	2,209,712	-96.2
January 1991	260	1,965,000	2,141,000	-8.9	**	**	4,430,991	-125.4
February 1991	350	2,646,000	2,141,000	19.1	**	**	4,087,011	-54.5
March 1991	250	1,890,000	2,141,000	-13.1	**	**	1,851,444	2.0
Cass Waterworks (30584)								
June 1990	232	682,080	**	**	835,200	-22.4	**	**
July 1990	203	596,820	**	**	730,500	-22.4	**	**
August 1990	332	976,080	**	**	1,252,800	-28.4	**	**
September 1990	272	799,680	**	**	885,600	-10.7	**	**
October 1990	236	693,840	**	**	782,400	-12.8	**	**
November 1990	172	505,680	**	**	768,600	-52.0	**	**
December 1990	126	370,440	**	**	479,300	-29.4	**	**
January 1991	58	170,520	**	**	602,900	-253.6	**	**
February 1991	198	582,120	**	**	--	--	**	**
March 1991	132	388,080	**	**	--	--	**	**

Table 2.--*Water withdrawals computed from noninvasive flowmeter measurements, reported to State agencies, and computed from inline flowmeter measurements*--Continued

Month	Adjusted monthly pump run time (hours)	Water use computed from average of noninvasive flowmeter measurements (a) (gallons)	Water use reported to ASWCC (b) (gallons)	Percent difference between a and b [(a-b)/a]x100	Water use reported to ADH (c) (gallons)	Percent difference between a and c [(a-c)/a]x100	Water use computed from average of inline flowmeter measurements (d) (gallons)	Percent difference between a and d [(a-d)/a]x100
Collins Water Association (30596)								
August 1990	62	554,280	612,800	-10.5	613,800	-10.7	554,280	0.0
September 1990	62	554,280	560,464	-1.1	559,500	-.9	560,985	-1.2
October 1990	66	590,040	511,586	13.3	511,800	13.3	550,346	6.7
November 1990	54	482,760	485,518	-.6	485,000	-.5	489,644	-1.4
December 1990	58	518,520	540,913	-4.3	541,900	-4.5	508,418	1.9
January 1991	55	491,170	--	--	515,100	-4.9	482,402	1.8
February 1991	46	411,240	--	--	424,300	-3.2	407,664	.9
Dierks Waterworks (30631)								
May 1990	225	9,733,500	1,668,357	82.9	5,205,000	46.5	**	**
June 1990	254	10,988,040	2,104,997	80.8	6,460,000	41.2	**	**
July 1990	310	13,410,600	2,124,549	84.2	6,516,000	51.4	**	**
August 1990	325	14,059,500	2,049,603	85.4	6,119,000	56.5	**	**
September 1990	286	12,372,360	1,883,419	84.8	5,876,000	52.5	**	**
October 1990	266	11,507,160	1,756,337	84.7	5,386,000	53.2	**	**
November 1990	263	11,377,380	1,841,058	83.8	5,746,000	49.5	**	**
December 1990	284	12,285,840	2,088,705	83.0	6,409,000	47.8	**	**
January 1991	276	11,939,760	--	--	5,810,000	51.3	**	**
February 1991	240	10,382,400	--	--	5,804,000	44.1	**	**
Franklin Waterworks (30666)								
August 1990	145	691,650	423,500	38.8	**	**	503,236	27.2
September 1990	175	834,750	590,000	29.3	**	**	536,720	35.7
October 1990	96	457,920	461,000	-.7	**	**	488,994	-6.8
November 1990	128	610,560	503,000	17.6	**	**	611,700	-.2
December 1990	132	629,640	509,700	19.0	**	**	537,948	14.6

Table 2.--*Water withdrawals computed from noninvasive flowmeter measurements, reported to State agencies, and computed from inline flowmeter measurements*--Continued

Month	Adjusted monthly pump run time (hours)	Water use computed from average of noninvasive flowmeter measurements (a) (gallons)	Water use reported to ASWCC (b) (gallons)	Percent difference between a and b [(a-b)/a]x100	Water use reported to ADH (c) (gallons)	Percent difference between a and c [(a-c)/a]x100	Water use computed from average of inline flowmeter measurements (d) (gallons)	Percent difference between a and d [(a-d)/a]x100
Franklin Waterworks (30666)--Continued								
January 1991	113	539,010	443,500	17.7	**	**	463,495	14.0
February 1991	104	496,080	470,500	5.2	**	**	468,048	5.7
Gilmore Waterworks (30676)								
June 1990	39	678,600	1,360,700	-100.5	**	**	678,600	0.0
July 1990	39	678,600	1,058,770	-56.0	**	**	675,120	.5
August 1990	39	678,600	1,457,720	-114.8	**	**	678,600	.0
September 1990	39	678,600	1,230,280	-81.3	**	**	678,600	.0
October 1990	39	678,600	1,196,220	-76.3	**	**	701,220	-3.3
November 1990	41	713,400	1,793,350	-151.4	**	**	708,180	.7
December 1990	65	713,400	1,242,440	-74.2	**	**	1,137,960	-59.5
January 1991	105	1,131,000	1,133,530	-.2	**	**	1,169,280	-3.4
February 1991	88	1,827,000	556,020	69.6	**	**	1,524,240	16.6
March 1991	--	1,531,200	727,220	52.5	**	**	--	--
Green Forest Waterworks (30686)								
August 1990	499	25,299,300	29,978,292	-18.5	29,836,300	-17.9	**	**
September 1990	406	20,584,200	24,112,974	-17.1	24,220,900	-17.7	**	**
October 1990	564	28,594,800	30,304,143	-6.0	30,342,000	-6.1	**	**
November 1990	522	26,465,400	27,371,484	-3.4	27,336,000	-3.3	**	**
December 1990	512	25,958,400	25,416,378	2.1	25,293,100	2.6	**	**
January 1991	513	26,009,100	27,701,000	-6.5	27,701,600	-6.5	**	**
February 1991	464	23,524,800	22,622,000	3.8	22,622,600	3.8	**	**

Table 2.--*Water withdrawals computed from noninvasive flowmeter measurements, reported to State agencies, and computed from inline flowmeter measurements*--Continued

Month	Adjusted monthly pump run time (hours)	Water use computed from average of noninvasive flowmeter measurements (a) (gallons)	Water use reported to ASWCC (b) (gallons)	Percent difference between a and b [(a-b)/a]x100	Water use reported to ADH (c) (gallons)	Percent difference between a and c [(a-c)/a]x100	Water use computed from average of inline flowmeter measurements (d) (gallons)	Percent difference between a and d [(a-d)/a]x100
Guy Waterworks (30693)								
August 1990	537	2,577,600	1,345,933	47.8	**	**	2,674,082	-3.7
September 1990	519	2,491,200	1,345.933	46.0	**	**	244,464	90.2
October 1990	332	1,593,600	1,345,933	15.5	**	**	659,463	58.6
November 1990	320	1,536,000	1,345,933	12.4	**	**	670,529	56.3
December 1990	361	1,732,800	1,580,800	8.8	**	**	2,106,990	-21.6
January 1991	311	1,492,800	1,246,200	16.5	**	**	1,820,390	-29.9
February 1991	259	1,243,200	1,210,800	2.6	**	**	1,492,610	-20.1
Harrell Waterworks (30699)								
July 1990	99	867,240	877,500	-1.2	**	**	775,260	10.6
August 1990	65	569,400	877,500	-54.1	**	**	817,045	-43.5
September 1990	71	621,360	877,500	-41.2	**	**	792,955	-27.6
October 1990	76	665,760	877,500	-31.8	**	**	587,708	11.7
November 1990	70	613,200	877,500	-43.1	**	**	648,152	-5.7
December 1990	96	840,960	877,500	-4.3	**	**	869,079	-3.3
January 1991	77	674,520	877,500	-30.1	**	**	875,299	-29.8
February 1991	74	648,240	877,500	-35.4	**	**	549,420	15.2
Haskell Waterworks (30702)								
June 1990	458	3,599,880	3,845,042	-6.8	**	**	3,841,889	-6.7
July 1990	560	4,401,600	4,366,403	.8	**	**	4,400,499	.0
August 1990	426	3,348,360	1,723,752	48.5	**	**	3,578,186	-6.9
September 1990	500	3,930,000	3,809,198	3.1	**	**	3,895,573	.9
October 1990	508	3,992,880	3,929,763	1.6	**	**	4,169,808	-4.4
November 1990	527	4,142,220	4,011,226	3.2	**	**	4,200,305	-1.4
December 1990	620	4,873,200	4,653,152	4.5	**	**	4,408,281	9.5

Table 2.--*Water withdrawals computed from noninvasive flowmeter measurements, reported to State agencies, and computed from inline flowmeter measurements*--Continued

Month	Adjusted monthly pump run time (hours)	Water use computed from average of noninvasive flowmeter measurements (a) (gallons)	Water use reported to ASWCC (b) (gallons)	Percent difference between a and b [(a-b)/a]×100	Water use reported to ADH (c) (gallons)	Percent difference between a and c [(a-c)/a]×100	Water use computed from average of inline flow-meter measurements (d) (gallons)	Percent difference between a and d [(a-d)/a]×100
Holly Grove Waterworks (30713)								
June 1990	300	8,586,000	6,031,502	29.8	6,172,000	28.1	8,586,999	0.0
July 1990	249	7,126,380	6,960,177	2.3	7,095,000	.4	6,815,280	4.4
August 1990	207	5,924,340	6,517,020	-10.0	4,382,000	26.0	5,940,367	-.3
September 1990	204	5,838,480	6,005,434	-2.9	4,036,000	30.9	5,421,772	7.1
October 1990	176	5,037,120	5,327,664	-5.8	5,267,000	-4.6	5,448,103	-8.2
November 1990	201	5,752,620	5,164,738	10.2	4,833,000	16.0	5,560,866	3.3
December 1990	187	5,351,940	5,604,637	-4.7	5,624,000	-5.1	5,307,006	.8
Hoxie Waterworks (30719)								
June 1990	293	8,790,000	--	--	9,783,000	-11.3	**	**
July 1990	338	10,140,000	--	--	10,912,000	-7.6	**	**
August 1990	316	9,480,000	--	--	9,626,000	-1.5	**	**
September 1990	297	11,910,000	--	--	11,334,000	4.8	**	**
October 1990	288	8,640,000	--	--	8,620,000	.2	**	**
November 1990	279	8,370,000	--	--	9,119,000	-8.9	**	**
December 1990	294	8,820,000	--	--	8,759,000	.7	**	**
January 1991	295	8,850,000	8,854,416	0.0	8,749,000	1.1	**	**
February 1991	273	8,190,000	8,854,416	-4.8	7,670,000	6.3	**	**
Huntsville Waterworks (30723)								
June 1990	620	36,009,600	--	--	33,686,000	6.5	35,355,610	1.8
July 1990	619	35,937,600	--	--	33,177,000	7.7	36,369,690	-1.2
August 1990	638	37,055,040	--	--	32,831,000	11.4	35,697,130	3.7
September 1990	573	33,308,880	--	--	30,406,000	8.7	33,551,650	- .7
October 1990	635	36,880,800	--	--	34,299,000	7.0	36,873,830	.0
November 1990	587	34,092,960	--	--	32,232,000	5.5	34,952,540	-2.5
December 1990	637	36,996,960	--	--	35,755,000	3.4	38,480,900	-4.0

Table 2.--*Water withdrawals computed from noninvasive flowmeter measurements, reported to State agencies, and computed from inline flowmeter measurements*--Continued

Month	Adjusted monthly pump run time (hours)	Water use computed from average of noninvasive flowmeter measurements (a) (gallons)	Water use reported to ASWCC (b) (gallons)	Percent difference between a and b [(a-b)/a]x100	Water use reported to ADH (c) (gallons)	Percent difference between a and c [(a-c)/a]x100	Water use computed from average of inline flowmeter measurements (d) (gallons)	Percent difference between a and d [(a-d)/a]x100
Huntsville Waterworks (30723)--Continued								
January 1991	669	38,841,000	–	--	36,454,000	6.1	39,177,860	- .9
February 1991	616	35,762,760	–	--	34,137,000	4.5	33,665,490	5.9
March 1991	542	31,464,840	–	--	34,857,000	-10.8	31,472,390	.0
Marianna Waterworks (30778)								
June 1990	601	45,688,020	–	--	30,470,000	33.3	**	**
July 1990	621	47,208,420	–	--	32,445,000	31.3	**	**
August 1990	645	49,032,900	–	--	32,445,000	33.8	**	**
September 1990	446	33,904,920	–	--	30,910,000	8.8	**	**
October 1990	419	31,852,380	–	--	42,850,000	-34.5	**	**
November 1990	481	36,565,620	–	--	43,400,000	-18.7	**	**
December 1990	465	35,349,300	–	--	40,423,000	-14.4	**	**
January 1991	698	30,255,960	–	--	46,532,000	-53.8	**	**
February 1991	384	29,191,680	–	--	38,494,000	-31.9	**	**
Mountain Home Waterworks (includes withdrawals from pumps 1, 2, and 3) (30812)								
July 1990	–	–	100,,689,00	--	100,557,000	–	**	**
August 1990	–	–	98,732,853	--	98,778,000	–	**	**
September 1990	–	105,727,440	84,372,962	20.2	85,382,000	19.2	**	**
October 1990	–	80,833,320	69,406,263	14.1	69,222,000	14.4	**	**
November 1990	–	76,566,000	84,069,558	-9.8	54,742,000	28.5	**	**
December 1990	–	74,702,220	56,372,223	24.5	56,378,000	24.5	**	**
January 1991	–	81,883,860	57,649,000	29.6	57,649,000	29.6	**	**
February 1991	–	–	43,624,000	--	43,624,000	–	**	**

