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Reconnaissance of Ground-Water Quality at Selected Sites in Bedford County, Tennessee, August 1996

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USGS

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in cooperation with the
UNIVERSITY OF TENNESSEE
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and the
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Bennett, M.W., 1997, Reconnaissance of ground-water quality at selected sites in Bedford County, Tennessee, August 1996

Most of the rural residents in Bedford County in south-central Tennessee (fig. 1) rely on domestic wells and springs as their primary source of drinking water. A reconnaissance of ground-water quality in Bedford County was conducted in 1991 (Roman-Mas and others, 1991). A followup reconnaissance of ground-water quality was conducted during August 1996 by the U.S. Geological Survey (USGS), in cooperation with the University of Tennessee Agricultural Extension Service and the Tennessee Farm Bureau.

Water samples from 78 domestic ground-water sites (fig. 1) were analyzed for selected water-quality constituents (table 1). University of Tennessee Agricultural Extension Service agents and volunteers assisted the USGS in the selection, location, and sampling of the ground-water sites included in the project. After collection, the samples were transported to the USGS field laboratory for analysis. Collection and preservation of the samples followed standard USGS procedures for whole water analysis (Wood, 1981).

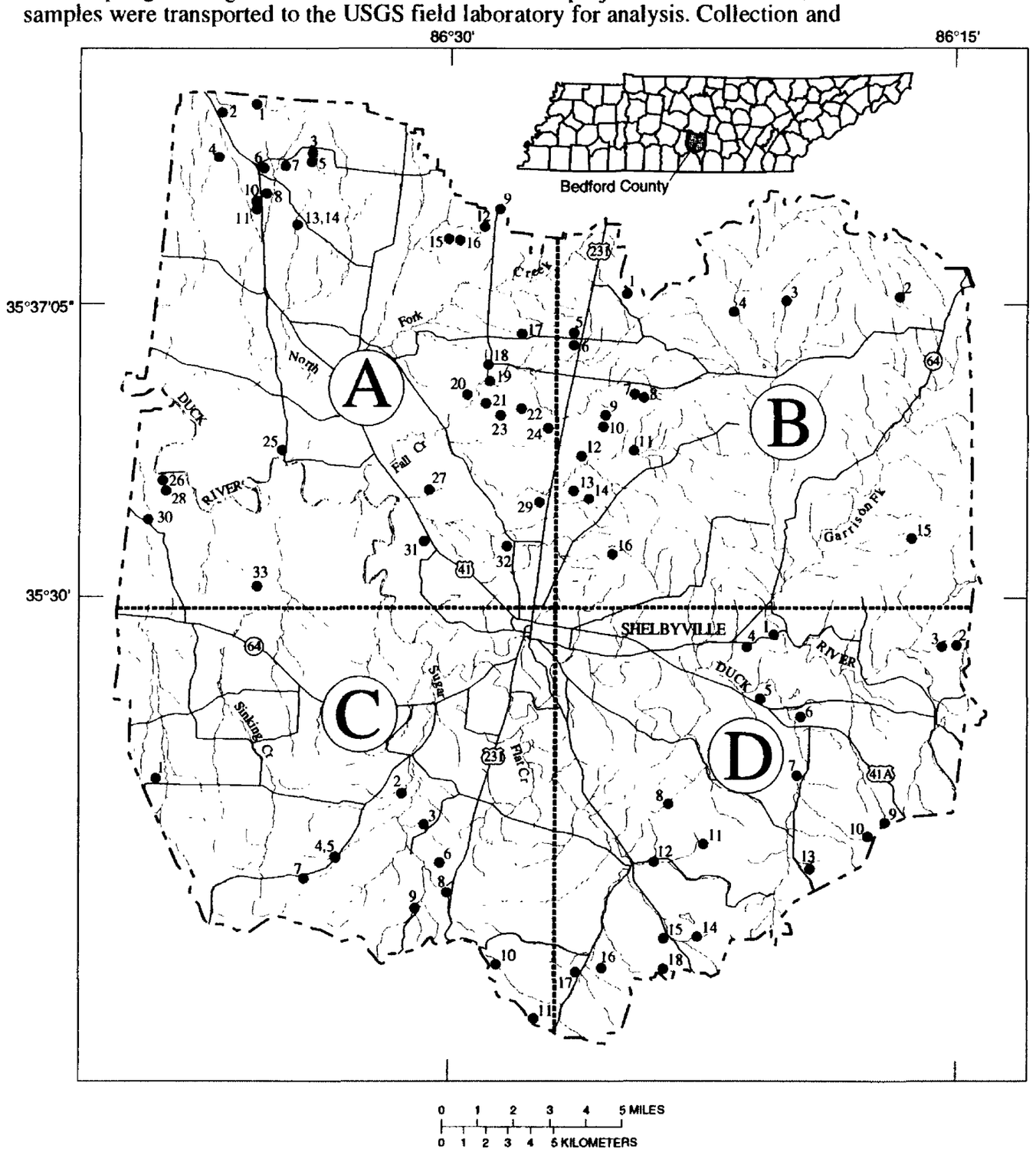

Figure 1. Location of study area and sampling sites, Bedford County, Tennessee.

Analyses for pH, specific conductance, fecal coliform bacteria, and fecal streptococci bacteria were conducted at the field laboratory. Standard methods 423 and 205 (electrometric techniques) were used to determine pH and specific conductance, respectively (American Public Health Association and others, 1985). Bacteria analyses were conducted following methods described by Britton and Greeson (1989).

