TECHNIQUES FOR ESTIMATING THE QUANTITY AND QUALITY OF STORM RUNOFF FROM URBAN WATERSHEDS OF JEFFERSON COUNTY, KENTUCKY

By Ronald D. Evaldi and Brian L. Moore

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BRUCE BABBITT, Secretary

U.S. GEOLOGICAL SURVEY
GORDON P. EATON, Director

For additional information write to:

District Chief
U.S. Geological Survey
2301 Bradley Avenue
Louisville, KY 40217

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CONVERSION FACTORS AND ABBREVIATED WATER-QUALITY UNITS

Multiply	By	To obtain
inch (in.)	25.4	millimeter
mile (mi)	1.609	kilometer
pound (lb)	0.4536	kilogram
ton (ton)	907.2	kilogram
acre	0.4047	square hectometers
square mile (mi^2)	2.590	square kilometer
cubic foot (ft^3)	28.32	cubic decimeter
cubic foot per second (ft^3/s)	28.32	cubic decimeter per second

Temperature in degrees Fahrenheit can be converted to degrees Celsius as follows:

$$°C = (°F - 32)/1.8$$

Abbreviated water-quality units used in this report: Chemical concentrations and water temperatures are given in metric units. Chemical concentration is given in milligrams per liter (mg/L) or micrograms per liter (μg/L). Milligrams per liter is a unit expressing the concentration of chemical constituents in solution as weight (milligrams) of solute per unit volume (liter) of water. One thousand micrograms per liter is equivalent to one milligram per liter. For concentrations less than 7,000 mg/L, the numerical value is the same as for concentrations in parts per million.

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ABSTRACT

This report presents techniques for estimation of storm-runoff volumes, and mean concentrations and loads of selected constituents in storm runoff from urban watersheds of Jefferson County, Ky. Estimation models were developed on the basis of runoff volumes, and concentrations and loads of selected constituents in runoff measured at 6 stormwater outfalls and 25 streams in Jefferson County. In addition, previously developed regional estimation models were evaluated to assess their suitability for use in the county. Adjustments to the previously developed models were determined from comparisons to data obtained in Jefferson County.

The estimation techniques consist of sets of linear regression models for estimating mean concentrations and total loads of selected constituents in single storms, the quantity of the storm runoff, and annual and mean annual loads of selected constituents in storm runoff. Constituents modeled include dissolved oxygen, biochemical and chemical oxygen demand, dissolved and suspended solids, volatile residue, nitrogen, phosphorus and phosphate, calcium, magnesium, barium, copper, iron, lead, and zinc. Model estimations are a function of drainage area, percentage of imperviousness, climatological data, and land use.

INTRODUCTION

Jefferson County, Ky., which includes the city of Louisville, is a rapidly developing urban area. As urbanization has progressed, rural land has been replaced by residences, businesses, industrial facilities, shopping centers, and parking lots. Associated with urbanization is a change in the types and quantities of contaminants discharged to the surface waters of the county. Storm runoff can wash contaminants, which accumulate during dry periods, into urban drainage systems and degrade the surface-water quality of many streams and drainage channels. Many contaminants in urban runoff are primarily by-products of human activity and include organic debris, sediments, nutrients, petroleum-based products, and potentially toxic chemicals, such as heavy metals and pesticides.

Urban planners and managers need information on the quantity and quality of runoff to plan adequately for the effects of storm runoff from urban areas. Quantity of runoff is commonly expressed as volumes; quality of runoff is commonly expressed in terms of constituent concentrations or loads. (The load of a constituent in a stream is the concentration of that constituent multiplied by the discharge.) The constituents that contribute to the total stream load are often from point and nonpoint sources. Nonpoint-source contaminants generally are transported to receiving waters in runoff resulting

from storms[1]. Estimates of loads of selected constituents in storm runoff provides a measure of nonpoint-source effects on water quality. Estimates of annual loads and event mean concentrations of selected constituents are required as part of the National Pollutant Discharge Elimination System permit for discharges from municipal separate storm-sewer systems (U.S. Environmental Protection Agency, 1992). (The event mean concentration of a constituent is the mean of that constituent in runoff during a storm from the rise, through the crest, together with the recession that follows the crest.)

In 1991, the Louisville and Jefferson County Metropolitan Sewer District (MSD) and the U.S. Geological Survey (USGS) began a cooperative program to assess the quality of stormwater runoff in the county. The program involved collection of a number of samples for determination of stormwater quality. Quantification of constituent concentrations in the stormwater and estimation of constituent transport from the watersheds can help to describe the effects of urbanization on water quality.

Purpose and Scope

This report describes techniques for estimating the quantity and quality of storm runoff from urban watersheds of Jefferson County, Ky. Previously developed regional estimation models were evaluated to assess their suitability for use in the county. These models were adjusted, and additional new models were developed on the basis of storm data measured in Jefferson County. Regression models are presented for estimation of (1) selected constituent concentrations in storm runoff, (2) runoff volumes and selected constituent loads in runoff from single storms, and (3) annual total volumes of runoff and loads of selected constituents in runoff. The main constituents of interest for this study include chemical oxygen demand, biochemical oxygen demand, dissolved solids, suspended solids, total nitrogen, total Kjeldahl nitrogen, total phosphorus, dissolved phosphorus, total cadmium, total copper, total lead, and total zinc.

Description of Study Area

Jefferson County covers 386 mi^2 of the north-central part of Kentucky along the Ohio River (fig. 1) (Louisville Chamber of Commerce, 1992). Within its borders is Louisville, the largest city and the most densely populated area of the State.

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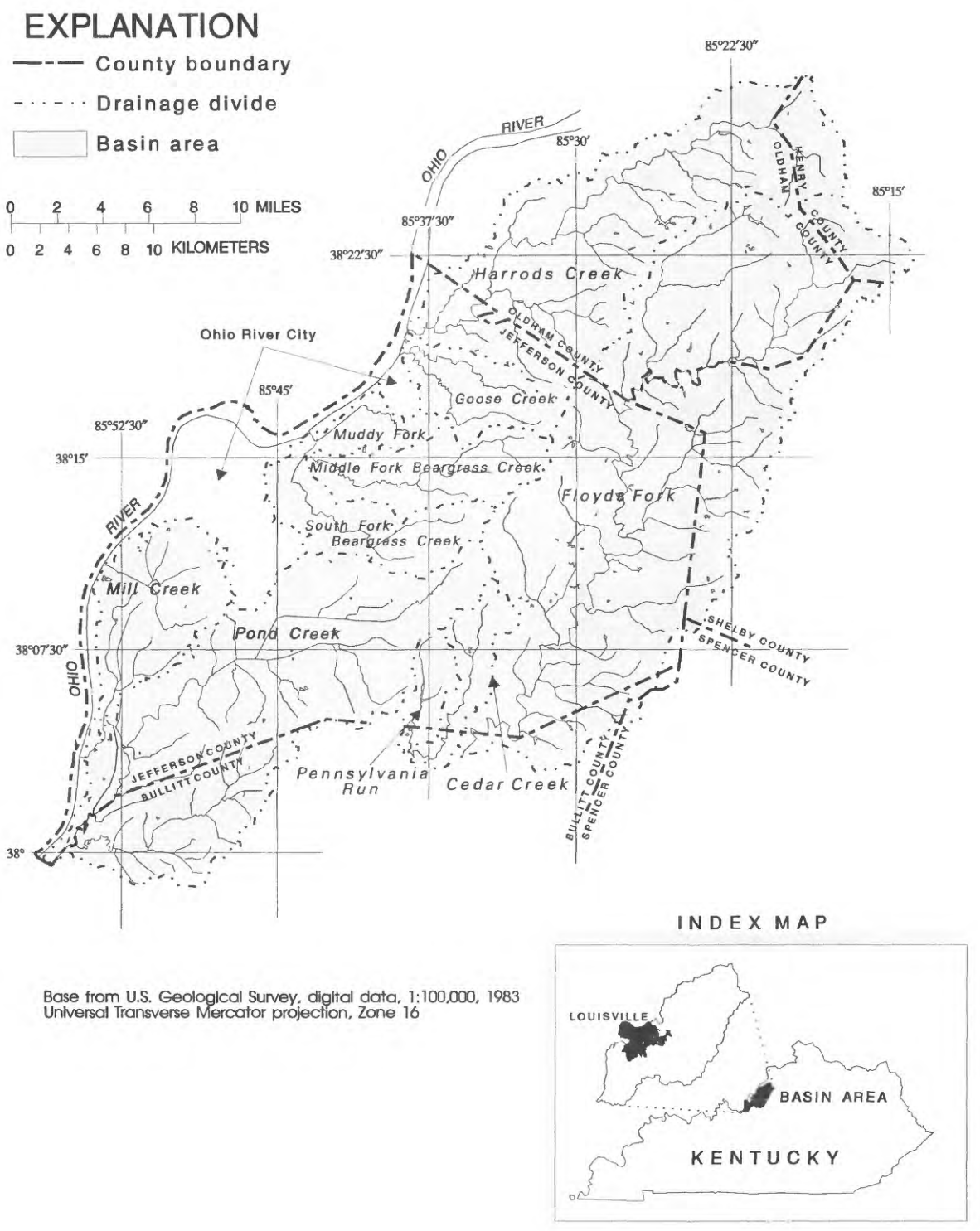
[1]Approximately 69 storms, defined as 0.1 in. accumulation with at least 0.01 in. each hour, occur each year in Jefferson County (Steurer and Nold, 1986).



Base from U.S. Geological Survey, digital data, 1:100,000, 1983
Universal Transverse Mercator projection, Zone 16

Figure 1.--Major stream basins in Jefferson County, Kentucky.

Climate

The climate of Louisville, Ky., is classified as "moist-continental" by Strahler and Strahler (1979). It is characterized by changeable weather and only short periods of extreme conditions. Weather systems generally track either north from the Gulf of Mexico, bringing warm, moist air in the summer, or southeast from Canada, bringing occasional arctic air masses to the area in the winter. As a result, winters are moderately cold (temperatures rarely below 0°F), and summers are warm (temperatures rarely above 100°F). The coldest month is January, during which the daily minimum temperature averages 26.2°F; the warmest month is July, during which the daily maximum temperature averages 88.1°F (National Oceanic and Atmospheric Administration, 1990).

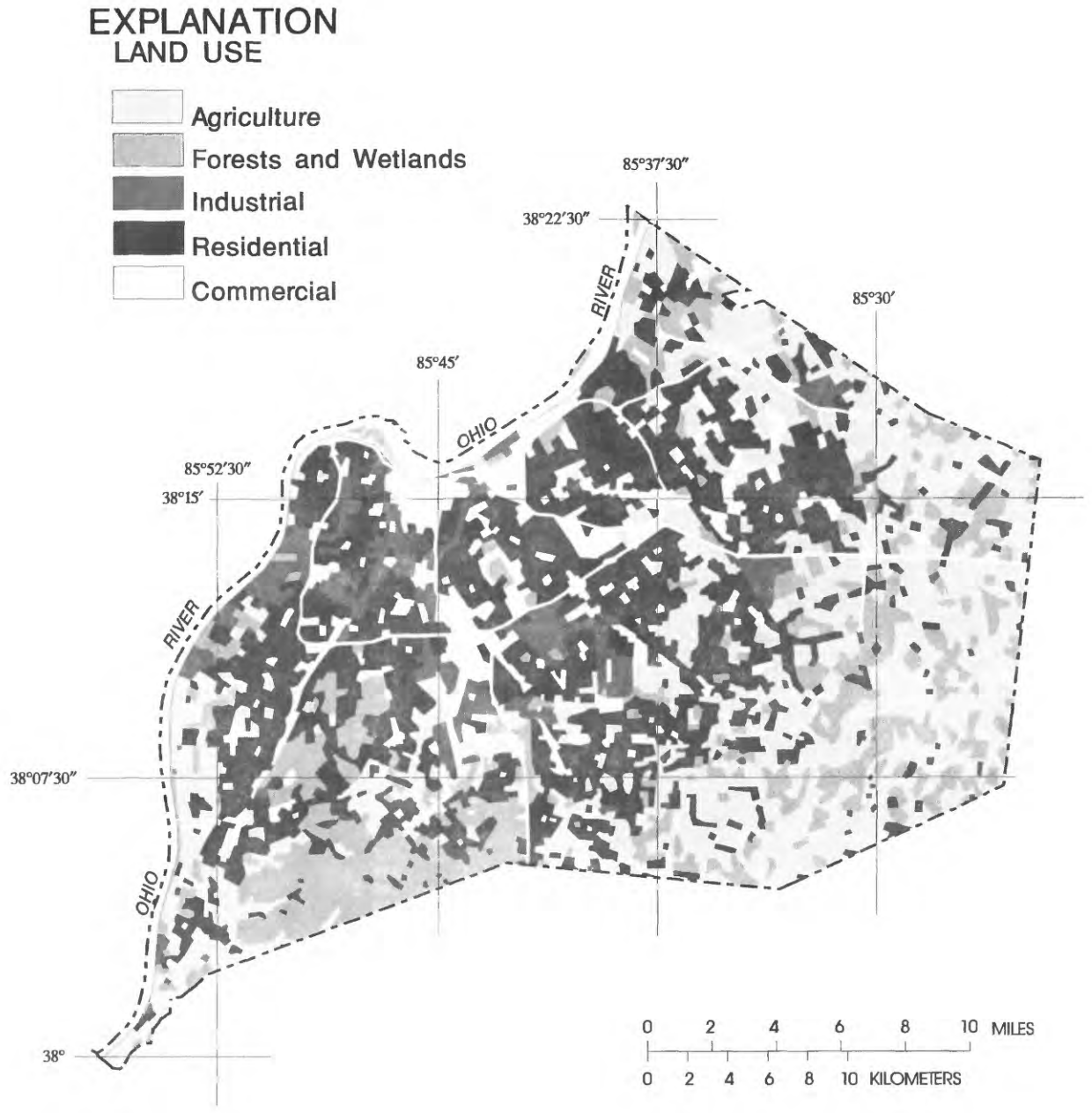
Based on records for 1960-90, the average annual precipitation at Louisville is 43.0 in. (National Oceanic and Atmospheric Administration, 1990). Generally, October is the driest month and March is the wettest. Thunderstorms usually contribute substantially to the rainfall in the spring and summer. Snow usually occurs from November through March, although it has fallen as late as April and as early as October. Average annual snowfall is 16.6 in. (5.4 in. in January).

Population and Land Use

According to the 1990 U.S. Census, the population of Jefferson County is approximately 665,000 (Louisville Chamber of Commerce, 1992). This figure represents a 3-percent decline from the 1980 census and a 4-percent decline since 1970. The Louisville Chamber of Commerce, however, projects that the population of Jefferson County will grow to 673,000 by the end of 1994.

Generalized land-use regions of Jefferson County are shown in figure 2. The sources of the land-use data shown in figure 2 are 1983 National Atmospheric and Space Administration high-altitude aerial photographs and National High-Altitude Photography program photographs digitized at a scale of 1:250,000 (U.S. Geological Survey, 1986). The degree of change in land use since 1983 is unknown; however, on the basis of this 1983 land-use information, most commercial and industrial land is within the Louisville city limits. In this report, agricultural and forest and wetland land uses were considered as nonurban.

Within and immediately surrounding the city limits, residential land use predominates (with some exceptions). The least populated and least developed watersheds of Jefferson County are Pennsylvania Run, which has one population center, and Cedar Creek, which has three population centers (fig. 1). Most agricultural and forest land is in the eastern, southern, and southwestern parts of the county. Industrial areas are also in these parts of the county, however, and include parts of an industrial park in the Floyds Fork watershed, an industrial park and truck-assembly plant in the Harrods Creek watershed, and large manufacturing facilities in the Pond Creek watershed.



Base from U.S. Geological Survey, digital data, 1:100,000, 1983
Land use from digital data, 1:250,000, 1983
Universal Transverse Mercator projection, Zone 16

Figure 2.--Generalized land use in Jefferson County, Kentucky.

Surface-Water Hydrology

Ten stream systems course through Jefferson County and also drain parts of five surrounding counties (fig. 1). These stream systems are Harrods Creek, Goose Creek, Muddy Fork, Middle Fork Beargrass Creek, South Fork Beargrass Creek, Floyds Fork, Cedar Creek, Pennsylvania Run, Pond Creek, and Mill Creek. Their watersheds range in size from 8.5 mi^2 (Pennsylvania Run) to 222 mi^2 (Floyds Fork) and have a combined area of approximately 600 mi^2.

The Louisville metropolitan area and other parts of the county that drain directly to the Ohio River are known locally as the Ohio River City area (fig. 1). The Louisville metropolitan area consists of a dense commercial central business district that is drained mainly by a complex system of combined sanitary and storm sewers, with few open channels.

STORMWATER DATA FOR JEFFERSON COUNTY

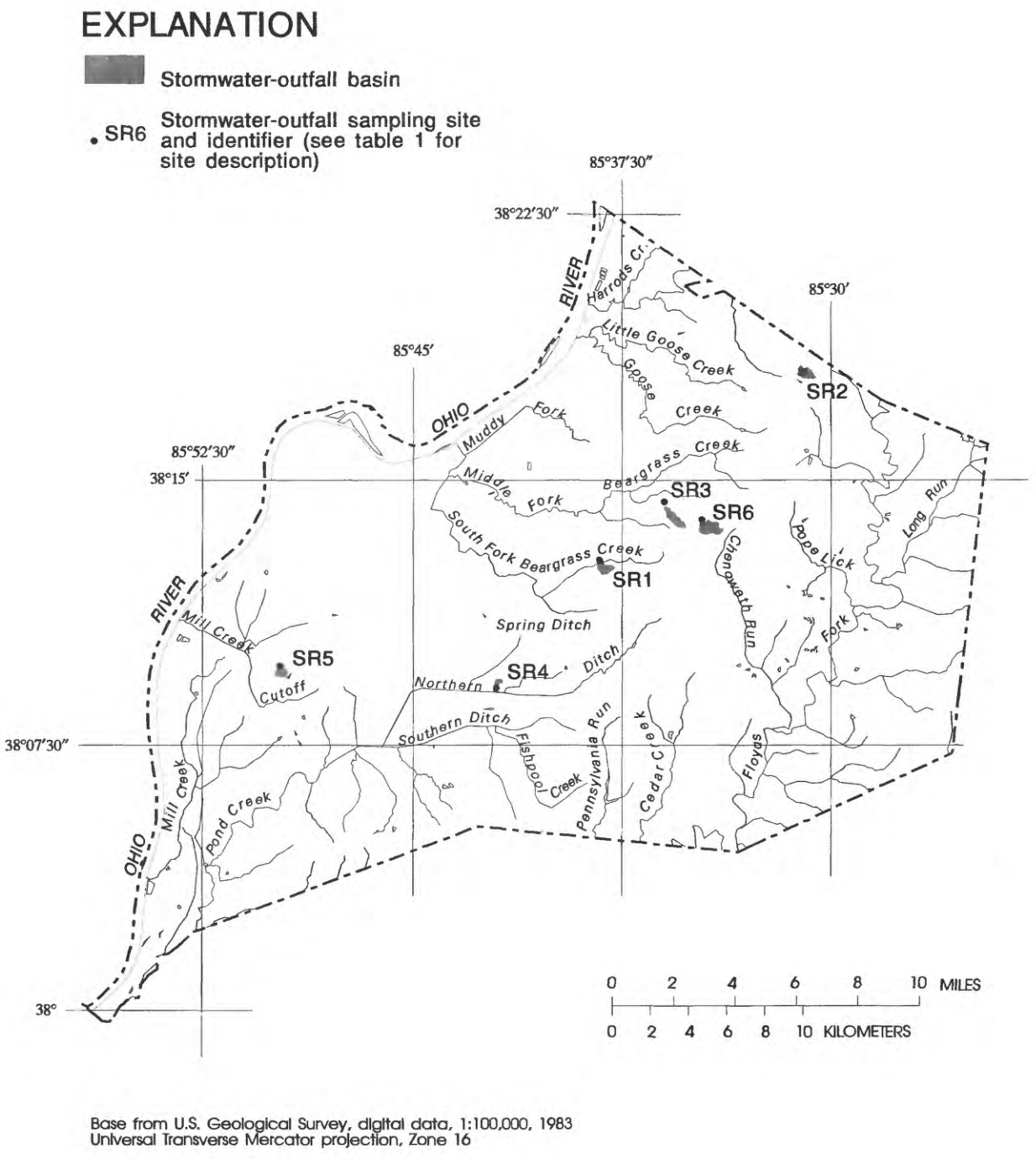
Stormwater samples were collected in Jefferson County from storm outfalls in six small watersheds identified as having a specific predominant land use. These samples were collected to describe the chemical characteristics of stormwater in Jefferson County. Total storm-runoff volume was measured for most sampled storms and used in conjunction with the sample analyses to compute loads of selected constituents in the storm runoff. These data were supplemented with constituent-load computations from 25 stream-water-quality sampling sites in the county.