Table 2.--*Water withdrawals computed from noninvasive flowmeter measurements, reported to State agencies, and computed from inline flowmeter measurements*--Continued

Month	Adjusted monthly pump run time (hours)	Water use computed from average of noninvasive flowmeter measurements (a) (gallons)	Water use reported to ASWCC (b) (gallons)	Percent difference between a and b [(a-b)/a]x100	Water use reported to ADH (c) (gallons)	Percent difference between a and c [(a-c)/a]x100	Water use computed from average of inline flow-meter measurements (d) (gallons)	Percent difference between a and d [(a-d)/a]x100
Mountain Home Waterworks - Pump 1 (30812)								
August 1990	457	35,669,460	**	**	**	**	**	**
September 1990	466	35,593,080	**	**	**	**	**	**
October 1990	428	32,690,640	**	**	**	**	**	**
November 1990	364	27,802,320	**	**	**	**	**	**
December 1990	279	21,310,020	**	**	**	**	**	**
January 1991	239	18,254,820	**	**	**	**	**	**
Mountain Home Waterworks - Pump 2 (30812)								
August 1990	706	52,611,120	**	**	**	**	**	**
September 1990	658	49,034,160	**	**	**	**	**	**
October 1990	589	43,892,280	**	**	**	**	**	**
November 1990	579	43,147,080	**	**	**	**	**	**
December 1990	635	47,320,200	**	**	**	**	**	**
January 1991	807	60,137,640	**	**	**	**	**	**
Mountain Home Waterworks - Pump 3 (30812)								
September 1990	278	21,100,200	**	**	**	**	**	**
October 1990	56	4,250,400	**	**	**	**	**	**
November 1990	74	5,616,600	**	**	**	**	**	**
December 1990	80	6,072,000	**	**	**	**	**	**
January 1991	46	3,491,400	**	**	**	**	**	**

Table 2.--*Water withdrawals computed from noninvasive flowmeter measurements, reported to State agencies, and computed from inline flowmeter measurements*--Continued

Month	Adjusted monthly pump run time (hours)	Water use computed from average of noninvasive flowmeter measurements (a) (gallons)	Water use reported to ASWCC (b) (gallons)	Percent difference between a and b [(a-b)/a]x100	Water use reported to ADH (c) (gallons)	Percent difference between a and c [(a-c)/a]x100	Water use computed from average of inline flow-meter measurements (d) (gallons)	Percent difference between a and d [(a-d)/a]x100
Norphlet Waterworks - Well 1 (30830)								
July 1990	36	591,840	**	**	**	**	589,680	34.6
August 1990	81	1,331,640	**	**	**	**	1,326,780	35.7
September 1990	74	1,216,560	**	**	**	**	1,218,204	- .1
October 1990	71	1,167,240	**	**	**	**	1,093,260	6.3
November 1990	68	1,117,920	**	**	**	**	1,025,856	8.2
December 1990	69	1,134,360	**	**	**	**	1,344,792	-18.6
January 1991	84	1,380,960	**	**	**	**	1,376,028	.4
February 1991	76	1,249,440	**	**	**	**	1,209,984	3.2
Norphlet Waterworks - Wells 1-2 (30830)								
August 1990	--	2,862,000	4,065,684	-42.1	**	**	**	**
September 1990	--	2,943,120	3,679,330	-25.0	**	**	**	**
October 1990	--	2,658,360	2,590,678	2.5	**	**	**	**
November 1990	--	2,857,560	2,772,034	3.0	**	**	**	**
December 1990	--	3,305,640	2,536,461	23.3	**	**	**	**
January 1991	--	3,748,440	2,835,565	24.3	**	**	**	**
Ogden Waterworks - Well 1 (30836)								
June 1990	335	2,613,000	1,042,723	60.1	**	**	--	--
July 1990	513	4,001,400	1,267,560	68.3	**	**	2,165,737	45.9
August 1990	434	3,385,200	1,081,865	68.0	**	**	1,485,005	56.1
September 1990	397	3,096,600	1,277,336	58.8	**	**	2,313,573	25.3
October 1990	370	2,886,000	883,056	69.4	**	**	2,134,738	26.0
November 1990	392	3,057,600	896,090	70.7	**	**	1,754,930	42.6
December 1990	544	4,243,200	1,091,601	74.3	**	**	2,800,391	34.0
January 1991	552	4,305,600	1,032,168	76.0	**	**	2,125,134	50.6
February 1991	314	2,336,160	1,032,168	55.8	**	**	1,151,724	50.7

Table 2.--*Water withdrawals computed from noninvasive flowmeter measurements, reported to State agencies, and computed from inline flowmeter measurements*--Continued

Month	Adjusted monthly pump run time (hours)	Water use computed from average of noninvasive flowmeter measurements (a) (gallons)	Water use reported to ASWCC (b) (gallons)	Percent difference between a and b [(a-b)/a]x100	Water use reported to ADH (c) (gallons)	Percent difference between a and c [(a-c)/a]x100	Water use computed from average of inline flow-meter meas-urements (d) (gallons)	Percent difference between a and d [(a-d)/a]x100
Ogden Waterworks - Well 2 (30836)								
June 1990	232	1,726,080	1,042,723	39.6	**	**	**	**
July 1990	267	1,986,480	1,267,560	36.2	**	**	**	**
August 1990	287	2,135,280	1,081,865	49.3	**	**	**	**
September 1990	338	2,514,720	1,277,336	49.2	**	**	**	**
October 1990	280	2,083,200	883,056	57.6	**	**	**	**
November 1990	227	1,688,880	896,090	46.9	**	**	1,561,630	7.5
December 1990	233	1,733,520	1,091,601	37.0	**	**	925,893	46.4
January 1991	282	2,098,080	1,032,168	50.8	**	**	1,243,411	40.7
February 1991	314	2,336,160	1,032,168	55.8	**	**	1,047,172	55.2
Oxford Waterworks (30843)								
June 1990	229	842,262	816,000	3.1	--	--	--	--
July 1990	219	805,482	860,000	-6.8	--	--	--	--
August 1990	243	893,754	845,000	5.5	--	--	937,017	-4.8
September 1990	230	845,940	810,000	4.2	--	--	835,350	1.3
October 1990	220	809,160	769,000	5.0	--	--	863,195	-6.7
November 1990	219	805,482	720,000	10.6	--	--	756,711	6.1
December 1990	286	1,051,908	752,000	28.5	--	--	710,830	32.4
January 1991	301	1,177,078	--	--	1,293,600	-9.9	685,740	40.9
February 1991	234	860,652	--	--	1,026,300	-19.2	608,041	29.4
March 1991	228	838,584	--	--	1,071,100	-27.7	674,209	19.6
April 1991	213	783,414	--	--	974,000	-24.3	--	--
May 1991	220	809,160	--	--	--	--	--	--

Table 2.--*Water withdrawals computed from noninvasive flowmeter measurements, reported to State agencies, and computed from inline flowmeter measurements*--Continued

Month	Adjusted monthly pump run time (hours)	Water use computed from average of noninvasive flowmeter measurements (a) (gallons)	Water use reported to ASWCC (b) (gallons)	Percent difference between a and b [(a-b)/a]x100	Water use reported to ADH (c) (gallons)	Percent difference between a and c [(a-c)/a]x100	Water use computed from average of inline flowmeter measurements (d) (gallons)	Percent difference between a and d [(a-d)/a]x100
Parkin Waterworks (30852)								
June 1990	364	8,583,120	9,612,604	-12.0	**	**	**	**
July 1990	436	10,280,880	9,798,340	4.7	**	**	**	**
August 1990	452	10,658,160	9,997,109	6.2	**	**	**	**
September 1990	407	9,597,060	9,449,679	1.5	**	**	**	**
October 1990	332	7,828,560	9,384,509	-19.9	**	**	**	**
November 1990	285	6,720,300	9,123,828	-35.8	**	**	**	**
December 1990	321	7,569,180	9,091,243	-20.1	**	**	**	**
January 1991	299	7,050,420	--	--	**	**	**	**
February 1991	227	5,352,660	--	--	**	**	**	**
Perryville Waterworks - Wells 1 and 2 (30859)								
June 1990	394	11,370,840	12,799,427	-12.6	12,802,000	-12.6	12,872,710	-13.2
July 1990	554	15,988,440	15,119,486	5.4	15,122,000	5.4	15,987,570	.0
August 1990	312	9,004,320	13,969,232	-55.1	13,971,000	-55.2	9,959,874	-10.6
September 1990	459	13,246,740	12,532,229	5.4	12,533,000	5.4	12,867,230	2.9
October 1990	435	12,554,100	10,427,232	16.9	10,428,000	16.9	10,764,490	14.3
November 1990	323	9,321,780	9,205,291	1.2	9,206,000	1.2	9,055,113	2.9
December 1990	189	5,454,540	11,437,370	-109.7	11,444,000	-109.8	5,457,426	- .1
Prairie Grove Waterworks - Wells 1 and 2 (30871)								
June 1990	411	11,244,960	9,036,720	19.6	8,625,000	23.3	**	**
July 1990	447	12,229,920	10,608,040	13.3	10,113,000	17.3	**	**
August 1990	450	12,312,000	11,292,640	8.3	10,655,000	13.5	**	**
September 1990	408	11,162,880	10,405,920	6.8	9,826,000	12.0	**	**
October 1990	388	10,615,680	8,648,780	18.5	8,154,000	23.2	**	**
November 1990	345	9,439,200	8,159,780	13.6	7,642,000	19.0	**	**

Table 2.--*Water withdrawals computed from noninvasive flowmeter measurements, reported to State agencies, and computed from inline flowmeter measurements*--Continued

Month	Adjusted monthly pump run time (hours)	Water use computed from average of noninvasive flowmeter measurements (a) (gallons)	Water use reported to ASWCC (b) (gallons)	Percent difference between a and b [(a-b)/a]x100	Water use reported to ADH (c) (gallons)	Percent difference between a and c [(a-c)/a]x100	Water use computed from average of inline flow-meter meas-urements (d) (gallons)	Percent difference between a and d [(a-d)/a]x100
Prairie Grove Waterworks - Wells 1 and 2 (30871)--Continued								
December 1990	339	9,275,040	7,732,720	16.6	7,732,000	16.6	**	**
January 1991	192	5,253,120	--	--	8,558,000	-62.9	**	**
Roe Waterworks (30894)								
June 1990	119	1,306,620	257,230	80.3	**	**	1,208,898	7.5
July 1990	92	1,010,160	273,070	73.0	**	**	1,010,923	-.1
August 1990	48	527,040	482,600	8.4	**	**	522,428	.9
September 1990	45	494,100	483,110	2.2	**	**	496,955	-.6
October 1990	47	516,060	442,630	14.2	**	**	503,543	2.4
November 1990	43	472,140	400,240	15.2	**	**	554,490	-17.4
December 1990	68	746,640	360,790	51.7	**	**	707,002	5.3
January 1991	57	625,860	301,940	51.8	**	**	596,653	4.7
February 1991	39	428,220	388,400	9.3	**	**	419,436	2.1
Russell Waterworks (30896)								
June 1990	360	6,026,400	**	**	**	**	**	**
July 1990	335	5,607,900	**	**	**	**	**	**
August 1990	341	5,708,340	**	**	**	**	**	**
September 1990	323	5,407,020	**	**	**	**	**	**
October 1990	291	4,871,340	**	**	**	**	**	**
November 1990	266	4,452,840	**	**	**	**	**	**
December 1990	294	4,921,560	**	**	**	**	**	**
January 1991	314	5,256,360	**	**	**	**	**	**
February 1991	288	4,821,120	**	**	**	**	**	**