Analyses for chloride and sulfate were conducted within 3 days of sample collection, and analyses for nitrate were conducted within 7 days of sample collection at the USGS laboratory facilities in the Nashville, Tennessee, Subdistrict Office. Ion-selective electrodes were used for the chloride and nitrate analyses. Sulfate analyses were conducted using photometric techniques. Calibration curves for chloride, sulfate, and nitrate were developed by analyzing commercially available standard solutions at the beginning and end of each day. Field and laboratory blank samples, representing 5 percent of the total number of samples, were analyzed as part of the quality assurance and quality control program. In addition, 10 percent of the samples were analyzed in duplicate. Nitrate values exceeding 5.0 milligrams per liter were confirmed by ion chromatography using U.S. Environmental Protection Agency method 300.0 (Pfaff and others, 1989) at the USGS water-quality laboratory in Ocala, Florida.

Results of the sampling are shown in table 1. The county was divided into four quadrants labeled from A to D (fig. 1) and a map number was assigned to each sampling site.

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Roman-Mas, Angel, Bennett, M.W., and Hamilton, K.G., 1991, Reconnaissance of ground-water quality at selected sites in Bedford and Coffee Counties, Tennessee, June and July 1991: U.S. Geological Survey Open-File Report 91-510, 1 sheet.

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Table 1. Water-quality data for selected ground-water sites in Bedford County, Tennessee

[Cols./100 mL, number of colonies per 100 milliliters of sample; mg/L, milligrams per liter; °C, degrees Celsius; µS/cm, microsiemens per centimeter; K, non-ideal count; <, less than; >, greater than]