The stormwater outfalls used for sampling (fig. 3) and the primary land uses in their watersheds are listed in table 1.

Table 1. Stormwater-outfall sampling sites in Jefferson County, Kentucky, and primary land uses in their watersheds

Site number and name	Primary land use in watershed
SR1 Tributary to South Fork Beargrass Creek	high-density residential
SR2 Tributary to Hite Creek	light industrial
SR3 Tributary to Middle Fork Beargrass Creek	low-density residential
SR4 Tributary to Northern Ditch	heavy industrial
SR5 Tributary to Big Run	commercial
SR6 Tributary to Middle Fork Beargrass Creek	commercial

At least three storms that occurred at least 1 month apart were sampled at each of the six stormwater outfalls from January 1991 through May 1992 (table 2). Stormwater sampling generally followed a dry-weather period of at least 72 hours. The sample data used in this report represented the entire flow period of the stormwater outfall for each storm. Event mean concentrations and loads measured at the six storm-outfall sites in Jefferson



Base from U.S. Geological Survey, digital data, 1:100,000, 1983
Universal Transverse Mercator projection, Zone 16

Figure 3.--Stormwater outfall sampling sites in Jefferson County, Kentucky.

County are listed in table 3. Additional water-quality data, sampling procedures, analytical methods, and quality-assurance analyses are detailed in a data report by Evaldi and Moore (1992).

Table 2. Rainfall and runoff associated with stormwater samples collected in Jefferson County, Kentucky, January 1991-May 1992

[--, unknown]

Site	Date and time rainfall began[1]	Total storm rainfall, in inches	Storm duration, in minutes	Time since previous rain, in hours	Total storm runoff, in cubic feet
SR1	910115 @ 1650	0.18	600	97.0	--
SR1	910419 @ 0320	.22	76	82.9	7,780
SR1	911005 @ 0458	.40	222	246.2	10,400
SR2	910205 @ 1056	1.60	2339	146.1	--
SR2	910419 @ 0320	.22	76	91.9	16,500
SR2	911005 @ 0455	.44	223	246.5	16,900
SR3	910301 @ 1458	.22	362	268.6	14,800
SR3	910904 @ 0815	1.41	740	128.2	172,000
SR3	911212 @ 1222	.04	26	71.5	1,890
SR4	910312 @ 1325	.92	2,435	141.2	73,300
SR4	920212 @ 1426	.48	1,172	705.8	35,700
SR4	920317 @ 2105	1.74	2,495	181.2	478,000
SR4	920415 @ 0552	.57	381	109.5	30,900
SR5	910327 @ 1050	.03	20	116.0	11,000
SR5	910621 @ 1228	.92	132	18.4	105,000
SR5	920108 @ 1315	.05	85	123.5	100
SR5	920317 @ 2040	2.54	2,540	181.0	379,000
SR5	920512 @ 1650	.61	530	74.3	24,700
SR6	910404 @ 1302	.13	452	310.2	3,260
SR6	910708 @ 1915	.10	35	60.1	24,600
SR6	911212 @ 1149	.04	69	70.6	2,370

[1]Date is given as year, month, day; time is given in 24-hour form.

Another network of sampling sites operated cooperatively by the MSD and USGS was in Jefferson County beginning in February 1988 (fig. 4, table 4). Unlike the six storm-outfall sampling sites, the sampling sites in this network are in receiving waters of the county. Water-quality data from this stream network for February 1988-March 1991 were summarized in a report by Evaldi and others (1993). The drainage area, the percentage of the area covered by impervious surfaces, and the percentage of selected land uses

Table 3. Loads and event mean concentrations of selected constituents in storm runoff measured at stormwater outfalls in Jefferson County, Kentucky, January 1991-May 1992

[mg/L, milligrams per liter; lb, pounds; --, missing. Censored data were set to the detection limit, and indicated loads and concentrations are maximum probable values]

Site	Date storm began[1]	Event mean concentration, (mg/L)	Load for first 3 hours, (lb)	Total storm load, (lb)	Event mean concentration, (mg/L)	Load for first 3 hours, (lb)	Total storm load, (lb)	Event mean concentration, (mg/L)	Load for first 3 hours, (lb)	Total storm load, (lb)
		Chemical oxygen demand			Biochemical oxygen demand			Dissolved solids		
SR1	910115	30.0	6.84	--	7.00	1.60	--	534	122	--
SR1	910419	107	51.7	51.8	--	--	--	64.6	30.7	31.4
SR1	911005	82.0	52.4	53.2	40.0	23.5	25.7	95.9	48.3	62.2
SR2	910205	189	65.3	--	71.0	24.5	--	484	167	--
SR2	910419	62.0	62.0	63.9	--	--	--	56.0	56.0	57.7
SR2	911005	99.0	97.9	104	51.0	50.4	53.5	60.0	59.3	62.9
SR3	910301	94.6	70.7	87.3	24.0	15.7	--	296	194	--
SR3	910904	54.9	159	589	13.0	23.0	--	140	264	1,500
SR3	911212	119	12.3	--	21.0	2.18	--	580	60.1	--
SR4	910312	52.2	48.7	239	48.0	21.2	--	162	92.9	742
SR4	920212	159	45.4	--	147	41.9	--	240	104	537
SR4	920317	20.0	6.42	595	4.00	1.51	--	235	61.9	7,010
SR4	920415	66.1	79.4	127	1.00	.810	--	258	282	496
SR5	910327	365	238	251	610	136	--	174	50.7	120
SR5	910621	26.0	150	168	26.0	150	168	167	1,000	1,100
SR5	920108	--	--	--	20.0	.120	.120	300	1.87	1.87
SR5	920317	29.9	27.3	708	96.0	16.3	--	135	8.13	3,200
SR5	920512	39.0	41.0	60.1	36.0	21.1	--	57.4	44.6	88.5
SR6	910404	407	81.2	82.7	--	--	--	152	30.3	30.9
SR6	910708	140	215	215	45.0	69.0	69.0	264	405	405
SR6	911212	359	51.7	--	73.0	10.5	--	144	20.7	--
		Suspended solids			Total nitrogen			Total Kjeldahl nitrogen		
SR1	910115	36.0	8.21	--	2.70	0.616	--	1.29	0.294	--
SR1	910419	47.6	23.0	23.1	3.45	1.66	1.68	2.42	1.17	1.18
SR1	911005	40.8	25.9	26.5	1.98	1.14	1.29	1.26	.700	.820
SR2	910205	300	104	--	3.06	1.06	--	1.93	.667	--
SR2	910419	24.0	24.0	24.7	1.89	1.89	1.95	1.04	1.04	1.07
SR2	911005	202	200	212	2.95	2.92	3.09	2.05	2.03	2.15
SR3	910301	248	162	--	2.48	1.62	--	1.70	1.11	--
SR3	910904	46.8	90.2	502	1.73	2.49	18.5	.994	1.17	10.6
SR3	911212	272	28.2	--	5.49	.569	--	1.59	.165	--
SR4	910312	44.8	77.0	205	2.41	1.07	--	.393	.434	1.80
SR4	920212	43.4	22.8	96.8	1.62	.868	3.61	.753	.434	1.68
SR4	920317	47.9	15.9	1,430	1.06	.400	--	.360	.143	10.7
SR4	920415	61.7	81.0	119	1.63	1.54	3.14	.871	.875	1.68
SR5	910327	63.8	17.8	43.8	1.87	.596	1.29	1.12	.480	.768
SR5	910621	118	762	778	--	--	--	.476	2.65	3.13
SR5	920108	76.0	.470	.470	3.20	.020	.020	1.76	.011	.011
SR5	920317	48.0	8.47	1,140	1.47	.249	--	.600	.103	14.2
SR5	920512	19.1	19.9	29.5	2.02	1.59	3.11	1.21	.985	1.86
SR6	910404	72.0	14.4	14.6	2.07	.413	.421	1.49	.297	.303
SR6	910708	126	193	193	1.98	3.04	3.04	1.51	2.32	2.32
SR6	911212	112	16.1	--	--	--	--	--	--	--

Table 3. Loads and event mean concentrations of selected constituents in storm runoff measured at stormwater outfalls in Jefferson County, Kentucky, January 1991-May 1992--Continued

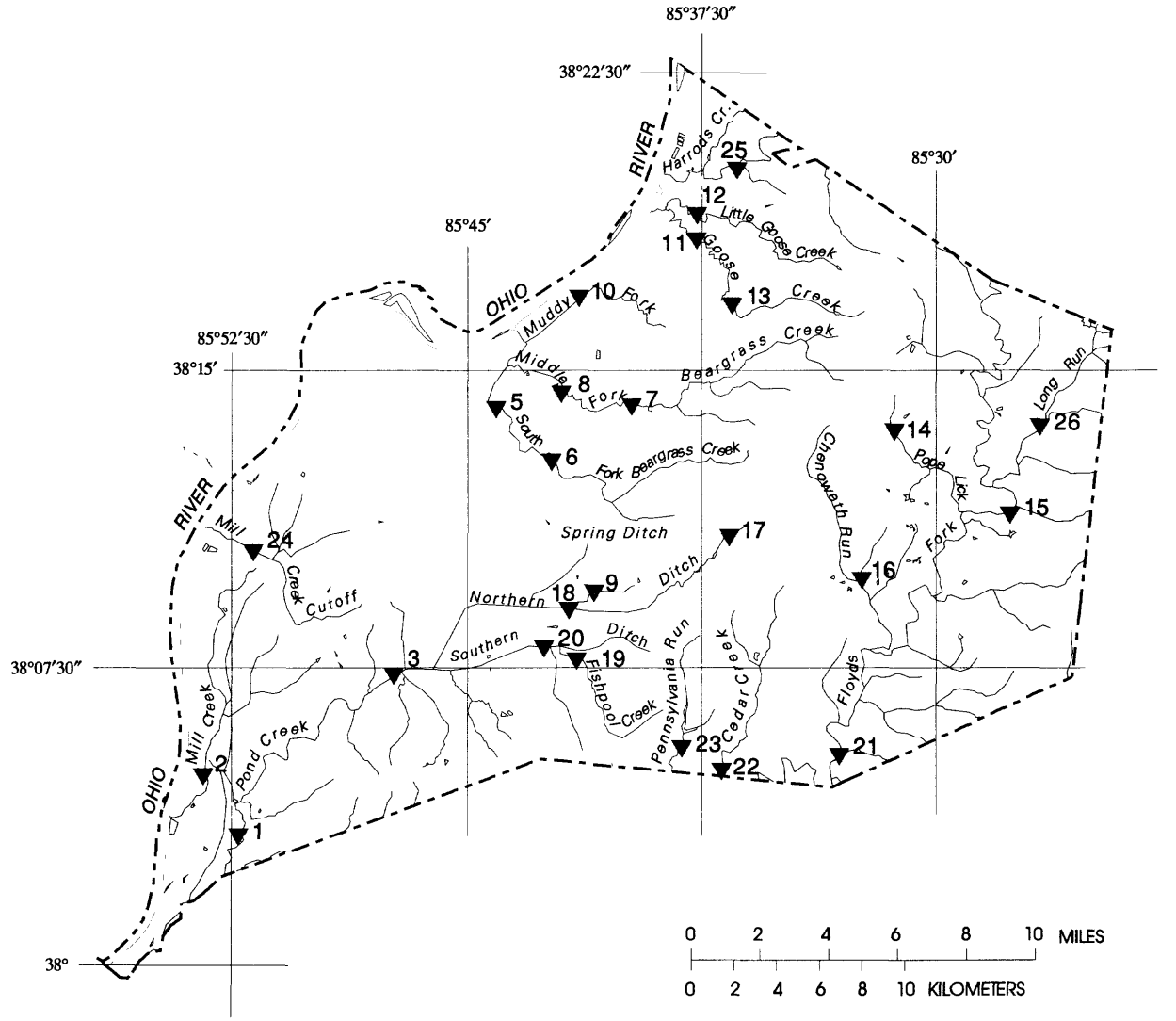
[mg/L, milligrams per liter; lb, pounds; --, missing. Censored data were set to the detection limit, and indicated loads and concentrations are maximum probable values]

Site	Date storm began[1]	Event mean concentration, (mg/L)	Load for first 3 hours, (lb)	Total storm load, (lb)	Event mean concentration, (mg/L)	Load for first 3 hours, (lb)	Total storm load, (lb)	Event mean concentration, (mg/L)	Load for first 3 hours, (lb)	Total storm load, (lb)
		Total phosphorus			Dissolved phosphorus			Total cadmium		
SR1	910115	0.250	0.060	--	--	--	--	0.007	0.002	--
SR1	910419	.460	.220	0.220	0.310	0.148	0.151	.007	.003	0.003
SR1	911005	1.19	.770	.770	1.10	.648	.708	.007	.004	.005
SR2	910205	.810	.280	--	--	--	--	.007	.002	--
SR2	910419	.390	.390	.400	.450	.450	.464	.007	.007	.007
SR2	911005	.260	.260	.270	.200	.198	.210	.007	.007	.007
SR3	910301	.080	.050	--	.050	.033	--	.008	.005	.007
SR3	910904	.220	.340	2.30	.120	.212	--	.007	.012	.075
SR3	911212	.370	.040	--	.030	.003	--	.007	.001	--
SR4	910312	.190	.080	--	.170	.075	--	.007	.003	.032
SR4	920212	.560	.060	1.25	.170	.049	--	.007	.002	.016
SR4	920317	.120	.030	3.56	--	--	--	.007	.003	.209
SR4	920415	.080	.050	.160	--	--	--	.023	.033	.044
SR5	910327	.100	.020	.070	.070	.016	--	.009	.002	.006
SR5	910621	.180	1.15	1.21	.150	.865	.971	.008	.040	.050
SR5	920108	.380	--	--	--	--	--	.007	--	--
SR5	920317	.250	.020	5.89	--	--	--	.007	.001	.166
SR5	920512	.120	.070	.180	.090	.053	--	.007	.004	.011
SR6	910404	.370	.070	.080	.010	.002	.002	.035	.007	.007
SR6	910708	.190	.290	.290	.110	.169	.169	.007	.011	.011
SR6	911212	.180	.030	--	.050	.007	--	.007	.001	--
		Total copper			Total lead			Total zinc		
SR1	910115	0.014	0.003	--	0.055	0.013	--	0.162	0.037	--
SR1	910419	.009	.004	0.004	.060	.029	0.029	.362	.175	0.176
SR1	911005	.008	.005	.005	.060	.035	.039	.066	.036	.043
SR2	910205	.017	.006	--	.055	.019	--	.142	.049	--
SR2	910419	.008	.008	.008	.060	.060	.062	.157	.157	.162
SR2	911005	.008	.008	.008	.060	.059	.063	.529	.523	.555
SR3	910301	.016	.011	.015	.055	.036	.051	.103	.079	.095
SR3	910904	.015	.021	.164	.060	.106	.643	.045	.126	.483
SR3	911212	.037	.004	--	.060	.006	--	.187	.019	--
SR4	910312	.012	.008	.053	.067	.058	.306	.215	.093	.983
SR4	920212	.013	.005	.028	.055	.016	.123	.125	.058	.280
SR4	920317	.013	.008	.390	.055	.021	1.64	.068	.037	2.04
SR4	920415	.019	.020	.036	.053	.043	.102	.238	.139	.459
SR5	910327	.017	.006	.011	.060	.013	.041	.235	.105	.162
SR5	910621	.008	.046	.053	.060	.346	.394	.100	.594	.658
SR5	920108	.021	--	--	.055	--	--	.330	.002	.002
SR5	920317	.016	.003	.379	.055	.009	1.30	.066	.023	1.57
SR5	920512	.015	.009	.023	.053	.031	.082	.144	.118	.223
SR6	910404	.025	.005	.005	.055	.011	.011	.256	.051	.052
SR6	910708	.010	.015	.015	.060	.092	.092	.324	.497	.497
SR6	911212	.012	.002	--	.060	.009	--	.211	.030	--

[1]Date is given as year, month, day.

EXPLANATION

▼17 Water-quality sampling site and identifier (see table 3 for site description)



Base from U.S. Geological Survey, digital data, 1:100,000, 1983
Universal Transverse Mercator projection, Zone 16

Figure 4.--Stream-water-quality sampling sites in Jefferson County, Kentucky.

Table 4. Stream-water-quality sampling sites in Jefferson County, Kentucky, and potential sources of contaminants in their watersheds

[NPR, nonpoint runoff; WTE, wastewater-treatment-plant effluent; STD, septic-tank discharges; IW, industrial wastewater; CSO, combined-sewer or sanitary-sewer overflows]

Site number and name	USGS station number	Latitude	Longitude	Potential sources of contaminants[1]
1 Pond Creek at Pendleton Road	03302030	38°03'15"	85°52'18"	NPR, WTE, STD, IW
2 Mill Creek at Orell Road	03294570	38°04'41"	85°53'24"	NPR, WTE, STD
3 Pond Creek at Manslick Road	03302000	38°07'11"	85°47'45"	NPR, WTE, STD, IW
5 South Fork Beargrass Creek at Winter Avenue	03292550	38°14'04"	85°43'50"	NPR, CSO
6 South Fork Beargrass Creek at Trevilian Way	03292500	38°12'39"	85°42'07"	NPR, CSO
7 Middle Fork Beargrass Creek at Old Cannons Lane	03293000	38°14'14"	85°39'53"	NPR, CSO
8 Middle Fork Beargrass Creek at Beals Branch Road	03293200	38°14'32"	85°41'57"	NPR, WTE, STD, CSO
9 Spring Ditch at Private Drive below Hanses Road	03301950	38°09'27"	85°40'57"	NPR, WTE
10 Muddy Fork at Mockingbird Valley Road	03293530	38°16'35"	85°41'37"	NPR, WTE, STD
11 Goose Creek at U.S. Highway 42	03292475	38°18'12"	85°37'41"	NPR, WTE, STD
12 Little Goose Creek at U.S. Highway 42	03292480	38°18'45"	85°37'33"	NPR, WTE, STD
13 Goose Creek at Old Westport Road	03292474	38°16'33"	85°36'22"	NPR, WTE, STD
14 Pope Lick at Pope Lick Road	03298100	38°13'09"	85°31'07"	NPR, WTE, STD
15 Floyds Fork at former State Highway 155	03298000	38°11'18"	85°27'37"	NPR, WTE, STD
16 Chenoweth Run at Gelhaus Road	03298150	38°09'36"	85°32'32"	NPR, WTE
17 Fern Creek at Old Bardstown Road	03301900	38°10'32"	85°36'55"	NPR, WTE
18 Northern Ditch at Preston Highway	03301940	38°09'01"	85°41'37"	NPR, WTE, STD, IW
19 Fishpool Creek at Bost Road	03301850	38°07'45"	85°41'35"	NPR, WTE, STD
20 Southern Ditch at Minors Lane	03301880	38°08'04"	85°42'34"	NPR, WTE, STD
21 Floyds Fork at Bardstown Road	03298200	38°05'07"	85°33'18"	NPR, WTE, STD
22 Cedar Creek at Thixton Road	03298250	38°04'45"	85°36'58"	NPR, WTE, STD
23 Pennsylvania Run at Mt. Washington Road	03298300	38°05'15"	85°38'33"	NPR, WTE, STD
24 Mill Creek Cutoff at Dover Road	03294550	38°10'39"	85°52'01"	NPR, STD
25 Harrods Creek at Hunting Creek Drive	03292473	38°20'06"	85°36'09"	NPR, WTE, STD
26 Long Run at State Highway 1531	03297980	38°13'10"	85°26'56"	NPR, STD

[1]Source, Pamela J. Pulliam, Louisville and Jefferson County Metrotpolitan Sewer District, written commun., 1992.

within the drainage basin are listed in table 5 for the 6 stormwater-outfall and 25 stream-water-quality sampling sites in Jefferson County. These data are needed in some load-estimation procedures.