Table 2.--*Water withdrawals computed from noninvasive flowmeter measurements, reported to State agencies, and computed from inline flowmeter measurements*--Continued

Month	Adjusted monthly pump run time (hours)	Water use computed from average of noninvasive flowmeter measurements (a) (gallons)	Water use reported to ASWCC (b) (gallons)	Percent difference between a and b [(a-b)/a]×100	Water use reported to ADH (c) (gallons)	Percent difference between a and c [(a-c)/a]×100	Water use computed from average of inline flowmeter measurements (d) (gallons)	Percent difference between a and d [(a-d)/a]×100
Sidney Waterworks (30916)								
June 1990	248	1,474,608	1,480,000	-0.4	**	**	1,746,438	-18.4
July 1990	284	1,688,664	1,480,000	12.4	**	**	2,388,247	-41.4
August 1990	311	1,849,206	1,480,000	20.0	**	**	2,591,414	-40.1
September 1990	301	1,789,746	1,480,000	17.3	**	**	1,896,830	-6.0
October 1990	254	1,510,284	1,480,000	2.0	**	**	1,691,546	-12.0
November 1990	249	1,480,554	1,480,000	.0	**	**	1,587,188	-7.2
December 1990	329	1,956,234	1,480,000	24.3	**	**	1,045,950	46.5
January 1991	384	2,283,264	1,480,000	35.2	**	**	1,669,889	26.9
February 1991	400	2,378,400	1,480,000	37.8	**	**	1,492,806	37.2
St. Paul Waterworks - Well 1 (30925)								
August 1990	271	260,160	**	**	211,600	18.7	--	--
September 1990	327	313,920	**	**	251,100	20.0	281,098	26.4
October 1990	375	360,000	**	**	329,800	8.4	311,829	13.4
November 1990	384	368,640	**	**	307,100	16.7	315,406	14.4
December 1990	424	407,040	**	**	--	--	351,455	13.7
January 1991	475	456,000	375,000	17.8	462,400	-1.4	394,402	13.5
February 1991	459	440,640	385,400	12.5	385,600	12.5	391,272	11.2
St. Paul Waterworks - Well 2 (30925)								
December 1990	421	378,900	--	--	--	--	**	**
January 1991	445	400,500	108,500	72.9	153,500	61.7	**	**
February 1991	385	154,000	84,000	45.5	98,400	36.1	**	**

Table 2.--*Water withdrawals computed from noninvasive flowmeter measurements, reported to State agencies, and computed from inline flowmeter measurements*--Continued

Month	Adjusted monthly pump run time (hours)	Water use computed from average of noninvasive flowmeter measurements (a) (gallons)	Water use reported to ASWCC (b) (gallons)	Percent difference between a and b [(a-b)/a]x100	Water use reported to ADH (c) (gallons)	Percent difference between a and c [(a-c)/a]x100	Water use computed from average of inline flow-meter meas-urements (d) (gallons)	Percent difference between a and d [(a-d)/a]x100
Stamps Waterworks (30926)								
June 1990	517	19,728,720	13,942,000	29.3	**	**	19,724,900	0.0
July 1990	433	16,523,280	16,507,000	.1	**	**	15,839,070	4.1
August 1990	408	15,569,280	15,681,000	-.7	**	**	15,400,610	1.1
September 1990	340	12,974,400	12,874,000	.8	**	**	12,407,340	4.4
October 1990	329	12,554,640	12,250,000	2.4	**	**	11,629,260	7.4
November 1990	273	10,417,680	10,247,000	1.6	**	**	10,539,790	-1.2
December 1990	307	11,715,120	12,073,000	-3.1	**	**	11,674,670	.3
Stuttgart Waterworks - new water treatment plant (30932)								
July 1990	515	47,431,500	60,885,259	-28.4	**	**	47,828,450	-0.8
August 1990	532	48,997,200	57,841,811	-18.1	**	**	48,824,050	.4
September 1990	501	46,142,100	59,813,210	-29.6	**	**	42,490,330	7.9
October 1990	423	38,958,300	40,930,144	-5.1	**	**	36,419,100	6.5
November 1990	350	32,235,000	48,261,792	-49.7	**	**	31,866,600	1.1
December 1990	349	32,235,000	58,744,418	-82.2	**	**	38,355,960	-19.0
January 1991	558	51,391,800	**	**	**	**	51,391,800	.0
Stuttgart Waterworks - old water treatment plant (30932)								
June 1990	469	45,952,620	102,786,439	-123.7	**	**	47,345,890	-3.0
July 1990	540	52,908,200	62,468,895	-18.1	**	**	53,820,410	-1.7
August 1990	576	56,436,480	68,122,410	-20.7	**	**	56,391,400	.1
September 1990	554	54,280,920	57,985,185	-6.8	**	**	50,316,640	7.3
October 1999	476	46,638,480	62,657,889	-34.3	**	**	43,125,890	7.5
November 1990	384	37,624,320	57,695,178	-53.3	**	**	41,582,710	-10.5
December 1990	522	51,145,560	52,530,440	-2.7	**	**	46,593,400	8.9
January 1991	378	37,036,440	–	--	**	**	36,949,230	.2

Table 2.--*Water withdrawals computed from noninvasive flowmeter measurements, reported to State agencies, and computed from inline flowmeter measurements*--Continued

Month	Adjusted monthly pump run time (hours)	Water use computed from average of noninvasive flowmeter measurements (a) (gallons)	Water use reported to ASWCC (b) (gallons)	Percent difference between a and b [(a-b)/a]x100	Water use reported to ADH (c) (gallons)	Percent difference between a and c [(a-c)/a]x100	Water use computed from average of inline flowmeter measurements (d) (gallons)	Percent difference between a and d [(a-d)/a]x100
Stuttgart Waterworks - old water treatment plant (30932)--Continued								
February 1991	334	32,725,320	--	--	**	**	31,820,960	2.8
March 1991	274	26,846,520	--	--	**	**	26,850,430	.0
Thornton Waterworks (30945)								
June 1990	233	1,551,780	1,416,366	8.7	**	**	1,793,005	-15.5
July 1990	281	1,871,460	1,416,366	24.3	**	**	1,898,899	-1.5
August 1990	303	2,017,980	1,416,366	29.8	**	**	2,003,594	.7
September 1990	294	1,958,040	1,416,366	27.7	**	**	1,818,180	7.1
October 1990	240	1,598,400	1,416,366	11.4	**	**	1,591,007	.5
November 1990	230	1,531,800	1,416,366	7.5	**	**	1,546,052	-.9
December 1990	259	1,724,940	1,416,366	17.9	**	**	1,583,548	8.2
Trumann Waterworks - City Hall Well and Water Plant Well (30950)								
June 1990	--	--	46,994,232	--	--	--	**	**
July 1990	--	44,066,880	53,993,510	-22.5	54,944,000	-24.7	**	**
August 1990	--	42,452,520	52,996,406	-24.8	52,977,000	-24.8	**	**
September 1990	--	40,095,660	45,997,128	-14.7	46,932,000	-17.1	**	**
October 1990	--	44,175,120	39,994,952	9.5	40,839,000	7.6	**	**
November 1990	--	32,109,660	36,997,122	-15.2	37,032,000	-15.3	**	**
December 1990	--	43,383,120	40,998,572	5.5	37,483,000	13.6	**	**
January 1991	--	33,456,720	40,000,000	-19.6	39,926,000	-19.3	**	**
February 1991	--	27,584,700	35,000,000	-26.9	34,730,000	-25.9	**	**
Trumann Waterworks - City Hall Well (30950)								
June 1990	--	--	23,497,116	--	23,799,000	--	**	**
July 1990	448	26,906,880	26,996,755	-0.3	27,322,000	-1.5	**	**

Table 2.--*Water withdrawals computed from noninvasive flowmeter measurements, reported to State agencies, and computed from inline flowmeter measurements*--Continued

Month	Adjusted monthly pump run time (hours)	Water use computed from average of noninvasive flowmeter measurements (a) (gallons)	Water use reported to ASWCC (b) (gallons)	Percent difference between a and b [(a-b)/a]×100	Water use reported to ADH (c) (gallons)	Percent difference between a and c [(a-c)/a]×100	Water use computed from average of inline flow-meter meas-urements (d) (gallons)	Percent difference between a and d [(a-d)/a]×100
Trumann Waterworks - City Hall Well (30950)--Continued								
August 1990	422	25,345,320	26,498,203	-4.5	26,488,500	-4.5	**	**
September 1990	381	22,882,860	22,998,564	-.5	23,466,000	-2.5	**	**
October 1990	332	19,939,920	19,997,476	-.3	20,419,500	-2.4	**	**
November 1990	321	19,279,260	18,498,561	4.0	18,516,000	4.0	**	**
December 1990	332	19,939,920	20,499,286	-2.8	18,741,500	6.0	**	**
January 1991	332	19,939,920	20,000,000	-.3	19,963,000	-.1	**	**
February 1991	265	15,915,900	17,500,000	-10.0	17,365,000	-9.1	**	**
Trumann Waterworks - Davis Street Well (30950)								
June 1990	--	--	23,497,116	--	23,799,000	--	**	**
July 1990	325	17,160,000	26,996,755	-57.3	27,322,000	-59.2	**	**
August 1990	324	17,107,800	26,498,203	-54.9	26,488,500	-54.8	**	**
September 1990	326	17,212,800	22,998,564	-33.6	23,466,000	-36.3	**	**
October 1990	459	24,235,200	19,997,476	17.5	20,419,500	15.7	**	**
November 1990	243	12,830,400	18,498,561	-44.2	18,516,000	-44.3	**	**
December 1990	444	23,443,200	20,499,286	12.6	18,741,500	20.1	**	**
January 1991	256	13,516,800	20,000,000	-48.0	19,963,000	-47.7	**	**
February 1991	221	11,668,800	17,500,000	-50.0	17,365,000	-48.8	**	**
Ward Waterworks - Well 2 (30969)								
June 1990	471	8,393,229	6,865,681	18.2	**	**	**	**
July 1990	233	4,152,060	6,816,803	-64.2	**	**	**	**
August 1990	272	4,847,040	5,526,433	-14.0	**	**	**	**
September 1990	308	5,488,560	3,737,511	31.9	**	**	**	**
October 1990	425	7,573,500	3,072,775	59.4	**	**	**	**
November 1990	270	6,593,400	3,118,394	52.7	**	**	**	**
December 1990	487	8,678,640	3,160,755	63.6	**	**	**	**

Table 2.--*Water withdrawals computed from noninvasive flowmeter measurements, reported to State agencies, and computed from inline flowmeter measurements*--Continued

Month	Adjusted monthly pump run time (hours)	Water use computed from average of noninvasive flowmeter measurements (a) (gallons)	Water use reported to ASWCC (b) (gallons)	Percent difference between a and b [(a-b)/a]x100	Water use reported to ADH (c) (gallons)	Percent difference between a and c [(a-c)/a]x100	Water use computed from average of inline flow-meter meas-urements (d) (gallons)	Percent difference between a and d [(a-d)/a]x100
Ward Waterworks - Well 2 (30969)--Continued								
January 1991	688	12,260,160	--	--	**	**	**	**
February 1991	529	9,426,780	--	--	**	**	**	**
Ward Waterworks - Well 4 (30969)								
June 1990	137	3,978,480	4,122,015	-3.6	**	**	**	**
July 1990	162	4,704,480	4,881,248	-3.8	**	**	**	**
August 1990	161	4,675,440	4,829,112	-3.3	**	**	**	**
September 1990	185	5,372,400	5,549,242	-3.3	**	**	**	**
October 1990	164	4,762,560	4,930,126	-3.5	**	**	**	**
November 1990	132	3,833,2380	3,949,314	-3.0	**	**	**	**
December 1990	154	4,472,160	4,620,567	-3.3	**	**	**	**
Warren Waterworks - Wells 1 and 2 (30970)								
May 1990	--	--	26,012,685	--	25,015,500	--	**	**
June 1990	--	--	29,870,761	--	29,876,700	--	**	**
July 1990	--	--	32,343,970	--	32,348,600	--	**	**
August 1990	--	--	29,893,571	--	29,898,900	--	**	**
September 1990	--	--	27,540,927	--	27,546,100	--	**	**
October 1990	354	30,899,400	25,142,663	18.6	25,148,000	18.6	**	**
November 1990	340	28,914,160	22,949,686	20.6	26,898,000	7.0	**	**
December 1990	330	30,427,020	24,256,348	20.3	28,031,000	7.9	**	**
January 1991	328	31,011,300	23,863,000	23.1	31,200,000	-.6	**	**
February 1991	241	23,638,260	20,736,000	12.3	24,786,000	-4.9	**	**