Map number	Fecal coliform (Cols./100 mL)	Fecal streptococci (Cols./100 mL)	Chloride (mg/L as Cl)	Nitrate (mg/L as NO_3)	Sulfate (mg/L as SO_4)	pH (stand. units)	Specific conductance (µS/cm at 25°C)
			Quadrant A				
1	K40	7,600	4.3	<1	22	7.6	521
2	K4	K3	28	<1	50	7.6	740
3	K3	K10	17	1.9	180	7.2	955
4	K880	K180	96	<1	19	7.2	885
5	K1,400	2,700	7.7	7.0	4	7.3	470
6	22	280	4.9	<1	21	7.6	440
7	210	K1,500	6.5	3.0	16	7.4	446
8	K11	K4	29	<1	62	7.3	821
9	K8	200	8.0	4.2	<5	7.4	468
10	K100	590	21	<1	41	8.9	692
11	K92	790	19	<1	48	8.9	696
12	K740	440	3.4	<1	<5	7.1	578
13	<1	460	44	4.0	<5	6.8	256
14	K10	K5	8.6	<1	22	7.2	561
15	<1	K2	2.1	<1	43	7.5	576
16	K4	K3	14	<1	30	7.6	534
17	K1,200	4,500	23	5.8	38	7.0	675
18	K1,500	K12,000	4.2	1.9	21	7.4	483
19	K89	420	35	<1	38	7.2	673
20	K2,500	7,400	4.7	<1	<5	7.4	377
21	20	54	2.4	3.6	18	7.3	520
22	K920	2,100	3.4	1.5	13	7.3	416
23	K1,800	4,900	5.9	1.1	14	7.2	494
24	<1	<1	6.2	<1	30	7.6	535
25	<1	K5	14	<1	43	7.6	593
26	200	340	12	<1	50	7.4	614
27	<1	<1	5.4	<1	38	7.3	536
28	400	330	11	<1	26	7.4	571
29	<1	<1	17	<1	33	7.3	601
30	K1	<1	10	<1	31	7.5	540
31	2,200	K19,000	8.4	1.4	42	6.9	746
32	K110	620	5.2	<1	84	7.6	524
33	<1	230	9.2	<1	30	7.8	462
			Quadrant B				
1	K7,800	>10,000	25	<1	66	7.2	788
2	<1	<1	4.3	1.1	<5	6.5	86
3	2,000	K1,200	4.4	<1	25	7.2	545
4	K740	4,000	3.0	7.1	16	7.0	381
5	K88	4,100	1.6	<1	55	7.4	598
6	230	K10,000	45	<1	96	7.2	928

Map number	Fecal coliform (Cols./100 mL)	Fecal streptococci (Cols./100 mL)	Chloride (mg/L as Cl)	Nitrate (mg/L as NO_3)	Sulfate (mg/L as SO_4)	pH (stand. units)	Specific conductance (µS/cm at 25°C)
			Quadrant B—Continued				
7	K1	K12	35	2.1	72	7.2	783
8	K87	K39,000	5.1	<1	34	7.4	548
9	K6,900	K25,000	32	11	57	7.1	778
10	K6	K8	19	<1	39	7.3	663
11	<1	<1	4.4	<1	13	7.6	424
12	<1	<1	9.9	<1	24	7.7	582
13	410	700	27	15	20	7.1	643
14	<1	<1	11	<1	41	7.3	625
15	K690	4,600	1.7	2.2	<5	7.2	189
16	29	450	2.4	<1	29	7.4	613
			Quadrant C				
1	<1	<1	4.2	<1	31	7.6	587
2	26	K1	8.5	<1	29	7.5	513
3	<1	<1	6.0	<1	40	7.7	596
4	220	540	12	22	22	6.2	333
5	K2	K3	23	<1	70	7.2	696
6	K13	K12	3.3	<1	26	7.6	412
7	230	910	4.1	1.1	19	7.2	498
8	K1,200	2,100	2.5	2.1	5	7.0	418
9	410	470	8.3	2.6	8	7.2	326
10	K8,600	K13,000	<1	<1	<5	5.9	32
11	<1	<1	10	15	65	7.1	505
			Quadrant D				
1	<1	<1	29	<1	25	7.2	746
2	53	430	1.3	<1	<5	7.4	293
3	37	490	4.2	2.6	<5	7.5	398
4	<1	<1	3.7	1.2	<5	7.4	89
5	K7,700	K7,700	28	<1	93	8.0	771
6	K830	K6,900	15	9.7	14	8.0	772
7	<1	<1	7.3	1.1	44	7.3	547
8	380	K1,300	2.1	1.1	<5	7.1	232
9	K2	32	3.5	<1	<5	7.6	218
10	K1	K1	1.1	<1	<5	5.6	11
11	<1	<1	1.3	<1	<5	8.0	359
12	K760	3,900	1.7	1.4	<5	7.2	355
13	<1	K4	2.8	<1	12	7.7	408
14	K9	49	4.4	3.3	<5	7.3	377
15	43	520	2.6	2.0	<5	7.4	253
16	<1	K2	5.0	<1	<5	7.5	361
17	K18	23	3.4	<1	<5	7.2	266
18	3,900	6,400	1.5	<1	<5	7.5	255

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U.S. GEOLOGICAL SURVEY

RECONNAISSANCE OF GROUND-WATER QUALITY AT SELECTED SITES IN BEDFORD COUNTY, TENNESSEE, AUGUST 1996

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