TECHNIQUES FOR ESTIMATING THE QUANTITY AND QUALITY OF STORM RUNOFF

Regional regression models to estimate storm-runoff volumes, mean constituent concentrations, and constituent loads were developed by Driver and Tasker (1990). Storm-runoff volumes, mean concentrations, and loads measured in Jefferson County were used to evaluate these regional estimation methods. Adjustments to some of the previously developed estimation models were based on Jefferson County measurements. In addition, models were developed from these data by use of multiple-regression analysis to relate storm-runoff constituent concentrations, volumes, and loads to measurable physical, land-use, and climatic characteristics in Jefferson County.

The previously developed regional regression models were of the same type as those developed during this study. The storm-runoff constituent concentrations, volumes, and loads were the response variables. Physical, land-use, and climatic characteristics were the explanatory variables and consisted of the following:

1. Total contributing drainage area.
2. Impervious area, as a percentage of total contributing drainage area.
3. Industrial land use, as a percentage of total contributing drainage area.
4. Commercial land use, as a percentage of total contributing drainage area.
5. Residential land use, as a percentage of total contributing drainage area.
6. Nonurban land use, as a percentage of total contributing drainage area.
7. Total storm or annual rainfall, in inches.
8. Mean annual rainfall, in inches.
9. Rainfall duration, in minutes.
10. Maximum 24-hour precipitation that has a 2-year recurrence interval, in inches.
11. Mean annual nitrogen load in precipitation, in pounds of nitrogen per acre.
12. Mean minimum January temperature, in degrees Fahrenheit.

Loads of Constituents in Storm Runoff, and Quantity of Runoff

National regression models developed by Driver and Tasker (1990) can be used to estimate loads of selected constituents and runoff quantity from single storms on the basis of total rainfall of the storm and on physical, land use, and climate characteristics of the drainage basin. Three regions of the United States were defined by Driver and Tasker (1990) on the basis of the amounts of mean annual precipitation in each region, and sets of models were developed for each region. The models used for estimation of loads of selected constituents in single storms and runoff quantity of the storms in Jefferson County were developed from urban storm-runoff data for 11 metropolitan areas in which mean annual rainfall is equal to or greater than 40 in. The closest of these 11 metropolitan areas was Knoxville, Tenn.;

Table 5. Land uses and percentage of impervious cover within the watersheds of selected stream-water-quality and stormwater-outfall sampling sites in Jefferson County, Kentucky

[Trib, tributary; SF, South Fork; Cr, Creek; MF, Middle Fork]

Site number and name	Drainage area, in square miles*	Impervious cover, in percentage of drainage area*	Land use, in percentage of drainage area**				
			Agricultural	Commercial	Forest & wetlands	Industrial	Residential
SR1 Trib to SF Beargrass Cr at Buechel	0.151	39.6	0	18.3	0	0	81.7
SR2 Trib to Hite Cr at O'Bannon	.169	20.6	16.1	0	0	57.9	26.0
SR3 Trib to MF Beargrass Cr at St Matthews	.210	35.0	0	5	15	0	80
SR4 Trib to Northern Ditch at Okolona	.068	45.5	11.5	0	12.0	76.5	0
SR5 Trib to Big Run at Pleasure Ridge Park	.132	68.9	3.4	45.9	0	0	50.7
SR6 Trib to MF Beargrass Cr at Hurstbourne Acres	.282	63.5	0	49.6	0	0	50.4
1 Pond Cr at Pendleton Road	82.0	27.5	19.5	9.5	24.5	8.2	38.3
2 Mill Cr at Orell Road	13.9	25.5	30.2	6.9	14.7	5.1	43.1
3 Pond Cr at Manslick Road	63.9	29.7	19.2	11.3	18.4	10.4	40.7
5 SF Beargrass Cr at Winter Avenue	22.3	38.7	10.6	16.7	4.0	12.5	56.2
6 SF Beargrass Cr at Trevilian Way	16.9	38.4	14.1	16.4	2.0	12.7	54.8
7 MF Beargrass Cr at Old Cannons Lane	18.4	35.9	16.3	23.2	2.6	4.4	53.5
8 MF Beargrass Cr at Beals Branch Road	22.6	36.0	13.2	22.2	2.1	6.2	56.3
9 Spring Ditch at Private Drive	2.4	44.7	20.0	15.3	1.8	37.3	25.6
10 Muddy Fork at Mockingbird Valley Road	6.5	39.6	3.1	12.1	5.8	6.7	72.3
11 Goose Cr at U.S. Highway 42	9.8	24.6	26.3	11.7	4.5	3.6	53.9
12 Little Goose Cr at U.S. Highway 42	5.8	22.6	51.2	14.7	8.4	.1	25.6
13 Goose Cr at Old Westport Road	6.8	24.7	27.3	12.7	3.3	1.7	55.0
14 Pope Lick at Pope Lick Road	3.0	22.7	29.4	14.6	8.6	0	47.4
15 Floyds Fork at former State Highway 155	138	16.5	71.5	2.1	12.1	1.1	13.2
16 Chenoweth Run at Gelhaus Road	11.7	23.9	34.8	5.1	10.9	12.7	36.5
17 Fern Cr at Old Bardstown Road	3.4	24.9	21.7	2.5	9.5	0	66.3
18 Northern Ditch at Preston Highway	11.4	26.2	24.5	7.4	7.5	4.4	56.2
19 Fishpool Cr at Bost Road	5.4	23.9	34.4	4.6	4.2	2.4	54.4
20 Southern Ditch at Minors Lane	13.1	25.7	25.2	7.7	13.8	1.3	52.0
21 Floyds Fork at Bardstown Road	214	16.1	66.4	2.0	14.4	1.4	13.6
22 Cedar Cr at Thixton Road	11.3	17.2	55.9	1.0	14.2	.3	28.6
23 Pennsylvania Run at Mt. Washington Road	6.2	16.8	46.4	1.2	18.2	.8	33.4
24 Mill Cr Cutoff at Dover Road	16.0	33.8	4.7	12.5	14.0	6.8	62.0
25 Harrods Cr at Hunting Creek Drive	100	16.7	66.5	3.0	20.2	1.9	8.4
26 Long Run at State Highway 1531	23.7	14.5	74.9	1.5	16.5	1.3	5.8

*Source: Digital data from 1986 and 1989 aerial photographs at a scale of 1:4,800.

**Source: Digital data from 1983 aerial photographs at a scale of 1:250,000. Residential development has occurred in the basin upstream from site SR3 since 1983, and land-use percentages are based on a visual inspection of the basin.

none were in Kentucky. Estimated runoff quantity and loads of selected constituents in single storms based on the regional regression models of Driver and Tasker (1990) were compared to runoff quantity (table 2) and constituent loads (table 3) measured at selected stormwater outfalls in Jefferson County to evaluate the reliability of the regional estimation models for use in the county.

Storms were defined by Driver and Tasker (1990) as rainfall events in which the total rainfall was at least 0.05 in. Three samples of Jefferson County runoff were collected during storms of less than 0.05 in. rainfall (table 2). Only the sample collected at Site SR5 on March 27, 1991, was not used in evaluating the regional regression models because the ratio of runoff to total rainfall indicated that the total measured rainfall may have been inaccurate.

Plots of the estimated and measured storm runoff and constituent loads in the runoff indicated that adjustments were needed in the estimation models. Adjustments were determined by simple linear regression between the estimated runoff quantity and constituent loads in the runoff and the Jefferson County measurements, with the regression intercepts set to zero (table 6). The means of the residuals of the regional-model estimates as compared to Jefferson County measurements were reduced after the adjustments. Regional regression models to estimate loads of biochemical oxygen demand and cadmium for single storms were not available.

Table 6. Adjustments to regional regression models for estimating loads of selected constituents in storm runoff and quantity of storm runoff in single storms from urban watersheds of Jefferson County, Kentucky

Constituent or property	Number of data pairs	Regression adjustment factor	Mean residual, in pounds: Unadjusted regression model	Mean residual, in pounds: Adjusted regression model
Chemical oxygen demand	15	0.63	-118	9.56
Dissolved solids	15	1.77	257	24.0
Suspended solids	15	.46	-303	-17.0
Nitrogen, total	11	.56	-4.19	-.73
Kjeldahl nitrogen, total	14	.62	-2.78	-.55
Phosphorus, total	14	.51	-1.09	-.10
Phosphorus, dissolved	9	1.56	.12	.021
Copper, total recoverable	16	.14	-.33	-.003
Lead, total	16	.23	-.85	-.035
Zinc, total	16	.58	-.26	.013
			Mean residual, in cubic feet	
Runoff	17	1.01	2,100	1,290

The drainage areas of the urban watersheds used to develop the regional models ranged from 0.014 to 0.830 mi^2. Watersheds whose drainage areas are greater than 0.5 mi^2 are calculated as though the drainage areas were 0.2 mi^2, and loads are then adjusted on the basis of actual drainage area. This method of estimation is based on the assumption that the estimated constituent loads are conservative and cumulative, an assumption that may not always be valid (Tasker and others, 1990). The adjusted regional regression models that can be used to compute loads in storm runoff and the quantity of runoff for single storms from urban watersheds of Jefferson County are

$$COD = 562.8 * (TRN ** 0.857) * (DA ** 0.634) * (LUI ** 0.321) * (LUC ** 0.217) * (LUN ** -0.111), \quad (1)$$

$$DS = 4,934.9 * (TRN ** 1.076) * (DA ** 1.285) * (IA ** 1.348) * (MJT ** -1.395), \quad (2)$$

$$SS = 2,267.4 * (TRN ** 1.017) * (DA ** 0.984) * (LUI ** 0.226) * (LUC ** 0.228) * (LUN ** -0.286), \quad (3)$$

$$TN = 0.3455 * (TRN ** 0.776) * (DA ** 0.474) * (IA ** 0.611) * (MNL ** 0.863), \quad (4)$$

$$TKN = 214,803 * (TRN ** 0.875) * (DA ** 0.393) * (LUN ** 0.082) * (MAR ** -2.643), \quad (5)$$

$$TP = 55.86 * (TRN ** 1.019) * (DA ** 0.846) * (LUC ** 0.189) * (LUR ** 0.103) * (LUN ** -0.160) * (MJT ** -0.754), \quad (6)$$

$$DP = 1.167 * (TRN ** 0.955) * (DA ** 0.471) * (LUN ** 0.364), \quad (7)$$

$$CU = 1.356 * (TRN ** 0.896) * (DA ** 0.609) * (LUI ** 0.648) * (LUC ** 0.253) * (LUN ** -0.328) * (INT ** -2.071), \quad (8)$$

$$PB = 0.043 * (TRN ** 0.852) * (DA ** 0.857) * (IA ** 0.999), \quad (9)$$

$$ZN = 4.905 * (TRN ** 0.830) * (DA ** 0.555) * (LUI ** 0.402) * (LUC ** 0.287) * (LUR ** -0.191) * (MJT ** -0.500), \text{ and} \quad (10)$$

$$ROFF = 49,590 * (TRN ** 1.042) * (DA ** 0.826) * (IA ** 0.669), \quad (11)$$

where

COD is load of chemical oxygen demand in storm runoff, in pounds;
DS is load of dissolved solids in storm runoff, in pounds;
SS is load of suspended solids in storm runoff, in pounds;
TN is load of total nitrogen in storm runoff, in pounds;
TKN is load of total Kjeldahl nitrogen in storm runoff, in pounds;
TP is load of total phosphorus in storm runoff, in pounds;
DP is load of dissolved phosphorus in storm runoff, in pounds;
CU is load of total copper in storm runoff, in pounds;

PB is load of total lead in storm runoff, in pounds;
ZN is load of total zinc in storm runoff, in pounds;
ROFF is storm runoff, in cubic feet;
TRN is total storm rainfall, in inches;
DA is drainage area, in square miles;
LUI is 1 + industrial land use, in percentage of drainage area;
LUC is 1 + commercial land use, in percentage of drainage area;
LUN is 2 + nonurban land use, in percentage of drainage area;
IA is 1 + impervious area, in percentage of drainage area;
MJT is mean minimum January temperature (26.2°F, National Oceanic and Atmospheric Administration, 1990);
MNL is mean annual nitrogen load in precipitation (9 lb per acre, based on estimated load from precipitation of ammonia and nitrate; Evaldi and others, 1993);
MAR is mean annual rainfall (43.0 in., National Oceanic and Atmospheric Administration, 1990);
LUR is 1 + residential land use, in percentage of drainage area; and
INT is maximum 24-hour precipitation that has a 2-year recurrence interval (3.1 in.; Melcher and Ruhl, 1984).

Driver and Tasker (1990) also developed three-variable regression models to estimate loads of selected constituents in single storms that are simplified alternatives to the previously presented regression models 1-10. The explanatory variables are always (1) total storm rainfall, (2) drainage area, and (3) impervious area. The model for estimating the quantity of runoff of a single storm (equation 11) was already a three-variable model of this type. As for the original regional regression models, estimated constituent loads in storm runoff based on the three-variable regression models were compared to constituent loads measured in storm runoff at sites in Jefferson County to evaluate the accuracy of the three variable estimation models for use in the county. Again, plots of the estimated and measured constituent loads in storm runoff indicated that adjustments were needed in some of the three-variable estimation models. Adjustments were determined by simple linear regression between the estimated and measured constituent loads, with the regression intercepts set to zero (table 7). The mean of the residuals of the estimated and measured regression relations were reduced after the adjustments.

Table 7. Adjustments to three-variable regional regression models for estimating loads of selected constituents in storm runoff in single storms from urban watersheds of Jefferson County, Kentucky

Constituent or property	Number of data pairs	Regression adjustment factor	Mean residual, in pounds: Unadjusted regression model	Mean residual, in pounds: Adjusted regression model
Chemical oxygen demand	15	0.58	-120	3.46
Dissolved solids	15	.63	-142	118
Suspended solids	15	.37	-391	-1.49
Nitrogen, total	11	1.00	-.80	-.80
Kjeldahl nitrogen, total	14	.89	-.97	-.53
Phosphorus, total	14	.77	-.50	-.17
Phosphorus, dissolved	9	1.98	.14	-.006
Copper, total recoverable	16	.43	-.12	-.021
Lead, total	16	.19	-1.06	-.034
Zinc, total	16	.41	-.43	.057

Regression models 1-10 should be used instead of models 12-21 if all explanatory variables are available. The drainage areas of the urban watersheds used to develop the regional models ranged from 0.014 to 0.830 mi^2. Watersheds whose drainage areas are greater than 0.5 mi^2 are calculated as though the drainage areas are 0.2 mi^2, and loads are then adjusted on the basis of actual drainage area. This method of estimation is based on the assumption that the estimated constituent loads are conservative and cumulative, an assumption that may not always be valid (Tasker and others, 1990). The adjusted three-variable regional regression models that can be used to compute constituent loads in single storms from urban watersheds of Jefferson County are

$$COD = 117.0 * (TRN ** 0.851) * (DA ** 0.601) * (IA ** 0.528), \quad (12)$$

$$DS = 2.945 * (TRN ** 1.251) * (DA ** 1.218) * (IA ** 1.964), \quad (13)$$

$$SS = 101.9 * (TRN ** 1.002) * (DA ** 1.009) * (IA ** 0.837), \quad (14)$$

$$TN = 3.063 * (TRN ** 0.703) * (DA ** 0.465) * (IA ** 0.521), \quad (15)$$

$$TKN = 5.833 * (TRN ** 0.808) * (DA ** 0.415) * (IA ** 0.199), \quad (16)$$

$$TP = 2.799 * (TRN ** 0.954) * (DA ** 0.789) * (IA ** 0.289), \quad (17)$$

$$DP = 9.711 * (TRN ** 1.003) * (DA ** 0.280) * (IA ** -0.448), \quad (18)$$

$$CU = 0.0315 * (TRN ** 0.715) * (DA ** 0.609) * (IA ** 0.642), \quad (19)$$

$$PB = 0.0430 * (TRN ** 0.852) * (DA ** 0.857) * (IA ** 0.999), \text{ and} \quad (20)$$

$$ZN = 0.0249 * (TRN ** 0.793) * (DA ** 0.628) * (IA ** 1.104), \quad (21)$$

where

COD is load of chemical oxygen demand in storm runoff, in pounds;
DS is load of dissolved solids in storm runoff, in pounds;
SS is load of suspended solids in storm runoff, in pounds;
TN is load of total nitrogen in storm runoff, in pounds;
TKN is load of total Kjeldahl nitrogen in storm runoff, in pounds;
TP is load of total phosphorus in storm runoff, in pounds;
DP is load of dissolved phosphorus in storm runoff, in pounds;
CU is load of total copper in storm runoff, in pounds;
PB is load of total lead in storm runoff, in pounds;
ZN is load of total zinc in storm runoff, in pounds;
TRN is total storm rainfall, in inches;
DA is drainage area, in square miles; and
IA is 1 + impervious area, in percentage of drainage area.

Mean Concentrations of Constituents in Storm Runoff

Regional regression models were developed by Driver and Tasker (1990) to estimate mean concentrations of selected water-quality constituents in storm runoff for urban watersheds in which annual rainfall is equal to or greater than 40 in. Mean constituent concentrations estimated by these models were compared to mean concentrations measured in storm runoff at stormwater outfalls in Jefferson County (table 3). The correspondence between estimated and measured mean concentrations was considered poor. Attempts to adjust the regional models by regression analysis with mean constituent concentrations in storm runoff measured in Jefferson County were not successful.

Attempts were made to estimate mean constituent concentrations in storm runoff in single storms by dividing estimated loads in storm runoff computed with equations 1-10 by estimated quantity of runoff computed with equation 11. Satisfactory results were not obtained by this procedure, as judged from comparisons of the estimated mean constituent concentrations to those measured at stormwater outfalls in Jefferson County. Therefore, data from the six stormwater outfalls were used to develop models to estimate mean constituent concentrations in storm runoff in ungaged watersheds in the county.

The methods used to develop these mean concentration models for Jefferson County were similar to those used by Driver and Tasker (1990) to develop regional estimation models. Regression models were developed that related the measured storm-runoff mean constituent concentrations to physical and land-use characteristics of the watersheds and climatic characteristics of each storm. For development of these regression models, the best transformation for the response variable was the logarithmic transformation. Bias-correction factors to adjust for underestimation errors during detransformation were computed for each model using a smearing estimate. A smearing estimate is a nonparametric retransformation method based on the average residuals in original units that

is calculated with the assumption that the pretransformed variables have equal error variances, or that the mean and the variance are independent (Duan, 1983).