Table 2.--*Water withdrawals computed from noninvasive flowmeter measurements, reported to State agencies, and computed from inline flowmeter measurements*--Continued

Month	Adjusted monthly pump run time (hours)	Water use computed from average of noninvasive flowmeter measurements (a) (gallons)	Water use reported to ASWCC (b) (gallons)	Percent difference between a and b [(a-b)/a]x100	Water use reported to ADH (c) (gallons)	Percent difference between a and c [(a-c)/a]x100	Water use computed from average of inline flow-meter meas-urements (d) (gallons)	Percent difference between a and d [(a-d)/a]x100
Warren Waterworks - Well 3 (30970)								
October 1990	152	16,817,280	**	**	**	**	16,417,870	2.4
November 1990	139	15,378,960	**	**	**	**	15,854,710	-3.1
December 1990	156	17,259,840	**	**	**	**	17,495,500	-1.4
January 1991	162	17,923,680	**	**	**	**	17,403,670	2.9
February 1991	127	14,051,280	**	**	**	**	14,064,550	-.1
Wright-Pastoria Water Association (30999)								
May 1990	239	2,552,520	2,359,161	7.6	2,359,200	7.6	2,552,626	0.0
June 1990	224	2,392,320	2,486,293	-3.9	2,487,500	-4.0	2,393,388	0.0
July 1990	233	2,488,440	2,645,910	-6.3	2,646,000	-6.3	2,482,779	.2
August 1990	206	2,200,080	2,329,835	-5.9	2,329,300	-5.9	2,011,044	8.6
September 1990	208	2,221,440	2,342,869	-5.5	2,344,500	-5.5	1,926,672	13.3
October 1990	177	1,890,360	2,127,807	-12.6	2,127,500	-12.5	1,979,078	-4.7
November 1990	172	1,836,960	1,912,745	-4.1	1,911,700	-4.1	2,295,695	-25.0
December 1990	220	2,349,600	2,267,923	3.5	2,268,000	3.5	--	--
Yorktown Water Association - Wells 1 and 2 (31004)								
June 1990	**	**	**	**	22,000,000	**	**	**
July 1990	**	**	**	**	--	**	**	**
August 1990	**	**	**	**	4,800,000	**	**	**
September 1990	**	**	**	**	12,600,000	**	**	**
October 1990	**	**	**	**	10,869,000	**	**	**
November 1990	**	**	**	**	--	**	**	**
December 1990	**	**	**	**	--	**	**	**
January 1991	**	**	**	**	9,027,000	**	**	**
February 1991	**	**	**	**	7,530,000	**	**	**

Table 2.--*Water withdrawals computed from noninvasive flowmeter measurements, reported to State agencies, and computed from inline flowmeter measurements*--Continued

Month	Adjusted monthly pump run time (hours)	Water use computed from average of noninvasive flowmeter measurements (a) (gallons)	Water use reported to ASWCC (b) (gallons)	Percent difference between a and b [(a-b)/a]x100	Water use reported to ADH (c) (gallons)	Percent difference between a and c [(a-c)/a]x100	Water use computed from average of inline flowmeter measurements (d) (gallons)	Percent difference between a and d [(a-d)/a]x100
Yorktown Water Association - Wells 1 and 2 (31004)--Continued								
March 1991	**	**	**	**	14,472,000	**	**	**
April 1991	**	**	**	**	7,361,000	**	**	**
Yorktown Water Association - Well 1 (31004)								
October 1990	72	1,378,080	**	**	**	**	2,518,058	-82.7
November 1990	204	3,904,560	**	**	**	**	4,184,386	-7.2
December 1990	321	6,143,940	**	**	**	**	6,141,643	.0
Yorktown Water Association - Well 2 (31004)								
May 1990	20	427,200	**	**	**	**	427,986	-0.2
June 1990	310	6,621,600	**	**	**	**	6,584,700	.6
July 1990	174	3,716,640	**	**	**	**	4,108,784	-10.6
August 1990	729	15,571,440	**	**	**	**	15,195,560	2.4
September 1990	640	13,670,400	**	**	**	**	12,478,000	8.7
October 1990	513	10,957,680	**	**	**	**	9,725,751	11.2
November 1990	408	8,714,880	**	**	**	**	7,852,572	9.9
December 1990	279	5,959,440	**	**	**	**	5,280,458	11.4
January 1991	207	4,421,520	**	**	**	**	4,476,780	-1.2
February 1991	205	4,378,800	**	**	**	**	4,346,118	.7
March 1991	176	3,759,360	**	**	**	**	3,772,490	-.3
Yorktown Water Association - Well 3 (31004)								
May 1990	--	--	2,300,500	--	**	**	--	--
June 1990	310	6,621,600	2,398,263	63.8	**	**	5,859,000	11.5
July 1990	174	3,716,640	2,499,277	32.8	**	**	3,634,470	2.2
August 1990	744	15,891,840	4,500,002	71.7	**	**	14,061,600	11.5

Table 2.--*Water withdrawals computed from noninvasive flowmeter measurements, reported to State agencies, and computed from inline flowmeter measurements*--Continued

Month	Adjusted monthly pump run time (hours)	Water use computed from average of noninvasive flowmeter measurements (a) (gallons)	Water use reported to ASWCC (b) (gallons)	Percent difference between a and b [(a-b)/a]x100	Water use reported to ADH (c) (gallons)	Percent difference between a and c [(a-c)/a]x100	Water use computed from average of inline flowmeter measurements (d) (gallons)	Percent difference between a and d [(a-d)/a]x100
Yorktown Water Association - Well 3 (31004)--Continued								
September 1990	720	15,379,200	3,300,870	78.5	**	**	11,918,340	22.5
October 1990	513	10,957,680	3,300,870	69.9	**	**	8,581,545	21.7
November 1990	408	8,714,880	3,098,938	64.4	**	**	7,614,243	12.6
December 1990	404	8,629,440	2,499,277	71.0	**	**	6,986,007	19.0
January 1991	328	7,006,080	2,200,000	68.6	**	**	5,975,424	14.7
February 1991	186	3,972,960	2,600,000	34.6	**	**	3,513,888	11.6
March 1991	--	--	1,900,000	--	**	**	--	--
April 1991	--	--	2,000,000	--	**	**	--	--
Yorktown Water Association - Well 5 (31004)								
May 1990	--	--	2,698,046	--	**	**	--	--
June 1990	75	1,435,500	2,900,073	-102.0	**	**	1,435,500	0.0
July 1990	219	4,191,660	2,900,073	30.8	**	**	4,213,671	-.5
August 1990	259	4,957,260	3,998,191	19.3	**	**	4,509,958	9.0
September 1990	173	3,311,220	3,698,408	-11.7	**	**	3,099,531	6.4
October 1990	150	2,871,000	4,799,785	-67.2	**	**	3,036,361	-5.8
November 1990	158	3,024,120	3,300,870	-9.2	**	**	3,101,828	-2.6
December 1990	177	3,387,780	3,098,843	8.5	**	**	3,492,475	-3.1
January 1991	189	3,617,460	2,700,000	25.4	**	**	3,605,593	.3
February 1991	164	3,138,960	3,300,000	-5.1	**	**	3,140,491	.0
March 1991	--	--	2,400,000	--	**	--	--	--
April 1991	--	--	3,200,000	--	**	--	--	--

Table 3.--*Flow data collected from public water-supply systems in Arkansas where record of pump running time was obtained from log books kept by the plant operator*

(Values were not rounded. ID, identification number; gal/min, gallons per minute; gal, gallons; --, no measurement; **, data not available)

Facility name	Facility ID (fig. 1)	Measurement date	Pipeflow measured by noninvasive flowmeter (gal/min)	Pipeflow measured by inline flowmeter (gal/min)	Water flowing through inline flowmeter since last visit (gal)
Bigelow	30551	6-19-90	156	160	--
		7-31-90	--	--	2,906,980
		8-24-90	186	187	1,302,434
		9-13-90	185	200	1,066,045
		10-12-90	187	215	1,472,600
		11-28-90	203	205	2,238,095
		12-18-90	210	200	951,920
		1-22-91	210	--	2,254,785
		Average	191	194	**
Big Flat	30550	7-17-90	181	172	--
		8-15-90	185	180	800,000
		9-25-90	190	182	908,800
		11-14-90	187	177	1,137,100
		12-12-90	192	179	837,900
		1-16-91	195	183	1,130,000
		2-21-91	164	160	540,400
		3-19-91	173	170	534,700
		Average	183	175	**
Calico Rock	30576	11-14-90	326	**	**
		12-12-90	330	**	**
		1-16-91	333	**	**
		2-14-91	331	**	**
		3-18-91	354	**	**
		6-04-91	320	**	**
		Average	332	**	**
Camden	20600	6-20-90	3,722	**	--
		7-25-90	4,311	**	22,742,200
		9-20-90	2,618	**	68,634,000
		10-14-90	3,154	**	59,294,000
		12-19-90	3,176	**	139,009,000
		3-26-91	3,295	**	--
		Average	3,379	**	**
Carthage	30582	5-15-90	--	100	--
		7-26-90	112	120	4,745,030
		8-21-90	140	150	1,886,000
		9-13-90	--	--	1,803,000
		10-16-90	124	120	3,601,000
		11-27-90	119	120	3,198,160
		12-17-90	145	150	1,342,840
		1-29-91	126	125	1,950,850
		2-27-91	122	130	2,733,150
		3-29-91	122	125	18,732,210
		Average	126	12	**

Table 3.--*Flow data collected from public water-supply systems in Arkansas where record of pump running time was obtained from log books kept by the plant operator*--Continued

Facility name	Facility ID (fig. 1)	Measurement date	Pipeflow measured by noninvasive flowmeter (gal/min)	Pipeflow measured by inline flowmeter (gal/min)	Water flowing through inline flowmeter since last visit (gal)
Cass	30584	7-16-90	42	**	**
		8-16-90	41	**	**
		9-28-90	42	**	**
		11-16-90	51	**	**
		12-07-90	51	**	**
		1-18-91	54	55	**
		2-20-91	54	57	2,845,670
		3-21-91	54	--	711,770
		Average	49	56	**
Dierks	30631	5-14-90	--	550	--
		6-18-90	--	850	12,761,200
		7-26-90	926	940	15,532,600
		9-21-90	715	720	52,059,800
		10-15-90	734	730	820,600
		11-26-90	678	675	14,105,000
		12-19-90	599	610	8,479,000
		1-23-91	674	670	12,285,400
		2-28-91	--	--	11,998,600
		3-25-91	--	--	8,523,700
		Average	721	718	**
Guy	30693	7-27-90	74	72	--
		8-24-90	93	97	2,411,530
		9-13-90	104	103	3,207,420
		11-29-90	36	33	914,760
		12-12-90	74	88	696,960
		1-14-91	72	99	2,465,100
		2-15-91	84	92	1,396,560
		3-14-91	100	99	1,740,420
		Average	80	85	**
Harrell	30699	7-24-90	--	--	--
		8-28-90	--	--	957,500
		9-17-90	142	150	684,100
		10-15-90	142	145	597,500
		11-19-90	149	152	803,900
		12-20-90	147	150	718,700
		1-24-91	147	150	1,011,200
		2-26-91	--	--	841,800
		3-27-91	150	150	662,800
		Average	146	150	**

Table 3.--*Flow data collected from public water-supply systems in Arkansas where record of pump running time was obtained from log books kept by the plant operator*--Continued

Facility name	Facility ID (fig. 1)	Measurement date	Pipeflow measured by noninvasive flowmeter (gal/min)	Pipeflow measured by inline flowmeter (gal/min)	Water flowing through inline flowmeter since last visit (gal)
Haskell	30702	5-04-90	151	132	--
		6-19-90	161	140	5,176,800
		7-31-90	107	130	3,512,400
		8-21-90	156	140	4,648,600
		9-14-90	115	127	3,174,800
		10-12-90	119	129	3,388,200
		11-27-90	122	127	6,034,700
		12-18-90	119	125	2,987,300
		1-29-91	177	174	7,033,400
		Average	136	136	**
Holly Grove	30713	6-21-90	468	475	--
		7-23-90	--	--	7,474,000
		8-27-90	--	--	6,221,000
		9-17-90	453	450	1,874,000
		10-17-90	526	500	5,499,000
		11-20-90	415	400	5,733,000
		12-21-90	493	500	5,410,000
		1-25-91	507	500	6,969,000
		Average	477	471	**
Huntsville	30723	6-14-90	916	930	--
		7-19-90	945	910	38,346,000
		8-15-90	920	900	28,358,000
		9-27-90	1,073	925	44,673,000
		11-15-90	944	920	55,142,000
		12-06-90	968	940	20,759,000
		1-17-91	998	950	48,686,000
		2-20-91	989	950	41,897,500
		3-20-91	--	960	33,041,500
		Average	969	932	**
Marianna	30778	9-17-90	1,229	**	**
		10-17-90	1,242	**	**
		11-19-90	1,303	**	**
		12-20-90	1,261	**	**
		1-25-91	1,278	**	**
		2-25-91	1,292	**	**
		Average	1,268	**	**
Perryville Wells 1 and 2	30859	6-01-90	372	--	--
		6-19-90	407	--	--
		7-31-90	455	--	1,358,000
		8-24-90	535	525	13,731,000
		9-14-90	597	555	10,899,000
		10-12-90	435	400	10.289,000
		11-28-90	487	475	14,729,000
		12-17-90	567	550	6,141,000
		1-22-91	471	455	14,166,000
		Average	493	**	**

Table 3.--*Flow data collected from public water-supply systems in Arkansas where record of pump running time was obtained from log books kept by the plant operator*--Continued

Facility name	Facility ID (fig. 1)	Measurement date	Pipeflow measured by noninvasive flowmeter (gal/min)	Pipeflow measured by inline flowmeter (gal/min)	Water flowing through inline flowmeter since last visit (gal)
Prairie Grove Wells 1 and 2	30871	6-14-90	396	--	**
		7-10-90	453	458	**
		8-16-90	455	458	**
		9-27-90	476	440	**
		11-15-90	472	440	**
		12-06-90	485	440	**
		1-17-91	472	480	**
		Average	458	453	**
Roe	30894	6-21-90	192	180	--
		8-27-90	--	--	1,315,900
		9-17-90	198	180	522,100
		10-17-90	155	150	488,100
		11-20-90	181	180	511,000
		12-21-90	186	180	461,322
		1-25-91	182	180	728,858
		2-25-91	--	--	513,220
		3-27-91	186	180	454,850
		Average	183	176	**
Stamps	30926	6-18-90	644	630	--
		7-25-90	--	--	18,779,825
		8-29-90	599	640	17,738,545
		9-19-90	647	630	9,791,930
		10-15-90	645	620	9,484,392
		11-26-90	611	625	14,660,678
		12-19-90	647	655	8,156,500
		1-23-91	659	650	14,102,450
		Average	636	636	**
Stamps	30926	6-18-90	644	630	--
		7-25-90	--	--	18,779,825
		8-29-90	599	640	17,738,545
		9-19-90	647	630	9,791,930
		10-15-90	645	620	9,484,392
		11-26-90	611	625	14,660,678
		12-19-90	647	655	8,156,500
		1-23-91	659	650	14,102,450
		Average	636	636	**
Stuttgart (new water treatment plant)	30932	5-17-90	--	3,000	--
		6-22-90	1,294	3,000	69,852,000
		7-23-90	1,615	1,680	63,221,000
		8-27-90	1,358	3,648	88,803,000
		9-17-90	1,486	1,475	55,742,000
		10-17-90	1,632	1,650	50,581,000
		11-20-90	1,700	1,700	66,996,000
		12-21-90	1,483	1,450	52,796,000
		1-25-91	1,592	1,715	103,089,000
		2-25-91	1,659	1,700	37,211,000
		3-27-91	1,535	2,102	67,957,000
		Average	1,535	2,102	**

Table 3.--*Flow data collected from public water-supply systems in Arkansas where record of pump running time was obtained from log books kept by the plant operator*--Continued

Facility name	Facility ID (fig. 1)	Measurement date	Pipeflow measured by noninvasive flowmeter (gal/min)	Pipeflow measured by inline flowmeter (gal/min)	Water flowing through inline flowmeter since last visit (gal)
Stuttgart (old water treatment plant)	30932	5-17-90	--	2,200	--
		6-22-90	2,727	2,425	58,614,500
		7-23-90	1,957	1,760	68,220,000
		8-27-90	1,935	1,600	68.226.500
		9-17-90	1,767	1,750	45,045,100
		10-17-90	1,534	1,575	51,384,900
		11-20-90	1,805	1,800	52,932,600
		12-21-90	931	925	48,467,500
		1-26-91	1,757	1,790	53,713,800
		2-25-91	935	950	35,623,900
		3-27-91	984	975	28,891,300
		Average	1,633	1,614	**
Thornton	30945	6-02-90	114	110	--
		7-25-90	--	--	2,127,050
		8-24-90	118	97	4,762,500
		9-19-90	115	100	2,682,310
		10-16-90	107	100	1,485,410
		11-27-90	111	100	1,937,380
		12-20-90	107	105	1,026,400
		1-24-91	106	110	20,074,780
		Average	111	103	**
Warren Wells 1 and 2	30970	5-15-90	--	**	--
		6-18-90	--	**	3,007,250
		7-24-90	602	**	30,228,500
		8-28-90	--	**	30,228,500
		9-20-90	692	**	20,101,000
		10-18-90	--	**	23,178,700
		11-19-90	--	**	24,872,600
		12-20-90	694	**	22,956,000
		1-29-91	--	**	27,502,000
		2-26-91	--	**	24,474,000
		3-26-91	663	**	20,405,500
		Average	663	**	**
Warren Well 3	30970	5-15-90	--	--	--
		6-18-90	1,650	--	--
		7-24-90	--	--	--
		8-28-90	--	--	--
		9-20-90	--	--	--
		10-18-90	1,726	1,730	377,900
		11-19-90	1,733	1,730	108,900
		12-20-90	**1,703**	**1,720**	**339,700**
		1-29-91	2,096	2,145	456,300
		2-26-91	2,153	2,220	122,700
		3-26-91	1,844	1,909	512,300
		Average	1,844	1,909	**

Table 3.--*Flow data collected from public water-supply systems in Arkansas where record of pump running time was obtained from log books kept by the plant operator*--Continued

Facility name	Facility ID (fig. 1)	Measure-ment date	Pipeflow measured by noninvasive flowmeter (gal/min)	Pipeflow measured by inline flowmeter (gal/min)	Water flowing through inline flowmeter since last visit (gal)
Wright-Pastoria	30999	5-31-90	179	185	--
		7-30-90	--	--	506,620
		8-22-90	156	189	170,910
		9-17-90	180	188	213,930
		10-11-90	192	200	172,290
		11-21-90	188	185	266,490
		12-18-90	170	172	172,930
		1-28-91	185	182	311,900
		Average	179	186	**

Table 4.--*Flow data collected from public water-supply systems in Arkansas where record of pump running time was determined from either electric energy consumption or vibration time totalizer*

(The numeric values in table are presented as reported or measured. ID, identification number; h/d, hours per day; gal/min, gallons per minute; gal, gallons; --, no measurement; **, data not available; NA, not applicable)

Facility name	Facility ID (fig.1)	Measurement date	Pump running time since last measurement (days)	Pump running time since last measurement (hours)	Average pumping rate for period of time since last measurement (h/d)	Pipeflow measured by noninvasive flowmeter (gal/min)	Pipeflow measured by inline flowmeter (gal/min)	Water flowing through inline flowmeter since last measurement (gal)
Arkansas City	30523	6-21-90	--	--	--	--	**	**
		7-24-90	33	335	10.1	231	**	**
		8-28-90	35	165	4.7	242	**	**
		9-18-90	21	174	8.3	247	**	**
		10-18-90	30	190	6.3	238	**	**
		11-19-90	32	203	6.3	224	**	**
		1-24-91	66	590	8.9	236	**	**
		Average	NA	NA	NA	236	NA	NA
Bennett Acres	30543	7-13-90	--	--	--	--	**	**
		8-21-90	39	223	5.7	11	**	**
		9-12-90	22	149	6.8	12	**	**
		10-10-90	28	186	6.6	12	**	**
		11-28-90	49	283	5.8	12	**	**
		12-18-90	20	119	5.9	12	**	**
		1-29-91	42	367	8.7	12	**	**
		2-22-91	24	143	6.0	11	**	**
		3-29-91	35	237	6.8	12	**	**
		Average	NA	NA	NA	12	NA	NA
Bergman	30547	7-18-90	--	--	--	97	95	--
		8-15-90	28	283	10.1	86	88	1,493,000
		9-27-90	43	480	11.2	98	96	2,540,000
		11-15-90	49	441	9.0	96	88	2,291,000
		12-06-90	21	174	8.3	85	80	935,000
		1-17-91	42	385	9.2	92	88	2,047,000
		2-21-91	35	318	9.1	96	90	1,688,000
		3-20-91	27	234	8.7	93	89	1,246,000
		Average	NA	NA	NA	93	89	NA
Black Rock	30556	5-08-90	--	--	--	--	--	**
		6-12-90	35	219	6.3	--	--	**
		7-16-90	34	377	11.1	--	--	**
		8-14-90	29	219	7.5	--	--	**
		9-25-90	42	336	8.0	227	246	**
		11-14-90	50	388	7.8	222	246	**
		12-12-90	28	195	7.0	220	246	**
		1-16-91	35	336	9.6	222	246	**
		2-13-91	29	255	9.1	222	246	**
		3-19-91	33	268	8.1	238	246	**
		6-03-91	76	558	7.3	226	246	**
		Average	NA	NA	NA	225	246	NA

Table 4.--*Flow data collected from public water-supply systems in Arkansas where record of pump running time was determined from either electric energy consumption or vibration time totalizer*--Continued

Facility name	Facility ID (fig. 1)	Measurement date	Pump running time since last measurement (days)	Pump running time since last measurement (hours)	Average pumping rate for period of time since last measurement (h/d)	Pipeflow measured by noninvasive flowmeter (gal/min)	Pipeflow measured by inline flowmeter (gal/min)	Water flowing through inline flowmeter since last measurement (gal)
Collins	30596	8-28-90	--	--	--	--	150	--
		9-17-90	20	--	--	121	129	425,700
		10-18-90	31	96	3.1	150	150	526,100
		11-19-90	32	77	2.4	155	157	494,625
		12-20-90	31	--	--	154	157	505,308
		1-24-91	35	208	5.9	162	165	630,774
		3-26-91	61	152	5.4	148	151	928,458
		Average	NA	NA	NA	148	151	NA
Franklin	30666	5-08-90	--	--	--	--	75	--
		6-12-90	35	--	--	--	--	--
		7-17-90	35	--	--	--	--	--
		8-14-90	28	74	2.6	--	--	383,800
		9-25-90	42	156	6.4	75	75	769,200
		11-14-90	50	156	3.1	72	73	788,700
		12-12-90	28	148	5.3	81	83	684,000
		1-16-91	35	125	3.6	84	81	476,000
		2-14-91	29	108	3.7	85	80	475,400
		3-19-91	33	123	3.7	80	83	562,300
		6-04-91	77	278	--	80	79	1,444,500
		Average	NA	NA	NA	80	79	NA
Gilmore	30676	5-07-90	--	--	--	--	--	--
		6-11-90	35	46	1.3	289	300	--
		7-16-90	35	44	1.3	285	295	2,516,340
		8-13-90	28	35	1.2	288	300	2,077,650
		9-24-90	42	54	1.3	--	--	--
		11-13-90	50	64	1.3	290	300	585,940
		12-11-90	28	39	1.4	--	--	--
		1-15-91	35	88	2.5	291	300	--
		2-13-91	29	121	4.2	295	300	2,602,800
		3-18-91	33	74	2.2	290	299	1,791,440
		Average	NA	NA	NA	290	299	NA
Green Forest	30686	7-19-90	--	--	--	--	--	**
		8-15-90	27	530	19.6	833	850	**
		9-26-90	42	537	12.8	848	850	**
		11-15-90	50	909	18.2	832	850	**
		12-06-90	21	349	16.6	851	850	**
		1-17-91	42	693	16.5	848	850	**
		2-20-91	34	565	16.6	857	850	**
		3-20-91	28	463	16.5	845	850	**
		Average	NA	NA	NA	845	850	NA

Table 4.--*Flow data collected from public water-supply systems in Arkansas where record of pump running time was determined from either electric energy consumption or vibration time totalizer*--Continued