The number of mean constituent concentration measurements in storm runoff, the coefficient of determination (R^2), and the standard error of the estimate for each model are listed in table 8. The proportion of the total variation of the response variable that is explained by the explanatory variables is indicated by the R^2 value. Therefore, the R^2 value is used as a summary measure to judge the fit of the regression model to the data. The standard error of estimate of the mean is an estimate of the standard deviation about the regression. The smaller the standard error of estimate, the more precise will be the estimations. The standard error of estimate, in percent, was calculated by use of the following equation:

$$SE = 100 * ((e ** (MSE * 5.302) -1) ** 0.5), \quad (22)$$

where

SE is the standard error of estimate, in percent; and,
MSE is the mean square error, in log (base 10) units.

Table 8. Summary of statistics for regression models of mean constituent concentrations in storm runoff in single storms from urban watersheds of Jefferson County, Kentucky

Constituent or property	Number of storms	Coefficient of determination (R^2)	Standard error of estimate, in percent
Chemical oxygen demand	19	0.67	62.5
Biochemical oxygen demand	17	.47	202
Dissolved solids	20	.42	75.2
Suspended solids	20	.37	75.5
Nitrogen, total	18	.62	28.6
Kjeldahl nitrogen, total	19	.72	34.8
Phosphorus, total	20	.40	71.6
Phosphorus, dissolved	14	.83	64.3
Cadmium, total	20	.23	45.0
Copper, total	20	.58	30.8
Lead, total	20	.25	6.7
Zinc, total	20	.58	50.7

The models for estimation of mean constituent concentrations in storm runoff in Jefferson County were based on 20 measurements or fewer and are therefore statistically tentative. These models generally have small coefficients of determination and large standard errors of estimate (table 8). The drainage areas of the Jefferson County watersheds used to develop the

mean-concentration models ranged from 0.068 to 0.282 mi^2, and estimates made for watersheds with drainage areas outside of this range may be subject to error. The following models for estimation of mean constituent concentrations in storm runoff in single storms should be used with caution:

```
COD = 143.6 * (TRN ** -0.3908) * (DA ** 1.126) *
      (LUR ** -0.2133) * (TPR ** 0.3979),                          (23)

BOD = 0.01460 * (TRN ** -0.09968) * (DA ** 1.732) * (LUC ** 1.573) *
      (LUN ** 0.6480) * (LUI ** 0.8850) * (TPR ** 1.089),          (24)

 DS = 18.03 * (TRN ** -0.5876) * (DA ** 0.09341) * (IA ** 0.7240) *
      (LUC ** -0.5989) * (LUI ** -0.3298) * (DRN ** 0.5121) *
      (TPR ** -0.4333),                                            (25)

 SS = 298.7 * (TRN ** -0.08872) * (DA ** 1.074) * (LUN ** 0.3273),  (26)

 TN = 21.07 * (TRN ** -0.2958) * (DA ** -0.1155) * (IA ** -0.7131) *
      (LUI ** -0.08127) * (DRN ** 0.1597) * (TPR ** -0.1820),      (27)

TKN = 29.80 * (TRN ** -0.1671) * (DA ** 0.1227) * (IA ** -1.171) *
      (LUC ** 0.2298) * (TPR ** 0.1523),                           (28)

 TP = 6.439 * (TRN ** 0.04072) * (DA ** -0.2215) * (IA ** -1.087) *
      (LUN ** -0.3704) * (TPR ** 0.2415),                          (29)

 DP = 471.1 * (TRN ** 0.6217) * (DA ** -1.899) * (IA ** -1.946) *
      (LUN ** -0.5863) * (DRN ** -0.4694),                         (30)

 CD = 0.02401 * (TRN ** -0.004208) * (DA ** 0.5390) *
      (LUR ** -0.2300) * (LUC ** 0.1099) * (TPR ** 0.09909),       (31)

 CU = 0.001838 * (TRN ** -0.3320) * (DA ** 0.01217) *
      (LUN ** 0.2372) * (LUI ** -0.1360) * (DRN ** 0.2523),        (32)

 PB = 0.07016 * (TRN ** 0.01328) * (DA ** 0.02258) * (IA ** 0.05436) *
      (LUC ** -0.04435) * (LUN ** -0.01922) * (LUI ** -0.01037) *
      (DRN ** -0.02222) * (TPR ** -0.01545), and                   (33)

 ZN = 0.2400 * (TRN ** -0.3404) * (DA ** -0.02839) *
      (IA ** -0.6284) * (LUC ** 0.4593) * (LUI ** 0.4062),         (34)
```

where

COD is mean concentration of chemical oxygen demand in storm runoff, in milligrams per liter;
BOD is mean concentration of biochemical oxygen demand in storm runoff, in milligrams per liter;
DS is mean concentration of dissolved solids in storm runoff, in milligrams per liter;
SS is mean concentration of suspended solids in storm runoff, in milligrams per liter;

TN is mean concentration of total nitrogen in storm runoff, in milligrams per liter;
TKN is mean concentration of total Kjeldahl nitrogen in storm runoff, in milligrams per liter;
TP is mean concentration of total phosphorus in storm runoff, in milligrams per liter;
DP is mean concentration of dissolved phosphorus in storm runoff, in milligrams per liter;
CD is mean concentration of total cadmium in storm runoff, in milligrams per liter;
CU is mean concentration of total copper in storm runoff, in micrograms per liter;
PB is mean concentration of total lead in storm runoff, in micrograms per liter;
ZN is mean concentration of total zinc in storm runoff, in micrograms per liter;
TRN is total storm rainfall, in inches;
DA is drainage area, in square miles;
LUC is 1 + commercial land use, in percentage of drainage area;
LUN is 1 + nonurban land use, in percentage of drainage area;
LUI is 1 + industrial land use, in percentage of drainage area;
TPR is time since previous rainfall, in hours;
IA is 1 + impervious area, in percentage of drainage area;
DRN is rainfall duration, in minutes; and
LUR is 1 + residential land use, in percentage of drainage area.

Annual Quantity of Storm Runoff

A computerized method for streamflow partitioning has been developed by the USGS Regional Aquifer System Analysis program (RASA) to estimate groundwater recharge (Rutledge, 1992). Streamflow partitioning is a method for separation of stream discharge records into their base-flow and surface-runoff components. The streamflow-partitioning method developed by the RASA program has two steps: (1) base flow, which includes point-source discharges, is set equal to streamflow during times of negligible runoff, and (2) base flow between these periods (during surface runoff) is interpolated.

An estimate of the daily base-flow component of total discharge was made for each day from January 1, 1988 through December 31, 1992. The surface-runoff (stormflow) component computed by subtracting the base-flow component from the total discharge. Partitioned hydrographs for four continuous discharge-record and periodic water-quality sampling sites in Jefferson County are shown in figure 5. Before partitioning, total daily discharge was synthesized for all noncontinuous-record sites from relations between measured discharge at the time of sampling and concurrent discharge at a continuous discharge-record site (Evaldi and others, 1993). Summaries of the partitioned streamflow records are presented in the appendix of this report.

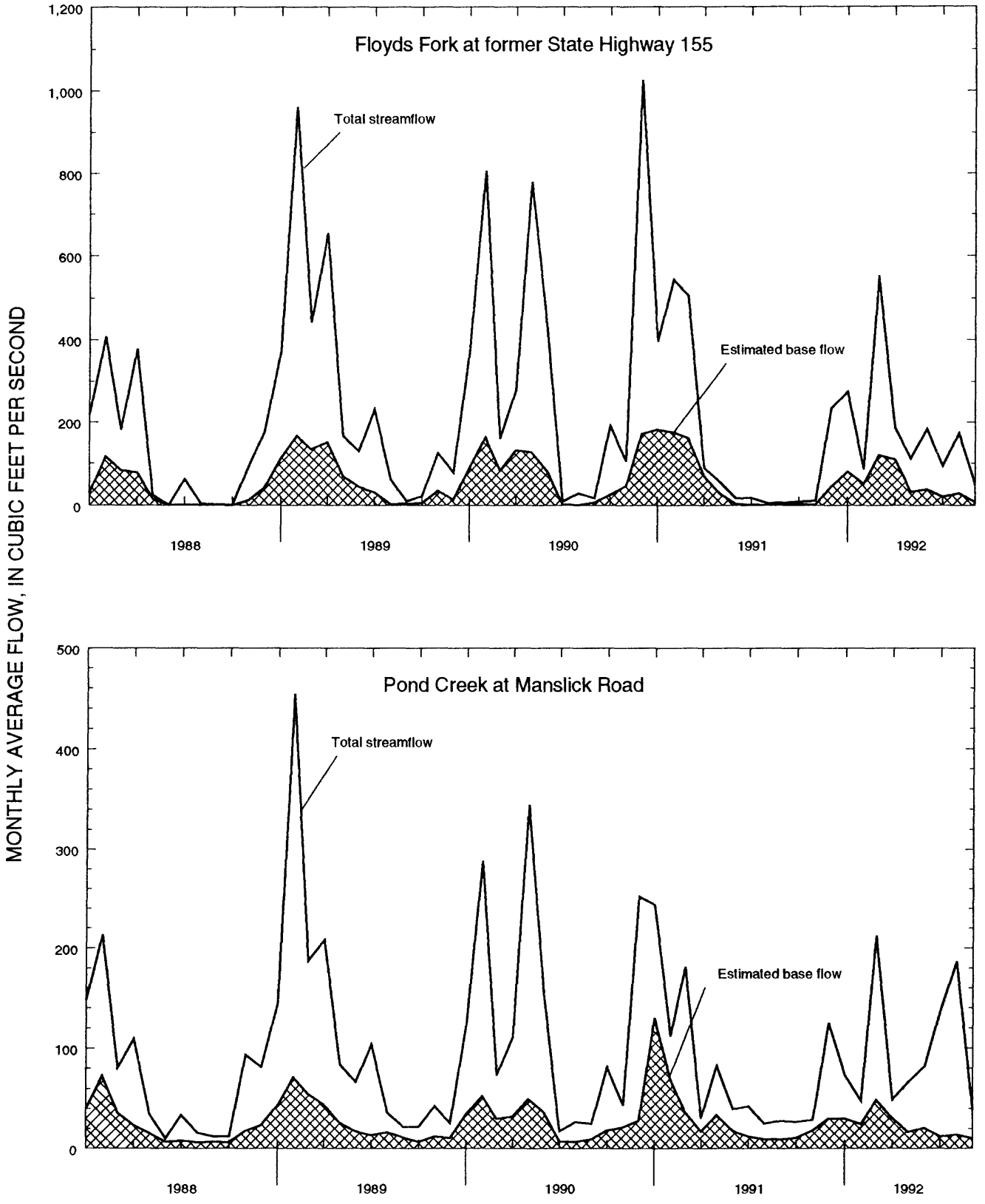


Figure 5. Partitioned flow of selected streams in Jefferson County, Kentucky, 1988-92.

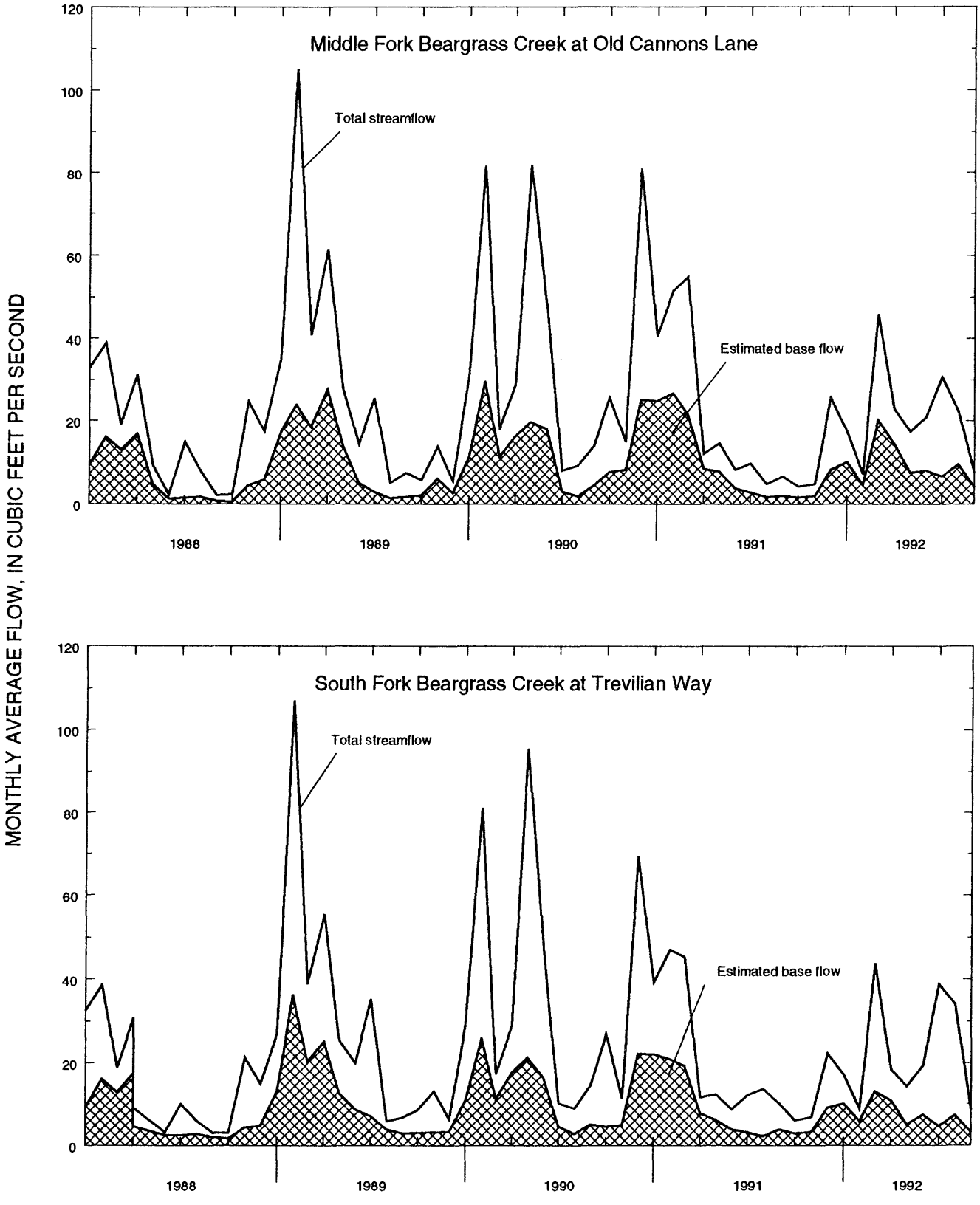


Figure 5. Partitioned flow of selected streams in Jefferson County, Kentucky, 1988-92--Continued.

A model was developed to estimate annual storm-runoff volumes, on the basis of stormwater runoff calculated for the 25 stream-sampling sites in the county by use of streamflow partitioning. Total annual storm runoff was calculated for each year during 1988-92. In development of the model, the storm-runoff volumes were converted to equivalent rainfall over the drainage basin and were regressed against the annual rainfall, percentage of impervious area, and percentages of land uses in the watersheds. Only annual rainfall, percentage of impervious area, and percentages of commercial and residential land uses were significant in the regression at the 5-percent level. The regression model for estimating annual storm-runoff volumes accounted for 68 percent of the variation in the dependent variable. In terms of rainfall over the basin, the mean square error of the model was 10.7 in. With conversion factors applied, the model for estimation of annual total storm-runoff volumes from watersheds of Jefferson County is

$$ROFF = ((-9.518 + (0.5361 * RAIN) + (0.1798 * IA) - (0.08789 * LUR) - (0.2930 * LUC)) * (2{,}323{,}200 * DA), \quad (35)$$

where

ROFF is annual storm runoff, in cubic feet;
RAIN is total annual rainfall, in inches;
IA is 1 + impervious area, in percentage of drainage area;
LUR is 1 + residential land use, in percentage of drainage area;
LUC is 1 + commercial land use, in percentage of drainage area; and
DA is drainage area, in square miles.

Annual Loads of Constituents in Storm Runoff

Annual constituent loads in storm runoff were computed for the 25 urban watersheds of Jefferson County from streamflow records and water-quality samples during 1988-92 and were used to develop models to estimate annual loads in storm runoff from ungaged watersheds in the county. The "discharge-record method" for annual load estimation, as described by Evaldi and Moore (1992), was used to compute annual loads in base flow and annual total loads. The calibration data used for estimation of annual total loads were based on periodic water-quality samples collected from February 1988 through December 1992. These data are summarized in the appendix of this report. Calibration data used to estimate loads in base flow were subsets of the data used to estimate total loads. Samples were eliminated from the base-flow calibration data set if greater than 10 percent of the streamflow at the time of sampling was from storm runoff.

Total daily streamflow was used for the total-load estimates, and daily estimates of base flow were used to estimate the annual nonstorm loads for each calendar year from 1988 through 1992. Annual base-flow and total-load estimates and statistics describing their accuracies are listed in the appendix of this report. Estimates of annual loads in storm runoff were calculated as the difference between the total annual loads and the total annual loads in base flow.

Development of models to estimate annual loads in storm runoff was attempted for all water-quality constituents sampled at the 25 stream sites in Jefferson County. Regression models to estimate annual loads of selected constituents in storm runoff for individual years were developed for dissolved oxygen, biochemical and chemical oxygen demands, dissolved and suspended solids, volatile residue, nitrogen, phosphorus and phosphate, calcium, magnesium, barium, and iron. Suitable models to estimate loads in storm runoff could not be developed for nonvolatile suspended solids, copper, and zinc.

The response variables were annual calculations of constituent loads in storm runoff from the 25 stream-sampling sites in Jefferson County and the averages for the period 1988-92. Although one of the assumptions of regression analysis is that the errors are uncorrelated in time, some annual loads may be correlated because they are all based on a continuous series of years (1988-92). Explanatory variables used in the regression analysis included annual rainfall; drainage area; percentage of impervious area; and the percentages of industrial, commercial, residential, and nonurban land use in each basin. Logarithmic transformations of the response and the explanatory variables were done before regression analysis, and a bias-correction factor was calculated for each regression model.

Selection of explanatory variables for each regression model was made by use of stepwise regression procedures available through the Statistical Analysis System[2] (SAS Institute, 1985). The primary criterion for selecting the most appropriate explanatory variables was that they be significant at the 5-percent level. Total annual rainfall and total contributing drainage area were the most significant explanatory variables in all the regression models. The number of storm-load calculations used for the response variables, the coefficients of determination (R^2's), and standard error of the estimates for each estimation model are listed in table 9. The standard error of estimate, in percent, was calculated by use of equation 22.

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[2]Use of a firm name in this report is for identification purposes only and does not constitute endorsement by the U.S. Geological Survey.