Facility name	Facility ID (fig. 1)	Measurement date	Pump running time since last measurement (days)	Pump running time since last measurement (hours)	Average pumping rate for period of time since last measurement (h/d)	Pipeflow measured by noninvasive flowmeter (gal/min)	Pipeflow measured by inline flowmeter (gal/min)	Water flowing through inline flowmeter since last measurement (gal)
Hoxie	30719	5-08-90	--	--	--	--	**	**
		6-12-90	35	256	7.3	572	**	**
		7-16-90	34	388	11.4	--	**	**
		8-14-90	29	303	10.4	504	**	**
		9-25-90	42	422	10.0	416	**	**
		11-14-90	50	465	9.3	510	**	**
		12-12-90	28	259	9.3	--	**	**
		1-16-91	35	335	9.6	501	**	**
		2-13-91	28	272	9.7	496	**	**
		3-19-91	33	322	9.8	500	**	**
		Average	NA	NA	NA	500	NA	NA
Mountain Home Pump 1	30812	6-13-90	--	--	--	1,355	**	**
		7-18-90	35	--	--	1,267	**	**
		8-14-90	27	383	14.2	1,297	**	**
		9-26-90	43	680	15.8	1,270	**	**
		11-15-90	50	389	13.8	1,210	**	**
		12-13-90	28	293	10.5	1,233	**	**
		1-17-91	35	275	7.9	1,277	**	**
		2-14-91	28	210	7.5	1,273	**	**
		Average	NA	NA	NA	1,242	NA	NA
Mountain Home Pump 2	30812	6-13-90	--	--	--	1,270	**	**
		7-18-90	35	--	--	1,176	**	**
		8-14-90	27	626	23.2	1,267	**	**
		9-26-90	43	964	22.4	1,245	**	**
		11-15-90	50	951	19.0	1,280	**	**
		12-13-90	28	550	19.6	1,210	**	**
		1-17-91	35	739	21.1	1,245	**	**
		2-14-91	28	896	32.0	1,242	**	**
		Average	NA	NA	NA	1,242	NA	NA
Mountain Home Pump 3	30812	7-18-90	--	--	--	**	**	**
		8-14-90	27	--	--	**	**	**
		9-26-90	43	449	10.4	**	**	**
		11-15-90	50	89	1.8	**	**	**
		12-13-90	28	87	3.1	**	**	**
		1-17-91	35	78	2.2	**	**	**
		2-14-91	28	16	.6	**	**	**
		Average	NA	NA	NA	NA	NA	NA

Table 4.--*Flow data collected from public water-supply systems in Arkansas where record of pump running time was determined from either electric energy consumption or vibration time totalizer*--Continued

Facility name	Facility ID (fig. 1)	Measurement date	Pump running time since last measurement (days)	Pump running time since last measurement (hours)	Average pumping rate for period of time since last measurement (h/d)	Pipeflow measured by noninvasive flowmeter (gal/min)	Pipeflow measured by inline flowmeter (gal/min)	Water flowing through inline flowmeter since last measurement (gal)
Norphlet Well 1	30830	6-20-90	--	--	--	270	265	**
		7-24-90	34	26	0.76	--	--	5,238,030
		8-28-90	--	--	--	--	--	3,744,000
		9-17-90	55	144	2.6	--	--	1,979,870
		10-15-90	28	64	2.3	275	280	1,803,390
		11-26-90	42	85	2.0	--	--	3,198,690
		12-19-90	23	61	2.6	277	275	1,381,760
		1-23-91	35	96	2.7	272	270	2,702,830
		2-26-91	35	93	2.7	275	--	2,245,470
		3-25-91	27	--	--	274	273	1,642,350
		Average	NA	NA	NA	274	273	NA
Norphlet Well 2	30830	6-20-90	--	--	--	204	**	**
		7-24-90	34	48	1.4	--	**	**
		8-28-90	35	127	3.6	--	**	**
		9-17-90	20	111	5.5	--	**	**
		10-15-90	28	84	3.0	228	**	**
		11-26-90	42	180	4.3	--	**	**
		12-19-90	23	120	5.2	216	**	**
		1-23-91	35	198	5.6	--	**	**
		2-26-91	34	221	6.5	226	**	**
		3-25-91	27	161	--	219	**	**
		Average	NA	NA	NA	219	NA	NA
Ogden Well 1	30836	6-18-90	--	--	--	--	--	--
		7-26-90	38	369	9.7	--	130	2,819,860
		8-30-90	35	582	16.6	--	125	1,654,470
		9-21-90	22	342	15.5	126	130	1,471,260
		10-15-90	24	290	12.1	132	--	2,424,530
		11-20-90	36	487	13.5	130	128	1,393,650
		12-19-90	29	291	10.0	132	--	2,843,935
		1-23-91	35	587	16.8	--	--	2,733,155
		2-28-91	36	710	19.7	--	--	1,480,780
		3-25-91	25	157	--	101	128	--
		Average	NA	NA	NA	124	128	NA
Ogden Well 2	30836	6-18-90	--	--	--	109	120	--
		7-26-90	38	--	--	--	--	--
		8-30-90	35	--	--	--	120	3,342,000
		9-21-90	22	--	--	--	--	--
		10-15-90	24	--	--	126	128	--
		11-20-90	36	--	--	119	121	2,400,463
		12-19-90	29	--	--	126	120	661,288
		1-23-91	35	--	--	128	120	1,436,874
		1-23-91	35	--	--	128	120	1,436,874
		2-28-91	36	--	--	133	130	1,346,375
		3-25-91	25	--	--	124	123	780,110
		Average	NA	NA	NA	124	123	NA

Table 4.--*Flow data collected from public water-supply systems in Arkansas where record of pump running time was determined from either electric energy consumption or vibration time totalizer*--Continued

Facility name	Facility ID (fig. 1)	Measurement date	Pump running time since last measurement (days)	Pump running time since last measurement (hours)	Average pumping rate for period of time since last measurement (h/d)	Pipeflow measured by noninvasive flowmeter (gal/min)	Pipeflow measured by inline flowmeter (gal/min)	Water flowing through in-line flowmeter since last measurement (gal)
Oxford	30843	5-08-90	--	--	--	--	--	--
		6-12-90	35	190	5.4	--	--	--
		7-17-90	35	320	9.1	--	68	--
		8-14-90	28	221	7.9	63	73	927,300
		9-25-90	42	329	7.8	--	--	--
		11-14-90	50	354	7.1	60	56	2,561,700
		12-12-90	28	210	7.5	62	51	--
		1-16-91	35	359	10.3	57	50	1,444,600
		2-21-91	29	240	9.1	63	52	635,800
		3-19-91	33	250	7.6	63	60	696,000
		6-04-91	77	545	7.1	61	59	1,754,800
		Average	NA	NA	NA	61	59	NA
Parkin	30852	5-07-90	--	--	--	--	**	**
		6-11-90	35	360	10.3	--	**	**
		7-16-90	35	463	13.2	392	**	**
		8-13-90	28	420	15.0	365	**	**
		9-24-90	42	601	14.3	--	**	**
		11-13-90	51	548	10.7	406	**	**
		12-11-90	28	242	8.6	--	**	**
		1-15-91	35	394	11.3	399	**	**
		2-13-91	29	234	8.1	404	**	**
		3-18-91	33	269	8.1	393	**	**
		Average	NA	NA	NA	393	NA	NA
Russell	30896	5-07-90	--	--	--	--	**	**
		6-28-90	52	630	12.1	--	**	**
		8-10-90	43	463	10.8	273	**	**
		9-24-90	45	500	11.1	270	**	**
		11-13-90	50	468	9.4	278	**	**
		12-11-90	29	232	8.0	280	**	**
		1-14-91	34	352	10.3	282	**	**
		2-28-91	36	362	10.0	290	**	**
		3-14-91	23	250	10.9	279	**	**
		Average	NA	NA	NA	279	NA	NA
Sidney	30916	5-08-90	--	--	--	--	--	--
		6-12-90	35	262	7.5	99	91	2,310,800
		7-17-90	35	307	8.8	104	94	1,855,300
		8-14-90	28	268	9.6	100	91	2,974,200
		9-25-90	42	438	10.4	103	92	2,728,300
		11-14-90	50	409	8.2	107	91	2,728,300
		12-12-90	28	235	8.4	99	90	1,440,700
		1-16-91	35	419	12.0	95	89	1,926,700
		2-14-91	30	384	12.8	86	88	1,578,200
		3-19-91	32	505	15.8	99	91	1,728,700
		Average	NA	NA	NA	99	91	NA

Table 4.--*Flow data collected from public water-supply systems in Arkansas where record of pump running time was determined from either electric energy consumption or vibration time totalizer*--Continued

Facility name	Facility ID (fig. 1)	Measurement date	Pump running time since last measurement (days)	Pump running time since last measurement (hours)	Average pumping rate for period of time since last measurement (h/d)	Pipeflow measured by noninvasive flowmeter (gal/min)	Pipeflow measured by inline flowmeter (gal/min)	Water flowing through inline flowmeter since last measurement (gal)
St. Paul Well 1	30925	7-16-90	--	--	--	15	13	--
		8-16-90	31	210	6.8	16	12	--
		9-28-90	43	463	10.8	21	14	324,000
		11-16-90	48	593	12.1	20	14	492,900
		12-07-90	22	285	13.6	13	15	231,700
		1-19-91	42	576	13.7	13	13	479,900
		2-20-91	33	582	17.6	15	14	479,100
		3-21-91	29	389	13.4	16	14	365,800
		Average	NA	NA	NA	16	14	NA
St. Paul Well 2		7-16-90	--	542	17.5	15	13	**
		8-16-90	31	--	--	--	--	**
		9-28-90	43	--	--	15	--	**
		11-16-90	48	--	--	15	13	**
		12-07-90	22	238	10.8	17	13	**
		1-19-91	42	603	14.4	15	13	**
		2-20-91	33	472	14.3	15	--	**
		3-21-91	29	359	12.4	15	13	**
		Average	NA	NA	NA	15	13	NA
Trumann City Hall Well	30950	6-11-90	--	--	--	--	**	**
		7-17-90	35	514	14.7	--	**	**
		8-13-90	28	397	14.2	1,061	**	**
		9-24-90	42	556	13.2	962	**	**
		11-13-90	50	173	3.5	961	**	**
		12-11-90	28	659	23.5	1,002	**	**
		1-15-91	35	375	10.7	1,011	**	**
		2-13-91	29	312	10.7	1,012	**	**
		3-18-91	33	278	8.4	1,002	**	**
		Average	NA	NA	NA	1,002	NA	NA
Trumann Water Plant Well	30950	5-07-90	--	--	--	888	**	**
		6-11-90	--	--	--	850	**	**
		7-17-90	36	358	9.9	888	**	**
		8-13-90	27	303	11.2	888	**	**
		9-24-90	42	416	9.9	888	**	**
		11-13-90	50	741	14.8	--	**	**
		12-11-90	28	85	3.0	--	**	**
		1-15-91	35	295	8.4	--	**	**
		2-13-91	29	234	8.1	--	**	**
		3-18-91	33	253	7.7	880	**	**
		Average	NA	NA	NA	880	NA	NA

Table 4.--*Flow data collected from public water-supply systems in Arkansas where record of pump running time was determined from either electric energy consumption or vibration time totalizer*--Continued

Facility name	Facility ID (fig. 1)	Measurement date	Pump running time since last measurement (days)	Pump running time since last measurement (hours)	Average pumping rate for period of time since last measurement (h/d)	Pipeflow measured by noninvasive flowmeter (gal/min)	Pipeflow measured by inline flowmeter (gal/min)	Water flowing through inline flowmeter since last measurement (gal)
Ward Well 2	30969	5-07-90	--	--	--	213	**	**
		6-28-90	52	846	16.3	225	**	**
		8-10-90	43	324	7.5	312	**	**
		9-24-90	45	425	9.4	308	**	**
		11-13-90	50	683	13.7	327	**	**
		12-12-90	29	158	5.4	338	**	**
		2-19-91	69	1,535	22.2	355	**	**
		3-17-91	26	309	11.9	297	**	**
		Average	NA	NA	NA	297	NA	NA
Ward Well 4	30969	5-07-90	--	**	**	482	**	**
		6-28-90	52	**	**	479	**	**
		8-10-90	43	**	**	488	**	**
		9-24-90	45	**	**	492	**	**
		11-13-90	50	**	**	480	**	**
		12-12-90	29	**	**	478	**	**
		2-19-91	69	**	**	485	**	**
		3-17-91	26	**	**	483	**	**
		Average	NA	NA	NA	483	NA	NA
Yorktown Well 1	31004	11-30-90	--	--	--	--	--	--
		12-17-90	18	44	2.4	--	--	1,810,100
		1-08-91	22	49	2.2	336	340	--
		1-28-91	20	168	7.6	311	340	5,366,200
		2-26-91	29	331	11.4	311	--	3,289,000
		3-28-91	30	518	17.3	319	340	3,532,700
		Average	NA	NA	NA	319	340	NA
Yorktown Well 2	31004	5-31-90	--	--	--	--	--	--
		6-01-90	2	20	10.0	366	--	--
		7-30-90	60	303	5.0	360	353	--
		8-22-90	23	554	24.0	--	310	8,840,000
		9-18-90	27	602	22.3	330	330	2,731,000
		10-11-90	23	457	19.9	369	360	10,091,000
		11-30-90	41	603	14.7	357	350	12,421,200
		12-17-90	26	285	11.0	--	--	3,760,100
		1-28-91	42	276	6.6	--	--	7,122,450
		2-26-91	29	214	7.4	--	--	4,118,250
		3-28-91	32	201	6.3	--	--	4,174,000
		Average	NA	NA	NA	356	341	NA