Table 9. Summary of statistics for regression models of annual loads of selected constituents in storm runoff from urban watersheds of Jefferson County, Kentucky

Constituent or property	Number of comparisons	Coefficient of determination (R2)	Standard error of estimate, in percent
Dissolved oxygen	148	0.92	41.1
Biochemical oxygen demand	145	.83	61.3
Chemical oxygen demand	135	.83	67.2
Dissolved solids	147	.92	41.7
Suspended solids	148	.78	101
Residue, volatile nonfilterable	141	.62	156
Organic nitrogen, dissolved as N	147	.80	71.5
Ammonia nitrogen, total as N	118	.49	206
Nitrite nitrogen, total as N	135	.66	132
Nitrate nitrogen, total as N	148	.73	78.5
Phosphorus, total as P	147	.82	60.2
Phosphorus, orthophosphate, total as P	146	.74	78.0
Phosphate, total as PO_4	146	.55	146
Calcium, total as Ca	111	.90	54.9
Magnesium, total as Mg	111	.83	69.7
Barium, total as Ba	112	.71	173
Iron, total as Fe	99	.83	136

The drainage areas of the Jefferson County watersheds used to develop the models for estimation of annual constituent loads in storm runoff ranged from 2.4 to 214 mi^2, and estimates made for watersheds with drainage areas outside of this range may be subject to error. The regression models that can be used to estimate annual loads of selected constituents in storm runoff from urban watersheds in the county are

$$DO = 14.14 * (AR ** 1.975) * (DA ** 1.055) * (LUR ** -0.1860), \quad (36)$$

$$BOD = 8.887 * (AR ** 1.938) * (DA ** 0.9648) * (LUC ** -0.2033) * (LUI ** 0.2231), \quad (37)$$

$$COD = 15.95 * (AR ** 2.363) * (DA ** 0.9171) * (LUR ** -0.3552) * (LUI ** 0.2329), \quad (38)$$

$$DS = 2,036 * (AR ** 1.826) * (DA ** 1.093) * (LUC ** -0.3305) * (LUN ** -0.3132), \quad (39)$$

$$SS = 0.9707 * (AR ** 2.935) * (DA ** 1.252) * (LUI ** 0.2252), \quad (40)$$

$$NVR = 1.423 * (AR ** 2.958) * (DA ** 1.228) * (LUN ** -0.4227), \quad (41)$$

$$DON = 0.5096 * (AR ** 2.223) * (DA ** 0.9500) * (LUC ** -0.3616) * (LUI ** 0.1599), \quad (42)$$

$$NH4 = 0.0006367 * (AR ** 2.550) * (DA ** 1.135) * (LUR ** 0.8158), \quad (43)$$

$$NO2 = 0.01077 * (AR ** 2.621) * (DA ** 1.043) * (LUC ** -0.2739), \quad (44)$$

$$NO3 = 1.086 * (AR ** 2.135) * (DA ** 0.9300), \quad (45)$$

$$TP = 1.249 * (AR ** 2.227) * (DA ** 0.9008) * (IA ** -0.4846), \quad (46)$$

$$TOP = 0.04245 * (AR ** 2.2867) * (DA ** 0.8500) * (LUN ** 0.3607), \quad (47)$$

$$PO4 = 1.104 * (AR ** 2.480) * (DA ** 0.8108) * (LUR ** -0.4030), \quad (48)$$

$$CA = 154.8 * (AR ** 1.737) * (DA ** 1.051) * (LUC ** -0.2528), \quad (49)$$

$$MG = 1,724 * (AR ** 1.797) * (DA ** 0.8885) * (IA ** -1.188), \quad (50)$$

$$BA = 0.00002629 * (AR ** 2.796) * (DA ** 1.544) * (LUR ** 0.8636) * (LUI ** -0.2909), \text{ and} \quad (51)$$

$$FE = 0.00006944 * (AR ** 2.592) * (DA ** 1.806) * (IA ** 6.714) * (LUR ** -2.122) * (LUI ** -1.684) * (LUN ** -1.503), \quad (52)$$

where

DO is annual load of dissolved oxygen in storm runoff, in pounds;
BOD is annual load of biochemical oxygen demand in storm runoff, in pounds;
COD is annual load of chemical oxygen demand in storm runoff, in pounds;
DS is annual load of dissolved solids in storm runoff, in pounds;
SS is annual load of suspended solids in storm runoff, in pounds;
NVR is annual load of nonfilterable volatile residue in storm runoff, in pounds;
DON is annual load of dissolved organic nitrogen in storm runoff, in pounds as N;
NH4 is annual load of total ammonia nitrogen in storm runoff, in pounds as N;
NO2 is annual load of total nitrite nitrogen in storm runoff, in pounds as N;
NO3 is annual load of total nitrate nitrogen in storm runoff, in pounds as N;
TP is annual load of total phosphorus in storm runoff, in pounds as P;
TOP is annual load of total orthophosphate in storm runoff, in pounds as P;
PO4 is annual load of total phosphate in storm runoff, in pounds as PO_4
CA is annual load of total calcium in storm runoff, in pounds as Ca;
MG is annual load of total magnesium in storm runoff, in pounds as Mg;
BA is annual load of total barium in storm runoff, in pounds as Ba;
FE is annual load of total iron in storm runoff, in pounds as Fe;
AR is total annual rainfall, in inches;

DA is drainage area, in square miles;
LUR is 1 + residential land use, in percentage of drainage area;
LUC is 1 + commercial land use, in percentage of drainage area;
LUI is 1 + industrial land use, in percentage of drainage area;
LUN is 1 + nonurban land use, in percentage of drainage area, and
IA is 1 + impervious area, in percentage of drainage area.

Mean Annual Loads of Constituents in Storm Runoff

Because the mean annual rainfall for 1988 through 1992 was representative of the long term, the averages of the annual loads computed for those years by use of the discharge-record method were considered good estimates of long-term mean annual loads from the 25 urban watersheds of Jefferson County. Annual rainfall totals 1988 to 1992 for Louisville ranged from 37.53 to 57.47 in. and averaged 45.0 in., which is within 5 percent of the long-term (1960-90) average rainfall of 43.0 in. (National Oceanic and Atmospheric Administration, 1990, 1991-92). The average 1988-92 estimates of constituent loads in storm runoff for the 25 urban watersheds of Jefferson County were used to evaluate the accuracy of regional models for estimation of mean annual loads of selected constituents in storm runoff at ungaged sites in the county.

Driver and Tasker (1990) developed regional regression models to estimate mean loads of selected constituents in single storms on the basis of physical, land-use, and climatic characteristics of the watershed (equations 12-21). Mean annual loads of selected constituents in storm runoff are subsequently estimated in the regional procedures by multiplying the mean constituent loads in single storms by the average number of storms per year; that number is 69 in the Jefferson County area, according to Steurer and Nold (1986). Evaldi and Moore (1992) estimated mean annual loads of selected constituents in storm runoff from urban watersheds of Jefferson County by use of the regional procedures. The accuracy of these procedures was assessed by comparison of the regional model estimates for the 25 urban watersheds in the county to the 1988-92 mean annual loads of selected constituents in storm runoff estimated on the basis of the discharge-record method.

Plots of average 1988-92 annual loads of constituents in storm runoff for the 25 urban watersheds of Jefferson County against estimates of mean annual loads in storm runoff for the 25 sites based on the regional models showed close linear relations, except for zinc, but indicated that adjustments were needed in the regional estimation models. Adjustments were determined by simple linear regression analysis between the regional model estimates and the 1988-92 discharge-record method estimates, with the regression intercepts set to zero (table 10).

Table 10. Adjustments to regional regression models for estimating mean annual loads of selected constituents in storm runoff from urban watersheds of Jefferson County, Kentucky

Constituent or property	Number of data pairs	Regression adjustment factor	Mean residual, in tons: Unadjusted regression model	Mean residual, in tons: Adjusted regression model
Chemical oxygen demand	23	0.82	-234	-49.0
Dissolved solids	25	6.02	7,550	-989
Suspended solids	25	2.12	2,830	-1,150
Nitrogen, total	19	3.28	54.3	-10.9
Kjeldahl nitrogen, total	20	1.12	1.53	-1.20
Phosphorus, total	25	2.41	10.2	-.206
Copper, total	12	1.37	.105	-.144

The drainage areas of the watersheds used to develop the regional models for mean annual loads ranged from 0.014 to 0.830 mi^2. Watersheds whose drainage areas are greater than 0.5 mi^2 are calculated as though the drainage areas are 0.2 mi^2, and loads are then adjusted on the basis of actual drainage area. This method of estimation is based on the assumption that the estimated constituent loads are conservative and cumulative, an assumption that may not always be valid (Tasker and others, 1990). The adjusted regional regression models that can be used to estimate mean annual loads of selected constituents in storm runoff from urban watersheds of Jefferson County are

$$COD = (10 ** (1.1174 + (2.0069 * SQRTDA) + (0.0051 * IA))) * 1.064, \quad (53)$$

$$DS = (10 ** (1.8449 + (2.5468 * SQRTDA) + (-0.0232 * MJT))) * 519.6, \quad (54)$$

$$SS = (10 ** (1.5430 + (1.5906 * SQRTDA) + (0.0264 * MAR) + (-0.0297 * MJT))) * 222.5, \quad (55)$$

$$TN = (10 ** (-0.2433 + (1.6383 * SQRTDA) + (0.0061 * IA) + (-0.4442 * X2))) * 304.4, \quad (56)$$

$$TKN = (10 ** (-0.7282 + (1.6123 * SQRTDA) + (0.0064 * IA) + (0.0226 * MAR) + (-0.0210 * MJT) + (-0.4345 * X2))) * 98.67, \quad (57)$$

$$TP = (10 ** (-1.3884 + (2.0825 * SQRTDA) + (0.0234 * MAR) + (-0.0213 * MJT))) * 218.5, \text{ and} \quad (58)$$

$$CU = (10 ** (-1.4824 + (1.8281 * SQRTDA) + (-0.0141 * MJT))) * 132.6, \quad (59)$$

where

COD is mean annual load of chemical oxygen demand in storm runoff, in pounds;

DS is mean annual load of dissolved solids in storm runoff, in pounds;
SS is mean annual load of suspended solids in storm runoff, in pounds;
TN is mean annual load of total nitrogen in storm runoff, in pounds;
TKN is mean annual load of total Kjeldahl nitrogen in storm runoff, in pounds;
TP is mean annual load of total phosphorus in storm runoff, in pounds;
CU is mean annual load of total recoverable copper in storm runoff, in pounds;
SQRTDA is square root of drainage area, in square miles;
IA is impervious area, in percent;
MJT is mean minimum January temperature (26.2°F; National Oceanic and Atmospheric Administration, 1990);
MAR is mean annual rainfall (43.0 in., National Oceanic and Atmospheric Administration, 1990); and
X2 is 1 if commercial + industrial land use > 75 percent, or 0 if < 75 percent.

Estimates of long-term mean annual loads of selected constituents in storm runoff were computed for the urban watersheds monitored at 25 stream-sampling sites in Jefferson County. These estimates included (1) mean annual loads of selected constituents in storm runoff for the 1988-92 period calculated with the discharge-record method, (2) mean annual loads in storm runoff based on adjusted regional regression models (equations 53-59), and (3) annual loads in storm runoff computed for an average rainfall year of 43.0 in. by use of models developed from annual-constituent-load and rainfall data in Jefferson County (equations 36-52). Estimates based on the discharge-record method were considered good and were the basis for adjusting or developing the two sets of estimation equations. Estimates of mean annual loads of selected constituents in storm runoff based on these three computation methods agreed reasonably well (table 11).

Table 11. Estimates of mean annual loads of selected constituents in storm runoff from urban watersheds of Jefferson County, Kentucky

[DRM, mean annual load in storm runoff estimated by use of the discharge-record method for 1988-92; JC, mean annual load in storm runoff estimated by use of Jefferson County regression equations, with average annual rainfall of 43.03 inches; DT, mean annual load in storm runoff estimated by use of adjusted Driver and Tasker models; Cr, Creek; SF, South Fork; MF, Middle Fork; --, unknown. All loads are in tons]

	Site number and name	DRM	JC	DT	DRM	JC	DT
			Dissolved oxygen			Chemical oxygen demand	
1	Pond Cr at Pendleton Road	508	629	--	1,480	1,500	2,150
2	Mill Cr at Orell Road	63.7	94.7	--	229	257	357
3	Pond Cr at Manslick Road	556	478	--	2,230	1,230	1,720
5	SF Beargrass Cr at Winter Avenue	198	149	--	468	434	667
6	SF Beargrass Cr at Trevilian Way	115	111	--	--	341	504
7	MF Beargrass Cr at Old Cannons Lane	148	122	--	--	299	533
8	MF Beargrass Cr at Beals Branch Road	219	151	--	382	380	655
9	Spring Ditch at Private Drive	17.1	16.3	--	126	94.1	77.1
10	Muddy Fork at Mockingbird Valley Road	46.5	38.6	--	131	113	197
11	Goose Cr at U.S. Highway 42	48.8	62.9	--	100	161	248
12	Little Goose Cr at U.S. Highway 42	43.8	41.4	--	127	92.4	144
13	Goose Cr at Old Westport Road	30.5	42.6	--	93.2	101	173
14	Pope Lick at Pope Lick Road	20.8	18.5	--	59.4	39.9	74.5
15	Floyds Fork at former State Highway 155	1,880	1,320	--	3,350	2,460	3,180
16	Chenoweth Run at Gelhaus Road	161	81.3	--	298	280	294
17	Fern Cr at Old Bardstown Road	36.0	19.8	--	56.8	39.8	86.9
18	Northern Ditch at Preston Highway	83.8	73.2	--	251	190	294
19	Fishpool Cr at Bost Road	54.5	33.5	--	129	86.8	136
20	Southern Ditch at Minors Lane	95.4	85.9	--	293	181	337
21	Floyds Fork at Bardstown Road	3,020	2,080	--	5,330	3,750	4,910
22	Cedar Cr at Thixton Road	85.3	81.9	--	263	171	262
23	Pennsylvania Run at Mt. Washington Road	51.0	42.3	--	122	101	144
24	Mill Cr Cutoff at Dover Road	118	103	--	435	272	452
25	Harrods Cr at Hunting Cr Drive	756	1,010	--	1,630	2,280	2,310
26	Long Run at State Highway 1531	320	235	--	692	648	534
			Biochemical oxygen demand			Calcium, total as Ca	
1	Pond Cr at Pendleton Road	564	466	--	2,480	3,020	--
2	Mill Cr at Orell Road	53.1	81.2	--	112	502	--
3	Pond Cr at Manslick Road	634	372	--	3,020	2,230	--
5	SF Beargrass Cr at Winter Avenue	263	130	--	665	673	--
6	SF Beargrass Cr at Trevilian Way	176	100	--	461	505	--
7	MF Beargrass Cr at Old Cannons Lane	79.9	82.5	--	--	508	--
8	MF Beargrass Cr at Beals Branch Road	87.9	108	--	--	637	--
9	Spring Ditch at Private Drive	18.0	19.4	--	61.4	66.0	--
10	Muddy Fork at Mockingbird Valley Road	24.2	37.1	--	313	199	--
11	Goose Cr at U.S. Highway 42	38.7	49.4	--	263	308	--
12	Little Goose Cr at U.S. Highway 42	34.2	20.7	--	229	168	--
13	Goose Cr at Old Westport Road	24.9	30.4	--	174	206	--
14	Pope Lick at Pope Lick Road	14.7	10.8	--	180	84.4	--
15	Floyds Fork at former State Highway 155	763	709	--	8,490	7,100	--
16	Chenoweth Run at Gelhaus Road	149	86.8	--	1,070	447	--
17	Fern Cr at Old Bardstown Road	40.5	16.4	--	202	140	--
18	Northern Ditch at Preston Highway	76.5	64.4	--	406	401	--
19	Fishpool Cr at Bost Road	31.0	30.7	--	--	203	--
20	Southern Ditch at Minors Lane	57.8	60.5	--	--	460	--
21	Floyds Fork at Bardstown Road	1,210	1,120	--	16,400	11,400	--
22	Cedar Cr at Thixton Road	82.4	62.2	--	520	572	--
23	Pennsylvania Run at Mt. Washington Road	38.1	36.8	--	240	297	--
24	Mill Cr Cutoff at Dover Road	162	88.1	--	--	508	--
25	Harrods Cr at Hunting Cr Drive	489	530	--	6,880	4,750	--
26	Long Run at State Highway 1531	197	138	--	--	1,180	--
			Magnesium, total as Mg			Dissolved solids	
1	Pond Cr at Pendleton Road	910	696	--	16,400	16,900	25,300
2	Mill Cr at Orell Road	30.0	157	--	1,170	2,650	4,290
3	Pond Cr at Manslick Road	1,070	510	--	16,700	12,800	19,700
5	SF Beargrass Cr at Winter Avenue	245	148	--	6,850	4,780	6,860
6	SF Beargrass Cr at Trevilian Way	105	116	--	3,750	3,450	5,220
7	MF Beargrass Cr at Old Cannons Lane	--	136	--	3,770	3,240	5,680
8	MF Beargrass Cr at Beals Branch Road	--	162	--	5,270	4,380	6,980
9	Spring Ditch at Private Drive	15.2	17.3	--	329	382	740
10	Muddy Fork at Mockingbird Valley Road	36.2	48.1	--	1,940	1,580	2,000
11	Goose Cr at U.S. Highway 42	69.9	120	--	1,150	1,740	3,030
12	Little Goose Cr at U.S. Highway 42	78.9	82.8	--	1,080	746	1,790
13	Goose Cr at Old Westport Road	58.2	86.2	--	857	1,140	2,100
14	Pope Lick at Pope Lick Road	81.0	45.9	--	759	418	927
15	Floyds Fork at former State Highway 155	1,750	1,970	--	51,300	36,700	42,600
16	Chenoweth Run at Gelhaus Road	523	145	--	6,460	2,380	3,610
17	Fern Cr at Old Bardstown Road	83.6	46.2	--	1,020	833	1,050
18	Northern Ditch at Preston Highway	193	128	--	2,060	2,320	3,520
19	Fishpool Cr at Bost Road	--	73.0	--	1,450	1,110	1,670
20	Southern Ditch at Minors Lane	--	148	--	2,950	2,520	4,050
21	Floyds Fork at Bardstown Road	3,170	2,990	--	71,000	60,500	66,200
22	Cedar Cr at Thixton Road	262	204	--	2,760	2,910	3,490
23	Pennsylvania Run at Mt. Washington Road	140	123	--	1,580	1,500	1,910
24	Mill Cr Cutoff at Dover Road	--	129	--	3,520	3,380	4,940
25	Harrods Cr at Hunting Cr Drive	1,260	1,460	--	19,700	23,500	30,900
26	Long Run at State Highway 1531	--	476	--	7,390	5,590	7,340

Table 11. Estimates of mean annual loads of selected constituents in storm runoff from urban watersheds of Jefferson County, Kentucky--Continued

[DRM, mean annual load in storm runoff estimated by use of the discharge-record method for 1988-92; JC, mean annual load in storm runoff estimated by use of Jefferson County regression equations, with average annual rainfall of 43.03 inches; DT, mean annual load in storm runoff estimated by use of adjusted Driver and Tasker models; Cr, Creek; SF, South Fork; MF, Middle Fork; --, unknown. All loads are in tons]