Table 4.--*Flow data collected from public water-supply systems in Arkansas where record of pump running time was determined from either electric energy consumption or vibration time totalizer*--Continued

Facility name	Facility ID (fig. 1)	Measurement date	Pump running time since last measurement (days)	Pump running time since last measurement (hours)	Average pumping rate for period of time since last measurement (h/d)	Pipeflow measured by noninvasive flowmeter (gal/min)	Pipeflow measured by inline flowmeter (gal/min)	Water flowing through inline flowmeter since last measurement (gal)
Yorktown Well 3	31004	5-31-90	–	–	–	–	315	–
		6-01-90	2	5.5	2.8	–	–	–
		7-30-90	60	673	11.2	287	310	–
		8-22-90	23	216	9.4	396	405	3,993,800
		9-18-90	27	121	4.5	–	–	4,209,700
		10-11-90	23	126	5.5	295	304	2,876,970
		11-30-90	41	318	7.8	308	307	6,109,309
		12-17-90	26	187	7.2	308	305	3,301,259
		1-28-91	42	316	7.5	306	304	5,502,412
		2-26-91	29	180	6.2	305	303	3,549,990
		3-28-91	32	185	5.8	315	319	3,179,890
		Average	NA	NA	NA	315	319	NA
Yorktown Well 5	31004	5-31-90	–	–	–	–	315	–
		6-01-90	2	5	2.5	327	–	103,000
		7-30-90	60	419	7.0	–	310	8,137,265
		8-22-90	23	208	9.0	314	405	3,273,505
		9-18-90	27	183	6.8	320	–	3,279,230
		10-11-90	23	96	4.2	330	304	2,575,000
		11-30-90	41	213	5.2	327	307	3,272,000
		12-17-90	26	140	5.4	317	305	2,463,300
		1-28-91	42	258	6.1	306	304	4,342,705
		2-26-91	29	175	6.0	311	303	3,083,000
		3-28-91	32	129	4.0	319	319	2,389,200
		Average	NA	NA	NA	319	319	NA

Table 5.--*Pipeflow measurements made at public-supply facilities in Arkansas by noninvasive and inline flowmeter and natural log-percent difference*

(ID, identification number; gal/min, gallons per minute; --, no measurement)

Facility name	Facility ID (fig. 1)	Measurement date	Pipeflow measured by noninvasive flowmeter (a) (gal/min)	Pipeflow measured by inline flowmeter (b) (gal/min)	Natural log-percent difference [ln(a/b)]x100
Bergman	30547	7-18-90	97	95	2.1
		8-15-90	86	88	-2.3
		9-27-90	98	96	2.1
		11-15-90	96	88	8.7
		12-06-90	85	80	6.1
		2-21-91	92	88	4.4
		3-20-91	96	90	6.4
		Average	93	89	4.4
Bigelow	30551	6-19-90	156	160	-2.5
		8-24-90	186	187	-.5
		9-13-90	185	200	-7.8
		10-12-90	187	215	-14.0
		11-28-90	203	205	-1.0
		12-18-90	210	200	4.9
		1-22-91	210	--	--
		Average	191	194	-1.6
Big Flat	30550	7-17-90	181	172	5.1
		8-15-90	185	180	2.7
		9-25-90	190	182	4.3
		11-14-90	187	177	5.5
		12-12-90	192	179	7.0
		1-16-91	195	183	6.4
		2-21-91	164	160	2.5
		3-19-91	173	170	1.7
		Average	183	175	4.5
Black Rock	30556	9-25-90	231	246	-6.3
		11-14-90	227	246	-8.0
		12-12-90	222	246	-10.3
		1-16-91	220	246	-11.2
		2-13-91	222	--	--
		3-19-91	222	246	-10.3
		6-03-91	238	246	-3.3
		Average	226	246	-8.5
Carthage	30582	5-15-90	--	100	--
		7-26-90	112	120	-6.9
		8-21-90	140	150	-6.9
		10-16-90	124	120	3.3
		11-27-90	119	120	-.8
		12-17-90	145	150	-3.4
		1-29-91	126	125	.8
		2-27-91	122	130	-6.4
		3-29-91	122	125	-2.4
		Average	126	127	-.8

Table 5.--*Pipeflow measurements made at public-supply facilities in Arkansas by noninvasive and inline flowmeter and natural log-percent difference*--Continued

Facility name	Facility ID (fig. 1)	Measurement date	Pipeflow measured by noninvasive flowmeter (a) (gal/min)	Pipeflow measured by inline flowmeter (b) (gal/min)	Natural log-percent difference [ln(a/b)]
Cass	30584	7-16-90	42	–	–
		8-16-90	41	–	–
		9-28-90	42	–	–
		11-16-90	51	–	–
		12-07-90	51	–	–
		1-18-91	54	55	-1.8
		2-20-91	54	57	-5.4
		3-21-91	54	–	–
		Average	49	56	-13.3
Collins	30596	8-28-90	–	150	–
		10-18-90	121	129	-6.4
		11-19-90	150	150	0.0
		12-20-90	155	157	-1.3
		1-24-91	154	157	-1.9
		3-26-91	162	165	-1.8
		Average	148	151	-2.0
Dierks	30631	5-14-90	–	550	–
		6-18-90	–	850	–
		7-26-90	926	940	-1.5
		9-21-90	715	720	-.7
		10-15-90	734	730	.5
		11-26-90	678	675	.4
		12-19-90	599	610	-1.8
		1-23-91	674	670	.6
		Average	721	718	.4
Franklin	30666	5-08-90	–	75	–
		11-14-90	75	75	0.0
		12-12-90	72	73	-1.4
		1-16-91	81	83	-2.4
		2-14-91	84	81	3.6
		3-19-91	85	80	6.1
		6-04-91	80	83	-3.7
		Average	80	79	1.3
Gilmore	30676	6-11-90	289	300	-3.7
		7-16-90	285	295	-3.4
		8-13-90	288	300	-4.1
		11-13-90	290	300	-3.4
		2-13-91	291	300	-3.0
		3-18-91	295	300	-1.7
		Average	290	299	-3.1

Table 5.--*Pipeflow measurements made at public-supply facilities in Arkansas by noninvasive and inline flowmeter and natural log-percent difference*--Continued

Facility name	Facility ID (fig. 1)	Measure-ment date	Pipeflow measured by noninvasive flowmeter (a) (gal/min)	Pipeflow measured by inline flowmeter (b) (gal/min)	Natural log-percent difference [ln(a/b)]
Green Forest	30686	9-26-90	833	850	-2.0
		11-15-90	848	850	-.2
		12-06-90	832	850	-2.1
		1-17-91	851	850	.1
		2-20-91	848	850	-.2
		3-20-91	857	850	.8
		Average	845	850	-.6
Guy	30693	7-27-90	74	72	2.7
		8-24-90	93	97	-4.2
		9-13-90	104	103	1.0
		11-29-90	36	33	8.7
		12-12-90	74	88	-17.0
		1-14-91	72	99	-31.8
		2-15-91	84	92	-9.1
		3-14-91	100	99	1.0
		Average	80	85	-6.1
Harrell	30699	9-17-90	142	150	-5.5
		10-15-90	142	145	-2.1
		11-19-90	149	152	-2.0
		12-20-90	147	150	-2.0
		1-24-91	147	150	-2.0
		3-27-91	150	150	0.0
		Average	146	150	-2.7
Haskell	30702	5-04-90	151	132	13.4
		6-19-90	161	140	14.0
		7-31-90	107	130	-19.5
		8-21-90	156	140	10.8
		9-14-90	115	127	-9.9
		10-12-90	119	129	-8.1
		11-27-90	122	127	-4.0
		12-18-90	119	125	-4.9
		1-29-91	177	174	1.7
		Average	136	136	0.0
Holly Grove	30713	7-23-90	468	475	-1.5
		9-17-90	453	450	.7
		10-17-90	526	500	5.1
		11-20-90	415	400	3.7
		12-21-90	493	500	-1.4
		1-25-91	507	500	1.4
		Average	477	471	1.3

Table 5.--*Pipeflow measurements made at public-supply facilities in Arkansas by noninvasive and inline flowmeter amd natural log-percent difference*--Continued

Facility name	Facility ID (fig. 1)	Measurement date	Pipeflow measured by noninvasive flowmeter (a) (gal/min)	Pipeflow measured by inline flowmeter (b) (gal/min)	Natural log-percent difference [ln(a/b)]
Huntsville	30723	6-14-90	916	930	-1.5
		7-19-90	945	910	3.8
		8-15-90	920	900	2.2
		9-27-90	1,073	925	14.8
		11-15-90	944	920	2.6
		12-06-90	968	940	2.9
		1-17-91	998	950	4.9
		2-20-91	989	950	4.0
		3-20-91	--	960	--
		Average	969	932	3.9
Norphlet Well 1	30830	6-20-90	270	265	1.9
		10-15-90	275	280	-1.8
		12-19-90	277	275	.7
		1-23-91	272	270	.7
		2-26-91	275	--	--
		Average	274	273	.4
Ogden Well 1	30836	7-26-90	--	130	--
		8-30-90	--	125	--
		9-21-90	126	130	-3.1
		10-15-90	132	--	--
		11-20-90	130	128	1.5
		12-19-90	132	--	--
		Average	130	128	1.5
Ogden Well 2	30836	6-18-90	109	120	-9.6
		8-30-90	--	120	--
		11-20-90	126	128	-1.6
		12-19-90	119	121	-1.7
		1-23-91	126	120	4.9
		2-28-91	128	120	6.4
		3-25-91	133	130	2.3
		Average	124	123	.8
Oxford	30843	7-17-90	--	68	--
		8-14-90	63	73	-14.7
		9-25-90	--	--	--
		11-14-90	60	56	6.9
		12-12-90	--	--	--
		1-16-91	62	51	19.5
		2-21-91	57	50	13.1
		3-19-91	63	52	19.2
		6-04-91	63	60	4.9
		Average	61	59	3.3

Table 5.--*Pipeflow measurements made at public-supply facilities in Arkansas by noninvasive and inline flowmeter and natural log-percent difference*--Continued

Facility name	Facility ID (fig. 1)	Measurement date	Pipeflow measured by noninvasive flowmeter (a) (gal/min)	Pipeflow measured by inline flowmeter (b) (gal/min)	Natural log-percent difference [ln(a/b)]
Perryville	30859	6-01-90	372	--	--
		6-19-90	707	--	--
		7-31-90	455	--	--
		8-24-90	535	525	1.9
		9-14-90	597	555	7.3
		10-12-90	435	400	8.4
		11-28-90	487	475	2.5
		12-17-90	567	550	3.0
		1-22-91	471	455	3.5
		Average	481	493	-2.5
Prairie Grove	30871	6-14-90	396	--	--
		7-10-90	453	458	-1.1
		8-16-90	455	458	-.7
		9-27-90	476	440	7.9
		11-15-90	472	440	7.0
		12-06-90	485	440	9.7
		1-17-91	472	480	-1.7
		Average	458	453	1.1
Roe	30894	6-21-90	192	180	6.4
		9-17-90	198	180	9.5
		10-17-90	155	150	3.3
		11-20-90	181	180	.6
		12-21-90	186	180	3.3
		1-25-91	182	180	1.1
		3-27-91	186	180	3.3
		Average	183	176	3.9
Sidney	30916	6-12-90	99	91	8.4
		8-14-90	104	94	10.1
		9-25-90	100	91	9.4
		11-14-90	103	92	11.3
		12-12-90	107	91	16.2
		1-16-91	99	90	9.5
		2-14-91	95	89	6.5
		3-19-91	86	88	-2.3
		Average	99	91	8.4
St. Paul Well 1	30925	8-16-90	15	13	14.3
		9-28-90	16	12	28.8
		11-16-90	21	14	40.5
		12-07-90	20	14	35.7
		1-19-91	13	15	-14.3
		2-20-91	13	13	0.0
		3-21-91	15	14	6.9
		Average	16	14	13.3

Table 5.--*Pipeflow measurements made at public-supply facilities in Arkansas by noninvasive and inline flowmeter and natural log-percent difference*--Continued