	Site number and name	DRM	JC	DT	DRM	JC	DT
		Suspended solids			Residue, volatile nonfilterable		
1	Pond Cr at Pendleton Road	20,500	12,400	18,700	3,100	2,170	--
2	Mill Cr at Orell Road	1,220	1,230	3,160	264	243	--
3	Pond Cr at Manslick Road	21,300	9,540	14,500	4,460	1,700	--
5	SF Beargrass Cr at Winter Avenue	7,250	2,650	5,090	3,080	686	--
6	SF Beargrass Cr at Trevilian Way	4,830	1,880	3,860	1,710	469	--
7	MF Beargrass Cr at Old Cannons Lane	773	1,700	4,200	449	488	--
8	MF Beargrass Cr at Beals Branch Road	1,090	2,340	5,150	267	684	--
9	Spring Ditch at Private Drive	177	206	547	38.2	37.8	--
10	Muddy Fork at Mockingbird Valley Road	490	499	1,480	97.5	183	--
11	Goose Cr at U.S. Highway 42	455	743	2,230	96.9	185	--
12	Little Goose Cr at U.S. Highway 42	542	279	1,320	106	73.9	--
13	Goose Cr at Old Westport Road	529	417	1,550	146	118	--
14	Pope Lick at Pope Lick Road	342	120	683	49.8	39.6	--
15	Floyds Fork at former State Highway 155	19,500	17,100	31,400	5,730	3,140	--
16	Chenoweth Run at Gelhaus Road	2,490	1,190	2,670	707	195	--
17	Fern Cr at Old Bardstown Road	520	140	774	192	50.1	--
18	Northern Ditch at Preston Highway	1,350	931	2,590	190	219	--
19	Fishpool Cr at Bost Road	461	329	1,230	126	81.0	--
20	Southern Ditch at Minors Lane	1,060	915	2,990	299	240	--
21	Floyds Fork at Bardstown Road	62,700	30,500	48,800	12,900	5,470	--
22	Cedar Cr at Thixton Road	408	669	2,570	98.4	157	--
23	Pennsylvania Run at Mt. Washington Road	148	339	1,410	37.5	77.5	--
24	Mill Cr Cutoff at Dover Road	1,420	1,550	3,650	286	413	--
25	Harrods Cr at Hunting Cr Drive	6,660	12,300	22,700	--	2,090	--
26	Long Run at State Highway 1531	3,650	1,920	5,410	382	348	--
		Nitrate nitrogen, total as N			Nitrite nitrogen, total as N		
1	Pond Cr at Pendleton Road	134	101	--	9.27	5.36	--
2	Mill Cr at Orell Road	9.34	19.3	--	--	.91	--
3	Pond Cr at Manslick Road	127	79.8	--	12.9	3.96	--
5	SF Beargrass Cr at Winter Avenue	31.4	30.0	--	1.29	1.19	--
6	SF Beargrass Cr at Trevilian Way	24.7	23.2	--	1.22	.90	--
7	MF Beargrass Cr at Old Cannons Lane	24.7	25.1	--	.37	.90	--
8	MF Beargrass Cr at Beals Branch Road	32.5	30.3	--	.48	1.12	--
9	Spring Ditch at Private Drive	4.18	3.7	--	.14	.12	--
10	Muddy Fork at Mockingbird Valley Road	9.62	9.5	--	.30	.36	--
11	Goose Cr at U.S. Highway 42	13.1	13.9	--	.76	.55	--
12	Little Goose Cr at U.S. Highway 42	14.2	8.5	--	.38	.30	--
13	Goose Cr at Old Westport Road	9.32	9.9	--	.42	.37	--
14	Pope Lick at Pope Lick Road	5.49	4.6	--	.22	.15	--
15	Floyds Fork at former State Highway 155	261	163	--	12.1	12.9	--
16	Chenoweth Run at Gelhaus Road	18.5	16.4	--	1.18	.82	--
17	Fern Cr at Old Bardstown Road	12.2	5.2	--	.60	.26	--
18	Northern Ditch at Preston Highway	20.3	16.1	--	.67	.73	--
19	Fishpool Cr at Bost Road	12.0	8.0	--	.80	.37	--
20	Southern Ditch at Minors Lane	25.0	18.3	--	1.32	.83	--
21	Floyds Fork at Bardstown Road	484	245	--	25.5	20.6	--
22	Cedar Cr at Thixton Road	15.5	15.9	--	.72	1.07	--
23	Pennsylvania Run at Mt. Washington Road	7.01	9.1	--	.76	.56	--
24	Mill Cr Cutoff at Dover Road	38.1	22.0	--	2.26	.91	--
25	Harrods Cr at Hunting Cr Drive	145	121	--	5.70	8.59	--
26	Long Run at State Highway 1531	43.8	31.7	--	--	2.18	--
		Ammonia nitrogen, total as N			Organic nitrogen, total as N		
1	Pond Cr at Pendleton Road	18.9	13.9	--	34.6	43.7	--
2	Mill Cr at Orell Road	.58	2.0	--	4.11	8.40	--
3	Pond Cr at Manslick Road	33.0	11.0	--	37.7	33.7	--
5	SF Beargrass Cr at Winter Avenue	10.7	4.3	--	25.2	11.2	--
6	SF Beargrass Cr at Trevilian Way	3.19	3.0	--	11.4	8.65	--
7	MF Beargrass Cr at Old Cannons Lane	1.95	3.3	--	6.03	7.17	--
8	MF Beargrass Cr at Beals Branch Road	1.27	4.3	--	6.96	9.27	--
9	Spring Ditch at Private Drive	.34	.1	--	2.86	1.63	--
10	Muddy Fork at Mockingbird Valley Road	.54	1.3	--	1.72	3.53	--
11	Goose Cr at U.S. Highway 42	.84	1.6	--	3.15	4.85	--
12	Little Goose Cr at U.S. Highway 42	.28	.5	--	1.84	2.17	--
13	Goose Cr at Old Westport Road	--	1.1	--	3.72	3.06	--
14	Pope Lick at Pope Lick Road	.64	.3	--	2.54	1.15	--
15	Floyds Fork at former State Highway 155	--	10.9	--	160	88.0	--
16	Chenoweth Run at Gelhaus Road	--	1.4	--	8.75	8.92	--
17	Fern Cr at Old Bardstown Road	1.64	.5	--	2.88	2.22	--
18	Northern Ditch at Preston Highway	1.44	2.0	--	11.2	6.68	--
19	Fishpool Cr at Bost Road	1.38	.8	--	4.32	3.53	--
20	Southern Ditch at Minors Lane	4.24	2.2	--	9.88	6.56	--
21	Floyds Fork at Bardstown Road	16.5	18.4	--	167	138	--
22	Cedar Cr at Thixton Road	1.74	1.1	--	7.48	8.86	--
23	Pennsylvania Run at Mt. Washington Road	2.44	.6	--	5.70	5.10	--
24	Mill Cr Cutoff at Dover Road	11.4	3.1	--	24.8	8.23	--
25	Harrods Cr at Hunting Cr Drive	--	5.4	--	56.4	62.2	--
26	Long Run at State Highway 1531	--	.8	--	31.3	18.1	--

Table 11. Estimates of mean annual loads of selected constituents in storm runoff from urban watersheds of Jefferson County, Kentucky--Continued

[DRM, mean annual load in storm runoff estimated by use of the discharge-record method for 1988-92; JC, mean annual load in storm runoff estimated by use of Jefferson County regression equations, with average annual rainfall of 43.03 inches; DT, mean annual load in storm runoff estimated by use of adjusted Driver and Tasker models; Cr, Creek; SF, South Fork; MF, Middle Fork; --, unknown. All loads are in tons]

	Site number and name	DRM	JC	DT	DRM	JC	DT
		Kjeldahl nitrogen, total as N			Nitrogen, total as N		
1	Pond Cr at Pendleton Road	53.5	57.6	79.0	196	164	283
2	Mill Cr at Orell Road	4.70	10.4	13.0	--	30.7	46.6
3	Pond Cr at Manslick Road	70.7	44.7	63.5	211	128	228
5	SF Beargrass Cr at Winter Avenue	35.9	15.5	25.3	68.7	46.6	90.2
6	SF Beargrass Cr at Trevilian Way	14.6	11.7	19.2	40.5	35.8	67.9
7	MF Beargrass Cr at Old Cannons Lane	7.99	10.5	20.0	33.0	36.4	71.5
8	MF Beargrass Cr at Beals Branch Road	8.23	13.6	24.6	41.2	45.1	87.9
9	Spring Ditch at Private Drive	3.19	1.8	2.98	7.51	5.71	10.6
10	Muddy Fork at Mockingbird Valley Road	2.26	4.8	7.47	12.2	14.7	26.6
11	Goose Cr at U.S. Highway 42	3.99	6.4	9.04	17.9	21.0	32.5
12	Little Goose Cr at U.S. Highway 42	2.12	2.6	5.20	16.7	11.5	18.7
13	Goose Cr at Old Westport Road	--	4.1	6.28	--	14.5	22.6
14	Pope Lick at Pope Lick Road	3.18	1.5	2.69	8.89	6.32	9.68
15	Floyds Fork at former State Highway 155	--	98.9	113	--	275	410
16	Chenoweth Run at Gelhaus Road	--	10.4	10.7	--	27.6	38.4
17	Fern Cr at Old Bardstown Road	4.52	2.8	3.15	17.3	8.27	11.3
18	Northern Ditch at Preston Highway	12.7	8.6	10.8	33.6	25.5	38.7
19	Fishpool Cr at Bost Road	5.70	4.3	4.93	18.5	12.8	17.7
20	Southern Ditch at Minors Lane	14.1	8.7	12.3	40.5	27.9	44.3
21	Floyds Fork at Bardstown Road	183	156	174	692	422	630
22	Cedar Cr at Thixton Road	9.22	10.0	9.34	25.4	27.0	33.8
23	Pennsylvania Run at Mt. Washington Road	8.15	5.7	5.10	15.9	15.4	18.4
24	Mill Cr Cutoff at Dover Road	36.2	11.4	16.9	76.5	34.3	60.4
25	Harrods Cr at Hunting Cr Drive	--	67.6	82.1	--	197	297
26	Long Run at State Highway 1531	--	18.9	18.8	--	52.8	68.2
		Phosphate, total as PO_4			Phosphorus, total as P		
1	Pond Cr at Pendleton Road	75.4	50.5	--	35.8	28.4	43.9
2	Mill Cr at Orell Road	9.56	11.4	--	5.41	5.94	7.45
3	Pond Cr at Manslick Road	92.0	40.3	--	38.7	21.9	34.2
5	SF Beargrass Cr at Winter Avenue	20.0	15.1	--	15.0	7.48	12.0
6	SF Beargrass Cr at Trevilian Way	17.4	12.2	--	7.64	5.84	9.06
7	MF Beargrass Cr at Old Cannons Lane	10.5	13.2	--	5.69	6.51	9.86
8	MF Beargrass Cr at Beals Branch Road	6.94	15.2	--	4.81	7.83	12.1
9	Spring Ditch at Private Drive	2.42	3.3	--	1.04	.94	1.29
10	Muddy Fork at Mockingbird Valley Road	2.30	5.0	--	1.62	2.43	3.49
11	Goose Cr at U.S. Highway 42	6.72	7.8	--	3.96	4.41	5.25
12	Little Goose Cr at U.S. Highway 42	6.73	6.8	--	2.84	2.86	3.11
13	Goose Cr at Old Westport Road	6.94	5.8	--	3.56	3.17	3.64
14	Pope Lick at Pope Lick Road	3.54	3.1	--	2.40	1.57	1.61
15	Floyds Fork at former State Highway 155	146	116	--	87.2	57.5	74.0
16	Chenoweth Run at Gelhaus Road	29.5	10.6	--	7.78	5.24	6.27
17	Fern Cr at Old Bardstown Road	6.49	3.0	--	3.64	1.69	1.82
18	Northern Ditch at Preston Highway	14.1	8.7	--	6.63	4.91	6.10
19	Fishpool Cr at Bost Road	6.80	4.8	--	3.40	2.61	2.89
20	Southern Ditch at Minors Lane	12.9	10.1	--	6.80	5.61	7.01
21	Floyds Fork at Bardstown Road	200	164	--	116	86.3	115
22	Cedar Cr at Thixton Road	9.66	11.3	--	3.93	5.91	6.05
23	Pennsylvania Run at Mt. Washington Road	3.82	6.5	--	1.66	3.48	3.33
24	Mill Cr Cutoff at Dover Road	44.6	11.1	--	13.9	5.91	8.58
25	Harrods Cr at Hunting Cr Drive	68.1	106	--	36.0	42.8	53.5
26	Long Run at State Highway 1531	70.4	37.4	--	23.5	12.5	12.7
		Phosphorus, ortophosphate, total as P			Barium, total as Ba		
1	Pond Cr at Pendleton Road	24.6	19.3	--	3.03	5.48	--
2	Mill Cr at Orell Road	3.38	4.3	--	.28	.44	--
3	Pond Cr at Manslick Road	30.0	14.8	--	3.00	3.68	--
5	SF Beargrass Cr at Winter Avenue	6.49	4.3	--	1.43	.91	--
6	SF Beargrass Cr at Trevilian Way	5.85	3.5	--	.74	.58	--
7	MF Beargrass Cr at Old Cannons Lane	3.31	4.0	--	--	.84	--
8	MF Beargrass Cr at Beals Branch Road	2.19	4.4	--	--	1.11	--
9	Spring Ditch at Private Drive	.78	.7	--	.06	.01	--
10	Muddy Fork at Mockingbird Valley Road	.74	1.3	--	.28	.20	--
11	Goose Cr at U.S. Highway 42	2.20	2.8	--	.18	.34	--
12	Little Goose Cr at U.S. Highway 42	2.20	2.2	--	.30	.12	--
13	Goose Cr at Old Westport Road	2.26	2.0	--	.12	.23	--
14	Pope Lick at Pope Lick Road	1.16	1.1	--	.08	.08	--
15	Floyds Fork at former State Highway 155	47.6	37.8	--	6.62	7.80	--
16	Chenoweth Run at Gelhaus Road	9.62	3.7	--	.73	.23	--
17	Fern Cr at Old Bardstown Road	2.12	1.1	--	.46	.12	--
18	Northern Ditch at Preston Highway	4.16	3.2	--	.56	.42	--
19	Fishpool Cr at Bost Road	2.32	1.8	--	--	.15	--
20	Southern Ditch at Minors Lane	4.51	3.9	--	--	.63	--
21	Floyds Fork at Bardstown Road	65.1	54.2	--	15.0	15.1	--
22	Cedar Cr at Thixton Road	3.14	4.2	--	.50	.36	--
23	Pennsylvania Run at Mt. Washington Road	1.24	2.4	--	.21	.15	--
24	Mill Cr Cutoff at Dover Road	14.6	3.5	--	--	.69	--
25	Harrods Cr at Hunting Cr Drive	22.2	29.1	--	4.60	3.02	--
26	Long Run at State Highway 1531	21.3	8.7	--	--	.27	--

Table 11. Estimates of mean annual loads of selected constituents in storm runoff from urban watersheds of Jefferson County, Kentucky--Continued

[DRM, mean annual load in storm runoff estimated by use of the discharge-record method for 1988-92; JC, mean annual load in storm runoff estimated by use of Jefferson County regression equations, with average annual rainfall of 43.03 inches; DT, mean annual load in storm runoff estimated by use of adjusted Driver and Tasker models; Cr, Creek; SF, South Fork; MF, Middle Fork; --, unknown. All loads are in tons]

	Site number and name	DRM	JC	DT	DRM	JC	DT
		Copper, total as Cu			Iron, total as Fe		
1	Pond Cr at Pendleton Road	1.48	--	2.51	--	322	--
2	Mill Cr at Orell Road	--	--	.43	74.4	12.2	--
3	Pond Cr at Manslick Road	1.60	--	1.96	197	262	--
5	SF Beargrass Cr at Winter Avenue	.56	--	.68	850	330	--
6	SF Beargrass Cr at Trevilian Way	--	--	.52	33.1	170	--
7	MF Beargrass Cr at Old Cannons Lane	--	--	.56	--	513	--
8	MF Beargrass Cr at Beals Branch Road	--	--	.69	--	567	--
9	Spring Ditch at Private Drive	.04	--	.07	8.98	7.52	--
10	Muddy Fork at Mockingbird Valley Road	--	--	.20	280	125	--
11	Goose Cr at U.S. Highway 42	.08	--	.30	4.71	9.01	--
12	Little Goose Cr at U.S. Highway 42	--	--	.18	22.4	39.8	--
13	Goose Cr at Old Westport Road	.06	--	.21	3.24	11.3	--
14	Pope Lick at Pope Lick Road	.02	--	.09	--	7.95	--
15	Floyds Fork at former State Highway 155	5.11	--	4.23	2,840	1,260	--
16	Chenoweth Run at Gelhaus Road	--	--	.36	2.68	2.07	--
17	Fern Cr at Old Bardstown Road	.10	--	.10	71.7	12.0	--
18	Northern Ditch at Preston Highway	.07	--	.35	36.4	11.8	--
19	Fishpool Cr at Bost Road	--	--	.17	--	2.99	--
20	Southern Ditch at Minors Lane	--	--	.40	--	49.5	--
21	Floyds Fork at Bardstown Road	--	--	6.56	1,580	1,890	--
22	Cedar Cr at Thixton Road	.14	--	.35	4.72	11.0	--
23	Pennsylvania Run at Mt. Washington Road	.08	--	.19	1.40	1.52	--
24	Mill Cr Cutoff at Dover Road	--	--	.49	--	108	--
25	Harrods Cr at Hunting Cr Drive	--	--	3.07	1,800	1,010	--
26	Long Run at State Highway 1531	--	--	.73	--	83.1	--

SUMMARY

This report presents techniques for estimation of storm-runoff volumes and concentrations and loads of selected constituents in storm runoff from urban watersheds of Jefferson County, Ky. Previously developed regional regression models were evaluated to assess their suitability for use in the county. Comparisons of the regional regression model estimates to data obtained in Jefferson County indicated that, in general, the regional models did not adequately estimate constituent concentrations and loads in the county. Regional regression models were adjusted or other estimation models were developed on the basis of runoff volumes, concentrations, and loads measured in Jefferson County. Data on storm-runoff volumes and concentrations of constituents in storm runoff were collected at six stormwater outfalls in the county from January 1991 through May 1992. Samples were collected for at least three storms at each outfall site. Sampling events were at least 1 month apart and generally were preceeded by a dry period of at least 72 hours. Annual constituent loads in storm runoff were measured at a network of stream sites that were sampled from February 1988 through March 1991.

Adjustments were made to two sets of regional regression models that estimate loads in storm runoff of chemical oxygen demand; dissolved and suspended solids; total nitrogen and total Kjeldahl nitrogen; total and dissolved phosphorus; and total recoverable copper, lead, and zinc. One set of these models requires total storm rainfall, drainage area, impervious area, land-use information, mean annual rainfall, mean annual nitrogen load in precipitation, and mean minimum January temperature as explanatory variables. The other set of models consists of simplified versions that only require total storm rainfall, drainage area, and impervious area as explanatory variables. A regional regression model that requires total storm rainfall, drainage area, and impervious area to estimate total runoff of a storm needed only slight adjustment for estimation in Jefferson County.

The correspondence of storm-runoff mean concentrations measured in Jefferson County to those estimated by regional models was considered poor, and suitable adjustments could not be defined. Regression models based on the data from the six stormwater outfalls were developed to estimate mean concentrations of chemical oxygen demand, dissolved and suspended solids, nitrogen, phosphorus, copper, lead, and zinc in storm runoff. Explanatory variables needed for these models include total storm rainfall and its duration, drainage area, impervious area, and land-use information. The concentration models generally have small coefficients of determination and large standard errors.

Regression models to estimate annual loads in storm runoff for individual years were developed for dissolved oxygen, biochemical and chemical oxygen demands, dissolved and suspended solids, volatile residue, nitrogen, phosphorus and phosphate, calcium, magnesium, barium, and iron. These models were based on loads in storm runoff from watersheds of Jefferson County calculated for 1988 through 1992 by use of the discharge-record method applied to partitioned streamflow records. Explanatory variables required by the models to estimate annual loads in storm runoff include total annual rainfall, drainage area, impervious area, and land use information.

Average rainfall for 1988-92 was within 5 percent of the long-term average rainfall for the Jefferson County area; therefore, average loads of selected constituents in storm runoff for this period were considered to be good estimates of the long-term mean annual loads for 25 watersheds of Jefferson County. The watershed data were used to adjust regional models for estimation of mean annual loads in storm runoff of chemical oxygen demand, dissolved and suspended solids, total nitrogen and total Kjeldahl nitrogen, total phosphorus, and total recoverable copper. Explanatory variables used in these models include drainage area, impervious area, commercial and industrial land-use information, mean annual rainfall, and minimum January temperature. In addition, annual loads were computed for an average rainfall year of 43.0 in. by use of models developed from annual-constituent-load and rainfall data in Jefferson County. The estimates of mean annual constituent loads in storm runoff based on these three computation methods agreed reasonably well.

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APPENDIX:

SUPPLEMENTAL STREAMFLOW AND WATER-QUALITY INFORMATION

Table 12. Average annual total streamflow and average annual base flow in streams in Jefferson County, Kentucky, 1988-92

[ft^3/s, cubic feet per second]

Site number and name	Total streamflow, in ft^3/s	Base flow	
		ft^3/s	Percent
1 Pond Creek at Pendleton Road	96.2	39.9	41.5
2 Mill Creek at Orell Road	10.5	3.00	28.6
3 Pond Creek at Manslick Road	99.7	31.9	32.0
5 South Fork Beargrass Creek at Winter Avenue	33.5	11.0	32.8
6 South Fork Beargrass Creek at Trevilian Way	24.0	9.30	38.8
7 Middle Fork Beargrass Creek at Old Cannons Lane	24.1	9.53	39.5
8 Middle Fork Beargrass Creek at Beals Branch Road	29.1	9.71	33.4
9 Spring Ditch at Private Drive	4.26	2.04	47.9
10 Muddy Fork at Mockingbird Valley Road	8.80	3.85	43.8
11 Goose Creek at U.S. Highway 42	12.7	8.08	63.6
12 Little Goose Creek at U.S. Highway 42	9.97	5.70	57.2
13 Goose Creek at Old Westport Road	9.87	6.38	64.6
14 Pope Lick at Pope Lick Road	4.34	1.96	45.2
15 Floyds Fork at former State Highway 155	213	56.8	26.7
16 Chenoweth Run at Gelhaus Road	23.6	7.81	33.1
17 Fern Creek at Old Bardstown Road	6.78	3.18	46.9
18 Northern Ditch at Preston Highway	20.6	10.9	52.9
19 Fishpool Creek at Bost Road	8.24	2.82	34.2
20 Southern Ditch at Minors Lane	15.3	4.79	31.3
21 Floyds Fork at Bardstown Road	372	89.3	24.0
22 Cedar Creek at Thixton Road	16.8	6.98	41.5
23 Pennsylvania Run at Mt. Washington Road	9.15	3.88	42.4
24 Mill Creek Cutoff at Dover Road	17.4	1.67	9.6
25 Harrods Creek at Hunting Creek Drive	131	59.5	45.4
26 Long Run at State Highway 1531	40.0	8.25	20.6

Table 13. Statistical summary of constituent concentrations in streams in Jefferson County, Kentucky, 1988-92

[N, number of observations; Cr, Creek; SF, South Fork; MF, Middle Fork; mg/L, milligrams per liter; °C, degrees Celsius; µg/L, micrograms per liter; ---, missing; <, less than; *, value estimated from log-normal fit program; percentiles not computed if fewer than 10 observations; the 10th and 90th percentiles are not shown if fewer than 30 observations]

Site number and name	N	N of censored data values	Minimum	Value at indicated percentile 10	25	50 (median)	75	90	Maximum
Dissolved oxygen, in mg/L									
1 Pond Cr at Pendleton Road	93	0	4.3	5.5	6.1	8.2	10	12	17
2 Mill Cr at Orell Road	87	0	4.4	5.5	6.2	7.9	10	12	18
3 Pond Cr at Manslick Road	95	0	2.8	5.0	6.0	7.7	9.9	11	15
5 SF Beargrass Cr at Winter Avenue	95	0	1.9	4.1	6.2	7.7	10	12	13
6 SF Beargrass Cr at Trevilian Way	94	0	4.9	6.1	7.0	8.5	10	12	14
7 MF Beargrass Cr at Old Cannons Lane	95	0	3.3	6.9	8.6	10	13	16	19
8 MF Beargrass Cr at Beals Branch Road	95	0	2.4	3.5	5.1	8.2	10	12	14
9 Spring Ditch at Private Drive	94	0	1.9	4.7	6.4	8.3	10	12	16
10 Muddy Fork at Mockingbird Valley Road	95	0	5.2	6.4	7.4	8.5	10	11	16
11 Goose Cr at U.S. Highway 42	95	0	6.9	7.9	8.4	9.9	12	13	17
12 Little Goose Cr at U.S. Highway 42	96	0	6.1	7.5	8.4	9.9	11	12	15
13 Goose Cr at Old Westport Road	95	0	4.9	7.2	8.5	11	12	14	18
14 Pope Lick at Pope Lick Road	96	0	4.4	5.6	6.5	8.7	10	12	14
15 Floyds Fork at former State Highway 155	95	0	3.0	6.2	7.5	8.9	12	13	16
16 Chenoweth Run at Gelhaus Road	94	0	6.6	7.8	9.0	11	13	14	17
17 Fern Cr at Old Bardstown Road	95	0	6.7	7.4	8.2	9.7	12	13	16
18 Northern Ditch at Preston Highway	96	0	3.9	8.0	9.6	11	13	15	17
19 Fishpool Cr at Bost Road	96	0	3.7	5.5	7.7	10	12	14	17
20 Southern Ditch at Minors Lane	96	0	2.0	5.9	7.4	9.1	11	13	16
21 Floyds Fork at Bardstown Road	95	0	4.2	5.8	7.5	9.0	12	13	16
22 Cedar Cr at Thixton Road	96	0	5.8	6.7	8.0	9.8	12	14	17
23 Pennsylvania Run at Mt. Washington Road	96	0	3.3	4.2	5.2	7.5	11	12	14
24 Mill Cr Cutoff at Dover Road	84	0	4.5	7.0	9.5	11	14	17	22
25 Harrods Cr at Hunting Cr Drive	91	0	3.1	5.3	6.4	8.6	11	12	15
26 Long Run at State Highway 1531	71	0	6.8	8.7	10	11	13	13	16
Chemical oxygen demand, 0.25N dicromate, in mg/L									
1 Pond Cr at Pendleton Road	89	10	<10	10*	14	20	26	33	45
2 Mill Cr at Orell Road	84	11	<10	9.5*	12	18	25	31	49
3 Pond Cr at Manslick Road	89	10	<10	10*	14	20	25	38	55
5 SF Beargrass Cr at Winter Avenue	88	26	<10	5.7*	8.6*	14	21	31	60
6 SF Beargrass Cr at Trevilian Way	89	37	<10	4.4*	6.9*	11	20	32	81
7 MF Beargrass Cr at Old Cannons Lane	89	36	<10	5.1*	7.4*	12	18	23	41
8 MF Beargrass Cr at Beals Branch Road	90	29	<10	6.0*	8.7*	14	21	26	84
9 Spring Ditch at Private Drive	90	10	<10	10*	15	24	37	50	141
10 Muddy Fork at Mockingbird Valley Road	89	28	<10	6.0*	8.8*	13	24	30	64
11 Goose Cr at U.S. Highway 42	88	28	<10	5.6*	8.5*	13	20	31	70
12 Little Goose Cr at U.S. Highway 42	89	26	<10	4.8*	7.7*	12	19	33	710
13 Goose Cr at Old Westport Road	87	11	<10	8.3*	12	17	26	36	138
14 Pope Lick at Pope Lick Road	92	13	<10	8.4*	11	15	22	28	59
15 Floyds Fork at former State Highway 155	89	15	<10	8.5*	11	18	23	30	94
16 Chenoweth Run at Gelhaus Road	89	15	<10	8.8*	11	18	24	30	61
17 Fern Cr at Old Bardstown Road	89	30	<10	5.5*	8.3*	13	21	29	74
18 Northern Ditch at Preston Highway	91	21	<10	7.4*	11	18	24	33	103
19 Fishpool Cr at Bost Road	89	15	<10	8.9*	12	17	25	32	47
20 Southern Ditch at Minors Lane	90	18	<10	8.7*	13	20	26	33	105
21 Floyds Fork at Bardstown Road	90	20	<10	7.2*	10	15	24	31	70
22 Cedar Cr at Thixton Road	91	20	<10	7.7*	10	17	23	31	101
23 Pennsylvania Run at Mt. Washington Road	92	10	<10	11*	15	21	28	33	49
24 Mill Cr Cutoff at Dover Road	76	1	<10	12	16	23	31	40	105
25 Harrods Cr at Hunting Cr Drive	89	18	<10	7.5*	11	17	24	40	55
26 Long Run at State Highway 1531	63	15	<10	7.0*	9.7*	15	20	26	49
Biochemical oxygen demand, 5-day at 20°C, in mg/L									
1 Pond Cr at Pendleton Road	89	20	<2.0	1.1*	2.0	3.0	6.1	10	24
2 Mill Cr at Orell Road	85	20	<2.0	1.2*	2.0	3.0	5.3	9.7	12
3 Pond Cr at Manslick Road	90	8	<2.0	2.0	2.0	4.0	6.9	9.7	20
5 SF Beargrass Cr at Winter Avenue	91	14	<2.0	1.5*	2.0	4.0	6.9	10	25
6 SF Beargrass Cr at Trevilian Way	91	39	<2.0	.54*	1.1*	2.0	6.1	9.2	72
7 MF Beargrass Cr at Old Cannons Lane	91	34	<2.0	.79*	1.4*	2.0	5.0	10	16
8 MF Beargrass Cr at Beals Branch Road	92	35	<2.0	.87*	1.4*	2.0	4.7	8.3	14
9 Spring Ditch at Private Drive	91	12	<2.0	1.6*	2.0	4.0	6.0	9.9	18
10 Muddy Fork at Mockingbird Valley Road	90	35	<2.0	.79*	1.3*	2.0	4.2	8.4	11
11 Goose Cr at U.S. Highway 42	90	27	<2.0	.91*	1.6*	2.0	7.6	12	13
12 Little Goose Cr at U.S. Highway 42	91	32	<2.0	.81*	1.5*	2.0	7.1	11	13
13 Goose Cr at Old Westport Road	90	18	<2.0	1.3*	2.0	4.0	8.0	11	15
14 Pope Lick at Pope Lick Road	92	18	<2.0	1.3*	2.0	3.0	5.0	8.9	12
15 Floyds Fork at former State Highway 155	91	18	<2.0	1.1*	2.0	2.0	6.2	9.0	14
16 Chenoweth Run at Gelhaus Road	90	14	<2.0	1.2*	2.0	3.0	6.6	13	23
17 Fern Cr at Old Bardstown Road	91	21	<2.0	1.2*	2.0	3.0	7.6	11	16
18 Northern Ditch at Preston Highway	92	17	<2.0	1.3*	2.0	3.4	7.4	13	15
19 Fishpool Cr at Bost Road	91	29	<2.0	.92*	1.5*	2.0	5.6	9.7	15
20 Southern Ditch at Minors Lane	91	13	<2.0	1.3*	2.0	3.0	5.2	8.2	14
21 Floyds Fork at Bardstown Road	90	24	<2.0	1.0*	1.6*	2.2	4.3	9.3	14
22 Cedar Cr at Thixton Road	92	34	<1.7	.75*	1.3*	2.0	6.6	11	14

Table 13. Statistical summary of constituent concentrations in streams in Jefferson County, Kentucky, 1988-92--Continued

[N, number of observations; Cr, Creek; SF, South Fork; MF, Middle Fork; mg/L, milligrams per liter; °C, degrees Celsius; µg/L, micrograms per liter; ---, missing; <, less than; *, value estimated from log-normal fit program; percentiles not computed if fewer than 10 observations; the 10th and 90th percentiles are not shown if fewer than 30 observations]

Site number and name	N	N of censored data values	Minimum	Value at indicated percentile 10	25	50 (median)	75	90	Maximum
Biochemical oxygen demand, 5-day at 20°C, in mg/L--Continued									
23 Pennsylvania Run at Mt. Washington Road	92	14	<2.0	1.4*	2.0	3.0	5.0	9.7	20
24 Mill Cr Cutoff at Dover Road	79	7	<2.0	2.0	3.0	4.0	8.0	12	18
25 Harrods Cr at Hunting Cr Drive	89	16	<2.0	1.3*	2.0	3.0	6.6	10	13
26 Long Run at State Highway 1531	65	16	<2.0	.99*	1.7*	2.0	8.5	12	14
Calcium, total, in mg/L as Ca									
1 Pond Cr at Pendleton Road	17	0	43	---	50	56	66	---	84
2 Mill Cr at Orell Road	15	0	13	---	31	50	71	---	92
3 Pond Cr at Manslick Road	18	0	47	---	53	58	63	---	82
5 SF Beargrass Cr at Winter Avenue	16	0	31	---	44	61	76	---	84
6 SF Beargrass Cr at Trevilian Way	16	0	35	---	46	57	76	---	82
7 MF Beargrass Cr at Old Cannons Lane	16	0	32	---	58	71	79	---	96
8 MF Beargrass Cr at Beals Branch Road	16	0	45	---	52	69	84	---	90
9 Spring Ditch at Private Drive	16	0	27	---	59	68	77	---	95
10 Muddy Fork at Mockingbird Valley Road	17	0	58	---	63	85	105	---	117
11 Goose Cr at U.S. Highway 42	16	0	39	---	52	55	60	---	66
12 Little Goose Cr at U.S. Highway 42	16	0	43	---	52	60	64	---	69
13 Goose Cr at Old Westport Road	16	0	40	---	49	53	59	---	66
14 Pope Lick at Pope Lick Road	18	0	52	---	60	64	68	---	91
15 Floyds Fork at former State Highway 155	18	0	42	---	54	64	71	---	80
16 Chenoweth Run at Gelhaus Road	18	0	40	---	51	60	66	---	102
17 Fern Cr at Old Bardstown Road	17	0	32	---	55	62	70	---	85
18 Northern Ditch at Preston Highway	16	0	41	---	49	55	60	---	87
19 Fishpool Cr at Bost Road	16	0	18	---	51	55	60	---	68
20 Southern Ditch at Minors Lane	16	0	36	---	49	54	59	---	69
21 Floyds Fork at Bardstown Road	17	0	32	---	53	63	70	---	84
22 Cedar Cr at Thixton Road	17	0	20	---	53	64	74	---	90
23 Pennsylvania Run at Mt. Washington Road	17	0	18	---	39	45	50	---	53
24 Mill Cr Cutoff at Dover Road	15	0	19	---	32	46	58	---	75
25 Harrods Cr at Hunting Cr Drive	16	0	1.0	---	47	53	58	---	73
26 Long Run at State Highway 1531	12	0	48	---	60	71	77	---	161
Magnesium, total, in mg/L as Mg									
1 Pond Cr at Pendleton Road	17	0	14	---	18	21	24	---	29
2 Mill Cr at Orell Road	15	0	3.2	---	9.7	16	28	---	33
3 Pond Cr at Manslick Road	18	0	15	---	20	22	23	---	28
5 SF Beargrass Cr at Winter Avenue	16	0	4.9	---	9.9	13	16	---	20
6 SF Beargrass Cr at Trevilian Way	16	0	7.1	---	12	15	17	---	20
7 MF Beargrass Cr at Old Cannons Lane	16	0	6.9	---	13	15	17	---	19
8 MF Beargrass Cr at Beals Branch Road	16	0	9.7	---	11	15	16	---	18
9 Spring Ditch at Private Drive	16	0	5.5	---	13	16	19	---	22
10 Muddy Fork at Mockingbird Valley Road	17	0	7.5	---	11	12	14	---	20
11 Goose Cr at U.S. Highway 42	16	0	14	---	21	22	24	---	26
12 Little Goose Cr at U.S. Highway 42	16	0	13	---	17	20	22	---	23
13 Goose Cr at Old Westport Road	16	0	15	---	19	22	24	---	26
14 Pope Lick at Pope Lick Road	18	0	19	---	24	26	27	---	35
15 Floyds Fork at former State Highway 155	18	0	11	---	13	17	20	---	23
16 Chenoweth Run at Gelhaus Road	17	0	14	---	18	22	24	---	27
17 Fern Cr at Old Bardstown Road	17	0	13	---	23	27	30	---	32
18 Northern Ditch at Preston Highway	16	0	15	---	19	21	25	---	28
19 Fishpool Cr at Bost Road	16	0	4.7	---	20	25	28	---	32
20 Southern Ditch at Minors Lane	16	0	13	---	22	25	27	---	30
21 Floyds Fork at Bardstown Road	17	0	9.5	---	15	18	21	---	30
22 Cedar Cr at Thixton Road	17	0	7.3	---	22	28	35	---	41
23 Pennsylvania Run at Mt. Washington Road	17	0	8.7	---	19	21	22	---	24
24 Mill Cr Cutoff at Dover Road	15	0	5.4	---	11	16	18	---	25
25 Harrods Cr at Hunting Cr Drive	16	0	18	---	21	24	26	---	30
26 Long Run at State Highway 1531	12	0	7.4	---	8.0	11	12	---	18
Alkalinity, in mg/L as $CaCO_3$									
1 Pond Cr at Pendleton Road	91	0	51	97	121	145	175	190	293
2 Mill Cr at Orell Road	86	0	35	54	94	151	240	297	360
3 Pond Cr at Manslick Road	91	0	68	114	134	158	180	197	230
5 SF Beargrass Cr at Winter Avenue	90	0	56	90	123	148	181	206	240
6 SF Beargrass Cr at Trevilian Way	90	0	50	75	105	145	179	196	230
7 MF Beargrass Cr at Old Cannons Lane	91	0	88	131	175	203	230	241	414
8 MF Beargrass Cr at Beals Branch Road	92	0	76	130	156	194	213	240	260
9 Spring Ditch at Private Drive	91	0	29	90	131	169	203	227	490
10 Muddy Fork at Mockingbird Valley Road	90	0	50	121	164	199	228	249	300
11 Goose Cr at U.S. Highway 42	91	0	57	124	157	176	192	210	240
12 Little Goose Cr at U.S. Highway 42	91	0	33	144	160	180	199	210	247
13 Goose Cr at Old Westport Road	90	0	26	111	143	164	192	205	240
14 Pope Lick at Pope Lick Road	92	0	1.5	119	153	186	213	239	280

Table 13. Statistical summary of constituent concentrations in streams in Jefferson County, Kentucky, 1988-92--Continued

[N, number of observations; Cr, Creek; SF, South Fork; MF, Middle Fork; mg/L, milligrams per liter; °C, degrees Celsius; µg/L, micrograms per liter; ---, missing; <, less than; *, value estimated from log-normal fit program; percentiles not computed if fewer than 10 observations; the 10th and 90th percentiles are not shown if fewer than 30 observations]