Facility name	Facility ID (fig. 1)	Measurement date	Pipeflow measured by noninvasive flowmeter (a) (gal/min)	Pipeflow measured by inline flowmeter (b) (gal/min)	Natural log-percent difference [ln(a/b)]
St. Paul Well 2	30925	7-16-90	15	13	14.3
		11-16-90	15	13	14.3
		12-07-90	15	13	14.3
		1-19-91	17	--	--
		2-20-91	15	--	--
		3-21-91	15	--	--
		Average	15	13	14.3
Stamps	30926	6-18-90	644	630	2.2
		8-29-90	599	640	-6.6
		9-19-90	647	630	2.7
		10-15-90	645	620	4.0
		11-26-90	611	625	-2.3
		12-19-90	647	655	-1.2
		1-23-91	659	650	1.4
		Average	636	636	0.0
Stuttgart New Water Treatment Plant	30932	5-17-90	--	3,000	--
		6-22-90	1,294	3,000	-84.1
		7-23-90	1,615	1,680	-3.9
		8-27-90	1,358	3,648	-98.8
		9-17-90	1,486	1,475	.74
		10-17-90	1,632	1,650	-1.1
		11-20-90	1,700	1,700	0.0
		12-21-90	1,483	1,450	2.2
		1-25-91	1,592	--	--
		2-25-91	1,659	1,715	-3.3
		3-27-91	--	1,700	--
		Average	1,535	2,102	-31.4
Stuttgart Old Water Treatment Plant	30932	5-17-90	--	2,200	--
		6-22-90	2,727	2,425	11.7
		7-23-90	1,957	1,760	10.6
		8-27-90	1,935	1,600	19.0
		9-17-90	1,767	1,750	1.0
		10-17-90	1,534	1,575	-2.6
		11-20-90	1,805	1,800	.3
		12-21-90	931	925	.6
		1-26-91	1,757	1,790	-1.9
		2-25-91	935	950	-1.6
		3-27-91	984	975	.9
		Average	1,633	1,614	1.2

Table 5.--*Pipeflow measurements made at public-supply facilities in Arkansas by noninvasive and inline flowmeter and natural log-percent difference*--Continued

Facility name	Facility ID (fig. 1)	Measurement date	Pipeflow measured by noninvasive flowmeter (a) (gal/min)	Pipeflow measured by inline flowmeter (b) (gal/min)	Natural log-percent difference [ln(a/b)]
Thornton	30945	6-02-90	114	110	3.6
		8-24-90	118	97	19.6
		9-19-90	115	100	14.0
		10-16-90	107	100	6.8
		11-27-90	111	100	10.4
		12-20-90	107	105	1.9
		1-24-91	106	110	-3.7
		Average	111	103	7.5
Warren	30970	6-18-90	1,650	--	--
		10-18-90	1,726	1,730	-0.2
		11-19-90	1,733	1,730	.2
		12-20-90	--	--	--
		1-29-91	1,703	1,720	-1.0
		2-26-91	2,096	2,145	-2.3
		3-26-91	2,153	2,220	-3.1
		Average	1,844	1,909	-3.5
Wright-Pastoria	30999	5-31-90	179	185	-3.3
		8-22-90	156	189	-19.2
		9-17-90	180	188	-4.3
		10-11-90	192	200	-4.1
		11-21-90	188	185	1.6
		12-18-90	170	172	-1.2
		1-28-91	185	182	1.6
		Average	179	186	-3.8
Yorktown Well 1	31004	1-28-91	336	340	-1.2
		2-26-91	311	340	-8.9
		3-28-91	311	--	--
		Average	319	340	-6.4
Yorktown Well 2	31004	6-01-90	366	--	--
		7-30-90	360	353	2.0
		8-22-90	--	310	--
		9-18-90	330	330	0.0
		10-11-90	369	360	2.5
		11-30-90	357	350	2.0
		Average	356	341	4.3

Table 5.--*Pipeflow measurements made at public-supply facilities in Arkansas by noninvasive and inline flowmeter and natural log-percent difference*--Continued

Facility name	Facility ID (fig. 1)	Measurement date	Pipeflow measured by noninvasive flowmeter (a) (gal/min)	Pipeflow measured by inline flowmeter (b) (gal/min)	Natural log-percent difference [ln(a/b)]
Yorktown Well 3	31004	5-31-90	--	315	--
		7-30-90	287	310	-7.7
		8-22-90	396	405	-2.2
		11-30-90	295	304	-3.1
		12-17-90	308	307	.3
		1-28-91	308	305	1.0
		2-26-91	306	304	.7
		3-28-91	305	303	-.7
		Average	315	319	-1.3
Yorktown Well 5	31004	5-31-90	--	315	--
		6-01-90	327	--	--
		7-30-90	--	310	--
		8-22-90	--	405	--
		9-18-90	314	--	--
		10-11-90	320	--	--
		11-30-90	330	304	8.2
		12-17-90	327	307	6.3
		1-28-91	317	305	3.9
		2-26-91	306	304	.7
		3-28-91	311	303	2.6
		Average	319	319	0.0

Table 6.--*Absolute average percent differences between water use measured by noninvasive flowmeter and that reported to the Arkansas Soil and Water Conservation Commission (ASWCC), the Arkansas Department of Health (ADH), and measured by inline flowmeter for facilities serving population less than 500, 500-900, 901-3,000, and more than 3,000*

(ID, identification number; <, less than; >, greater than; -- no measurement)

Range in population	Facility name	Facility ID (fig. 1)	Reported to ASWCC	Reported to ADH	Measured by inline flowmeter
<500	Bennett Acres	30543	23.6	--	--
	Big Flat	30550	2.4	2.5	45.0
	Cass	30584	--	25.4	--
	Collins	30596	6.0	5.4	2.0
	Franklin	30666	18.3	--	14.9
	Guy	30693	21.4	--	38.9
	Harrell	30699	30.2	--	18.4
	Roe	30894	34.0	--	4.5
	Sidney	30916	16.6	--	26.2
	St. Paul - Well 1	30925	15.2	13.0	15.4
		Average	18.6	11.6	20.7
500-900	Arkansas City	30523	35.4	--	--
	Bergman	30547	10.1	--	5.5
	Bigelow	30551	28.9	--	23.6
	Carthage	30582	26.6	--	46.4
	Gilmore	30676	77.7	--	9.3
	Holly Grove	30713	9.4	15.9	3.4
	Ogden - Well 1	30836	66.8	--	41.4
	Ogden - Well 2	30836	46.9	--	37.5
	Oxford	30843	9.1	20.3	17.6
	Russell	30896	--	--	--
	Thornton	30945	18.2	--	4.9
		Average	32.9	18.1	21.1
901-3,000	Black Rock	30556	23.9	--	--
	Calico Rock	30576	36.9	--	--
	Dierks	30631	83.7	49.4	--
	Haskell	30702	9.8	--	4.3
	Hoxie	30719	4.1	4.7	--
	Huntsville	30723	--	7.2	2.1
	Norphlet - Well 1	30830	--	--	13.4
	Norphlet - Wells 1,2	30830	20.0	--	--
	Parkin	30852	14.3	--	--
	Stamps	30926	5.4	--	2.6
	Wright-Pastoria	30999	6.2	6.2	7.4
		Average	22.7	16.9	5.9

Table 6.--*Absolute average percent differences between water use measured by noninvasive flowmeter and that reported to the Arkansas Soil and Water Conservation Commission (ASWCC), the Arkansas Department of Health (ADH), and measured by inline flowmeter for facilities serving population less than 500, 500-900, 901-3,000, and more than 3,000*--Continued

Range in population	Facility name	Facility ID (fig. 1)	Reported to ASWCC	Reported to ADH	Measured by inline flowmeter
>3,000	Camden	20600	34.8	33.4	4.9
	Green Forest	30686	8.2	8.3	--
	Marianna	30778	--	28.9	--
	Mountain Home	30812	19.6	19.4	--
	Perryville	30859	29.5	29.5	6.3
	Prairie Grove	30871	13.8	23.5	--
	Stuttgart - total	30932	35.5	--	5.1
	Trumann - Wells 1,2	30950	17.3	18.5	--
	Trumann - City Hall	30950	2.8	3.8	--
	Trumann - Davis St.	30950	39.8	40.9	--
	Ward - Well 2	30969	43.4	--	--
	Ward - Well 4	30960	3.4	--	--
	Warren - Wells 1,2	30970	19.0	7.8	--
	Warren - Well 3	30970	--	--	2.0
	Yorktown - Well 1	31004	--	--	30.0
	Yorktown - Well 2	31004	--	--	5.2
	Yorktown - Well 3	31004	61.7	--	14.2
	Yorktown - Well 5	31004	31.0	--	3.1
		Average	25.7	21.4	8.8

Table 7.--Percent difference between water use reported to the Arkansas Soil and Water Conservation Commission (ASWCC) and measured by inline flowmeter

Facility name	Facility ID (fig. 1)	Period of record	Water use reported to the ASWCC a (gallons)	Water-use measured by inline flowmeter b (gallons)	Percent difference [(a-b)/b]×100
Bergman	30547	8/90-2/91	10,259,222	10,623,807	-3.4
Bigelow	30551	6/90-1/91	11,736,500	12,109,239	-3.1
Big Flat	30550	5/90-12/90	4,503,261	3,570,692	26.1
Camden	20600	5/90-4/91	326,097,800	486,646,900	-33.0
Carthage	30582	5/90-3/91	23,551,000	23,905,548	-1.5
Collins	30596	8/90-2/91	2,711,081	2,663,673	1.8
Franklin	30666	8/90-2/91	3,401,200	3,610,141	-5.8
Gilmore	30676	6/90-3/91	11,029,030	7,951,800	38.7
Guy	30693	8/90-2/91	9,421,532	9,668,528	-2.6
Harrell	30699	7/90-2/91	7,020,000	5,914,925	18.7
Haskell	30702	6/90-12/90	26,338,536	28,494,541	-7.6
Holly Grove	30713	6/90-12/90	41,611,172	43,079,394	-3.4
Ogden - Well 1	30836	6/90-2/91	7,294,284	15,931,232	-54.2
Ogden - Well 2	30836	6/90-2/91	4,052,027	4,778,106	-15.2
Oxford	30843	6/90-5/91	3,896,000	4,103,103	-5.0
Perryville	30859	6/90-12/90	85,490,267	76,964,413	11.1
Roe	30894	6/90-2/91	3,390,010	6,020,333	-43.7
Sidney	30916	6/90-2/91	13,320,000	16,110,308	-17.3
St. Paul	30925	8/90-2/91	760,400	785,674	-3.2
Stamps	30926	6/90-12/90	93,574,000	97,215,640	-3.7
Stuttgart - new	30932	7/90-1/91	326,476,634	245,784,490	32.8
Stuttgart - old	30932	6/90-3/91	464,246,436	339,176,340	36.9
Thornton	30945	6/90-12/90	9,914,562	12,234,285	-19.0
Wright-Pastoria	30999	5/90-12/90	16,204,620	15,641,282	3.6
Yorktown - Well 3	31004	5/90-4/91	26,397,497	68,144,517	-61.3
Yorktown - Well 5	31004	5/90-4/91	30,696,243	29,635,408	3.6

Table 8.--Percent difference between water use reported to the Arkansas Soil and Water Conservation Commission (ASWCC) and the Arkansas Department of Health (ADH)

Facility name	Facility ID (fig. 1)	Period of record	Water use reported to ASWCC (a) (gallons)	Water use reported to ADH (b) (gallons)	Percent difference [(a-b)/b]x100
Big Flat	30550	5/90-12/90	5,901,162	5,920,500	-0.3
Camden	20600	5/90-4/91	682,147,560	682,717,000	-.1
Collins	30596	8/90-2/91	2,711,081	2,712,000	-.0
Dierks	30631	5/90-2/91	15,517,025	47,717,000	-67.5
Green Forest	30686	8/90-2/91	187,506,271	187,352,500	.1
Holly Grove	30713	6/90-12/90	41,611,172	37,409,000	11.2
Hoxie	30719	6/90-2/91	17,708,832	16,419,000	7.9
Mountain Home	30812	7/90-2/91	395,494,006	366,997,000	7.8
Perryville	30859	6/90-12/90	85,490,267	85,506,000	-.0
Prairie Grove	30871	6/90-1/91	65,884,600	62,747,000	5.0
St. Paul - Well 1	30925	8/90-2/91	760,400	848,000	-10.3
St. Paul - Well 2	30925	12/90-2/91	192,500	251,900	-23.6
Trumann - Wells 1,2	30950	6/90-2/91	345,977,690	344,863,000	.3
Trumann - City Hall well	30950	6/90-2-91	172,988,845	172,281,500	.4
Trumann - Davis St. well	30950	6/90-2-91	172,988,845	172,281,500	.4
Warren - Wells 1,2	30970	5/90-2/91	262,609,611	280,748,800	-6.5
Wright-Pastoria	30999	5/90-12/90	18,472,543	18,473,700	-.0