Site number and name	N	N of censored data values	Minimum	Value at indicated percentile 10	25	50 (median)	75	90	Maximum
Alkalinity, in mg/L as $CaCO_3$--Continued									
15 Floyds Fork at former State Highway 155	91	0	50	132	151	180	207	240	270
16 Chenoweth Run at Gelhaus Road	90	0	2.0	100	123	171	200	220	290
17 Fern Cr at Old Bardstown Road	90	0	30	98	149	210	244	258	290
18 Northern Ditch at Preston Highway	92	0	61	120	149	184	200	219	260
19 Fishpool Cr at Bost Road	91	0	9.1	101	145	172	189	206	260
20 Southern Ditch at Minors Lane	91	0	46	99	147	164	183	198	237
21 Floyds Fork at Bardstown Road	90	0	11	111	139	180	201	237	270
22 Cedar Cr at Thixton Road	92	0	8.8	99	136	173	200	220	265
23 Pennsylvania Run at Mt. Washington Road	92	0	56	100	121	144	161	175	260
24 Mill Cr Cutoff at Dover Road	78	0	42	66	96	123	162	210	279
25 Harrods Cr at Hunting Cr Drive	89	0	76	133	157	187	207	226	240
26 Long Run at State Highway 1531	65	0	90	136	164	180	205	240	250
Dissolved solids, residue at 105°C, in mg/L									
1 Pond Cr at Pendleton Road	91	0	134	238	315	374	450	555	828
2 Mill Cr at Orell Road	86	0	34	159	196	263	384	457	790
3 Pond Cr at Manslick Road	91	0	116	286	333	394	446	557	853
5 SF Beargrass Cr at Winter Avenue	91	0	21	232	290	345	381	408	760
6 SF Beargrass Cr at Trevilian Way	91	0	116	226	291	323	364	405	702
7 MF Beargrass Cr at Old Cannons Lane	91	0	161	250	304	352	390	422	546
8 MF Beargrass Cr at Beals Branch Road	91	0	124	234	292	351	385	421	834
9 Spring Ditch at Private Drive	91	0	36	232	304	394	463	500	602
10 Muddy Fork at Mockingbird Valley Road	90	0	221	355	408	454	500	535	658
11 Goose Cr at U.S. Highway 42	91	0	156	231	292	332	390	437	522
12 Little Goose Cr at U.S. Highway 42	91	0	110	250	306	340	390	448	504
13 Goose Cr at Old Westport Road	90	0	166	226	272	319	382	449	4,210
14 Pope Lick at Pope Lick Road	91	0	133	279	343	399	464	513	875
15 Floyds Fork at former State Highway 155	91	0	199	238	266	305	340	373	1,390
16 Chenoweth Run at Gelhaus Road	89	0	176	306	338	394	444	487	2,240
17 Fern Cr at Old Bardstown Road	90	0	123	305	377	413	470	520	731
18 Northern Ditch at Preston Highway	91	0	121	282	337	401	486	644	1,320
19 Fishpool Cr at Bost Road	90	0	114	286	360	416	462	512	707
20 Southern Ditch at Minors Lane	88	0	160	291	345	401	448	506	612
21 Floyds Fork at Bardstown Road	90	0	164	235	275	310	358	409	1,820
22 Cedar Cr at Thixton Road	91	0	158	273	368	461	555	704	1,480
23 Pennsylvania Run at Mt. Washington Road	92	0	149	217	266	326	427	528	1,740
24 Mill Cr Cutoff at Dover Road	79	0	92	174	243	328	390	449	1,160
25 Harrods Cr at Hunting Cr Drive	89	0	154	232	276	310	356	406	516
26 Long Run at State Highway 1531	64	0	92	205	239	275	298	338	419
Suspended solids, residue at 105°C, in mg/L									
1 Pond Cr at Pendleton Road	91	0	2.0	5.0	8.0	20	52	113	500
2 Mill Cr at Orell Road	86	0	2.0	4.0	7.0	17	31	92	4,350
3 Pond Cr at Manslick Road	91	0	4.0	14	27	48	95	143	1,370
5 SF Beargrass Cr at Winter Avenue	90	0	2.0	6.0	9.7	20	40	71	1,640
6 SF Beargrass Cr at Trevilian Way	91	0	2.0	5.0	8.0	15	28	175	3,030
7 MF Beargrass Cr at Old Cannons Lane	91	0	1.0	3.0	5.0	8.0	16	42	202
8 MF Beargrass Cr at Beals Branch Road	91	0	1.0	4.0	5.0	10	24	65	272
9 Spring Ditch at Private Drive	91	0	1.0	5.2	11	18	36	86	308
10 Muddy Fork at Mockingbird Valley Road	90	0	2.0	5.0	10	18	39	115	442
11 Goose Cr at U.S. Highway 42	91	0	2.0	4.2	7.0	12	29	66	1,080
12 Little Goose Cr at U.S. Highway 42	91	0	3.0	4.4	8.0	17	28	85	928
13 Goose Cr at Old Westport Road	90	0	1.0	6.0	8.9	18	42	118	1,960
14 Pope Lick at Pope Lick Road	92	0	1.0	4.0	7.0	11	20	64	1,250
15 Floyds Fork at former State Highway 155	91	0	2.0	4.2	8.0	16	30	102	1,640
16 Chenoweth Run at Gelhaus Road	89	0	.70	2.0	5.0	8.0	16	48	502
17 Fern Cr at Old Bardstown Road	90	0	1.5	5.0	7.0	13	27	66	810
18 Northern Ditch at Preston Highway	92	0	1.0	4.0	7.0	11	26	56	1,190
19 Fishpool Cr at Bost Road	91	0	1.6	4.8	7.0	12	27	72	1,180
20 Southern Ditch at Minors Lane	90	1	<1.0	5.0	11	19	32	51	1,230
21 Floyds Fork at Bardstown Road	90	1	<1.0	3.1	7.0	15	27	106	302
22 Cedar Cr at Thixton Road	91	1	<1.0	3.0	5.0	7.0	16	42	136
23 Pennsylvania Run at Mt. Washington Road	92	0	1.0	4.0	7.0	14	22	57	552
24 Mill Cr Cutoff at Dover Road	79	0	2.0	4.0	6.0	13	25	42	684
25 Harrods Cr at Hunting Cr Drive	89	0	4.0	10	14	28	45	103	998
26 Long Run at State Highway 1531	65	0	2.0	3.0	5.0	10	20	61	1,390
Residue, volatile nonfilterable, in mg/L									
1 Pond Cr at Pendleton Road	91	2	<1.0	2.0	3.0	5.0	10	32	326
2 Mill Cr at Orell Road	86	4	<.10	1.0	2.0	4.1	11	26	510
3 Pond Cr at Manslick Road	91	3	<1.0	2.0	4.0	9.0	20	59	556
5 SF Beargrass Cr at Winter Avenue	90	4	<1.0	1.0	4.0	6.0	16	33	382
6 SF Beargrass Cr at Trevilian Way	91	3	<1.0	1.0	2.7	5.0	12	31	308

Table 13. Statistical summary of constituent concentrations in streams in Jefferson County, Kentucky, 1988-92--Continued

[N, number of observations; Cr, Creek; SF, South Fork; MF, Middle Fork; mg/L, milligrams per liter; °C, degrees Celsius; µg/L, micrograms per liter; ---, missing; <, less than; *, value estimated from log-normal fit program; percentiles not computed if fewer than 10 observations; the 10th and 90th percentiles are not shown if fewer than 30 observations]

Site number and name	N	N of censored data values	Minimum	Value at indicated percentile 10	25	50 (median)	75	90	Maximum
Residue, volatile nonfilterable, in mg/L--Continued									
7 MF Beargrass Cr at Old Cannons Lane	91	6	<1.0	1.0	2.0	4.0	7.0	20	331
8 MF Beargrass Cr at Beals Branch Road	91	4	<1.0	1.0	2.0	4.0	9.0	19	114
9 Spring Ditch at Private Drive	91	2	<1.0	1.4	3.0	7.0	14	27	96
10 Muddy Fork at Mockingbird Valley Road	90	3	<1.0	2.0	3.0	6.0	11	17	144
11 Goose Cr at U.S. Highway 42	91	3	<.10	1.0	2.0	4.0	8.0	25	88
12 Little Goose Cr at U.S. Highway 42	91	2	<.10	1.0	2.0	4.0	9.0	20	435
13 Goose Cr at Old Westport Road	90	2	<.10	1.0	4.0	6.0	14	24	310
14 Pope Lick at Pope Lick Road	92	1	<1.0	1.0	2.0	4.0	7.0	16	190
15 Floyds Fork at former State Highway 155	91	4	<.10	1.0	2.0	4.0	11	32	134
16 Chenoweth Run at Gelhaus Road	89	7	<.10	.40*	2.0	4.0	7.5	18	348
17 Fern Cr at Old Bardstown Road	90	6	<1.0	1.0	2.0	5.0	9.2	24	232
18 Northern Ditch at Preston Highway	92	4	<.10	1.0	2.0	4.0	8.0	19	136
19 Fishpool Cr at Bost Road	91	3	<.10	1.0	2.0	5.0	10	21	138
20 Southern Ditch at Minors Lane	90	3	<.10	1.0	2.0	5.0	10	18	968
21 Floyds Fork at Bardstown Road	90	5	<.10	1.0	2.0	4.0	9.0	20	116
22 Cedar Cr at Thixton Road	91	10	<.10	.70*	2.0	4.0	6.0	12	90
23 Pennsylvania Run at Mt. Washington Road	92	3	<.10	1.0	2.0	4.5	8.7	15	79
24 Mill Cr Cutoff at Dover Road	79	1	<1.0	1.0	2.0	4.0	9.0	18	156
25 Harrods Cr at Hunting Cr Drive	89	2	<.10	1.5	3.0	6.0	11	20	534
26 Long Run at State Highway 1531	65	2	<1.0	1.0	2.0	4.0	7.0	15	152
Suspended solids, nonvolatile, in mg/L									
1 Pond Cr at Pendleton Road	20	0	1.0	---	2.2	6.5	22	---	214
2 Mill Cr at Orell Road	21	0	1.0	---	2.0	3.0	8.0	---	106
3 Pond Cr at Manslick Road	21	0	1.0	---	9.0	22	44	---	280
5 SF Beargrass Cr at Winter Avenue	20	0	<5.0	---	5.0	10	19	---	110
6 SF Beargrass Cr at Trevilian Way	20	0	<3.0	---	3.0	7.5	15	---	70
7 MF Beargrass Cr at Old Cannons Lane	20	0	1.0	---	1.0	2.5	6.7	---	24
8 MF Beargrass Cr at Beals Branch Road	21	0	1.0	---	2.0	3.0	6.0	---	101
9 Spring Ditch at Private Drive	20	0	2.0	---	4.0	7.0	10	---	19
10 Muddy Fork at Mockingbird Valley Road	19	0	1.0	---	3.0	8.0	12	---	131
11 Goose Cr at U.S. Highway 42	20	0	1.0	---	3.2	5.5	8.0	---	115
12 Little Goose Cr at U.S. Highway 42	20	0	2.0	---	3.0	5.5	15	---	176
13 Goose Cr at Old Westport Road	20	0	3.0	---	7.5	16	42	---	250
14 Pope Lick at Pope Lick Road	20	0	<3.0	---	3.0	4.5	16	---	61
15 Floyds Fork at former State Highway 155	20	0	1.0	---	2.2	8.0	19	---	160
16 Chenoweth Run at Gelhaus Road	19	0	<1.0	---	1.0	3.0	4.0	---	8.0
17 Fern Cr at Old Bardstown Road	20	0	2.0	---	3.0	4.5	11	---	352
18 Northern Ditch at Preston Highway	21	0	1.0	---	2.0	4.0	6.5	---	26
19 Fishpool Cr at Bost Road	19	0	2.0	---	3.0	5.0	10	---	54
20 Southern Ditch at Minors Lane	20	0	2.0	---	4.0	8.5	16	---	594
21 Floyds Fork at Bardstown Road	19	0	<5.0	---	5.0	9.0	38	---	210
22 Cedar Cr at Thixton Road	20	0	<2.0	---	2.0	5.0	12	---	110
23 Pennsylvania Run at Mt. Washington Road	20	0	1.0	---	2.1	4.0	7.0	---	54
24 Mill Cr Cutoff at Dover Road	19	0	1.0	---	3.0	4.0	9.0	---	628
25 Harrods Cr at Hunting Cr Drive	21	0	2.0	---	5.5	12	26	---	916
26 Long Run at State Highway 1531	14	0	1.0	---	1.0	2.5	5.0	---	60
Nitrogen, nitrate, total, in mg/L as N									
1 Pond Cr at Pendleton Road	91	2	<.10	.60	1.3	2.0	3.2	4.3	8.6
2 Mill Cr at Orell Road	85	4	<.10	.11	.23	.52	1.4	2.6	12
3 Pond Cr at Manslick Road	91	3	<.10	.89	1.5	2.1	3.0	4.9	11
5 SF Beargrass Cr at Winter Avenue	89	3	<.10	.57	1.0	1.4	2.1	3.2	6.8
6 SF Beargrass Cr at Trevilian Way	89	3	<.10	.66	.96	1.5	2.3	3.5	7.6
7 MF Beargrass Cr at Old Cannons Lane	90	4	<.10	.62	1.5	2.2	3.0	4.4	13
8 MF Beargrass Cr at Beals Branch Road	91	4	<.10	.75	1.2	1.9	2.8	4.3	6.0
9 Spring Ditch at Private Drive	91	3	<.10	.48	1.1	2.0	3.0	4.0	6.1
10 Muddy Fork at Mockingbird Valley Road	89	3	<.10	1.7	2.8	4.3	5.8	9.0	17
11 Goose Cr at U.S. Highway 42	90	0	.57	1.7	2.5	3.6	4.6	5.8	13
12 Little Goose Cr at U.S. Highway 42	89	0	.37	2.2	3.2	4.0	5.4	6.4	11
13 Goose Cr at Old Westport Road	89	0	.15	1.2	2.4	3.3	4.1	6.3	13
14 Pope Lick at Pope Lick Road	92	1	<.10	1.1	2.1	3.1	6.1	10	15
15 Floyds Fork at former State Highway 155	90	3	<.10	.27	.49	.91	1.8	3.2	9.6
16 Chenoweth Run at Gelhaus Road	89	0	.14	1.3	2.1	3.7	5.7	11	21
17 Fern Cr at Old Bardstown Road	90	2	<.10	1.7	2.8	4.5	7.7	14	33
18 Northern Ditch at Preston Highway	92	4	<.10	1.2	2.2	3.5	6.2	13	24
19 Fishpool Cr at Bost Road	91	3	<.10	.87	1.7	2.8	4.0	6.3	15
20 Southern Ditch at Minors Lane	91	3	<.10	.62	1.0	1.9	3.1	4.4	11
21 Floyds Fork at Bardstown Road	90	3	<.10	.33	.82	1.3	1.8	3.2	9.1
22 Cedar Cr at Thixton Road	92	0	.11	1.2	1.9	2.9	4.4	10	19
23 Pennsylvania Run at Mt. Washington Road	92	1	<.10	.83	1.6	2.8	6.2	13	20
24 Mill Cr Cutoff at Dover Road	77	0	.15	.55	1.1	1.9	3.7	5.7	11
25 Harrods Cr at Hunting Cr Drive	88	0	.19	.79	1.2	1.7	2.3	3.5	10
26 Long Run at State Highway 1531	65	4	<.10	.11	.24	.54	1.2	1.7	5.3

Table 13. Statistical summary of constituent concentrations in streams in Jefferson County, Kentucky, 1988-92--Continued

[N, number of observations; Cr, Creek; SF, South Fork; MF, Middle Fork; mg/L, milligrams per liter; °C, degrees Celsius; µg/L, micrograms per liter; ---, missing; <, less than; *, value estimated from log-normal fit program; percentiles not computed if fewer than 10 observations; the 10th and 90th percentiles are not shown if fewer than 30 observations]

Site number and name	N	N of censored data values	Minimum	Value at indicated percentile 10	25	50 (median)	75	90	Maximum
Nitrogen, nitrite, total, in mg/L as N									
1 Pond Cr at Pendleton Road	91	2	<0.01	0.01	0.03	0.06	0.08	0.12	0.57
2 Mill Cr at Orell Road	86	22	<.01	<.01*	.01*	.02	.04	.08	6.0
3 Pond Cr at Manslick Road	91	0	.01	.04	.06	.08	.12	.20	1.1
5 SF Beargrass Cr at Winter Avenue	90	3	<.01	.02	.03	.06	.08	.11	.14
6 SF Beargrass Cr at Trevilian Way	90	3	<.01	.01	.02	.05	.06	.08	.43
7 MF Beargrass Cr at Old Cannons Lane	90	14	<.01	.01*	.01	.02	.03	.05	.21
8 MF Beargrass Cr at Beals Branch Road	91	11	<.01	.01*	.01	.02	.03	.05	.30
9 Spring Ditch at Private Drive	91	3	<.01	.02	.03	.04	.06	.10	.71
10 Muddy Fork at Mockingbird Valley Road	90	1	<.01	.02	.02	.04	.06	.09	.58
11 Goose Cr at U.S. Highway 42	91	13	<.01	.01*	.01	.03	.05	.10	1.5
12 Little Goose Cr at U.S. Highway 42	91	8	<.01	.01*	.01	.03	.04	.09	.37
13 Goose Cr at Old Westport Road	90	3	<.01	.02	.03	.05	.11	.27	.45
14 Pope Lick at Pope Lick Road	92	0	.01	.03	.05	.07	.12	.23	1.3
15 Floyds Fork at former State Highway 155	91	17	<.01	.01*	.01	.02	.04	.06	.31
16 Chenoweth Run at Gelhaus Road	90	5	<.01	.01	.03	.07	.19	.32	.45
17 Fern Cr at Old Bardstown Road	91	2	<.01	.02	.03	.05	.10	.22	1.8
18 Northern Ditch at Preston Highway	92	0	.01	.03	.04	.07	.12	.23	.71
19 Fishpool Cr at Bost Road	91	5	<.01	.02	.04	.06	.13	.21	.91
20 Southern Ditch at Minors Lane	91	1	<.01	.02	.04	.07	.11	.15	.36
21 Floyds Fork at Bardstown Road	90	12	<.01	.01*	.01	.02	.03	.09	.17
22 Cedar Cr at Thixton Road	92	7	<.01	.01	.01	.03	.05	.08	.35
23 Pennsylvania Run at Mt. Washington Road	92	2	<.01	.02	.04	.08	.18	.28	.81
24 Mill Cr Cutoff at Dover Road	79	10	<.01	.01*	.03	.06	.11	.21	.90
25 Harrods Cr at Hunting Cr Drive	89	13	<.01	.01*	.01	.02	.04	.06	1.5
26 Long Run at State Highway 1531	67	23	<.01	<.01*	.01*	.01	.02	.04	.24
Nitrogen, ammonia, total, in mg/L as N									
1 Pond Cr at Pendleton Road	89	28	<.01	<.01*	.01*	.11	.28	.49	1.1
2 Mill Cr at Orell Road	84	35	<.01	<.01*	.01*	.04	.11	.18	.70
3 Pond Cr at Manslick Road	89	23	<.01	.01*	.02*	.25	.45	.62	5.3
5 SF Beargrass Cr at Winter Avenue	89	25	<.01	<.01*	.02*	.17	.32	.56	2.4
6 SF Beargrass Cr at Trevilian Way	89	22	<.01	.01*	.02*	.22	.34	.73	5.6
7 MF Beargrass Cr at Old Cannons Lane	89	39	<.01	<.01*	<.01*	.04	.11	.22	4.5
8 MF Beargrass Cr at Beals Branch Road	90	40	<.01	<.01*	<.01*	.04	.11	.28	4.6
9 Spring Ditch at Private Drive	88	32	<.01	<.01*	.01*	.10	.34	.50	.95
10 Muddy Fork at Mockingbird Valley Road	89	38	<.01	<.01*	<.01*	.06	.14	.22	.64
11 Goose Cr at U.S. Highway 42	91	43	<.01	<.01*	<.01*	.04	.11	.42	3.2
12 Little Goose Cr at U.S. Highway 42	90	43	<.01	<.01*	<.01*	.02	.09	.20	.71
13 Goose Cr at Old Westport Road	89	35	<.01	<.01*	.01*	.10	.45	.78	1.3
14 Pope Lick at Pope Lick Road	92	27	<.01	<.01*	.01*	.13	.33	.77	3.5
15 Floyds Fork at former State Highway 155	91	39	<.01	<.01*	<.01*	.04	.09	.37	6.6
16 Chenoweth Run at Gelhaus Road	88	31	<.01	<.01*	.01*	.09	.36	.76	6.8
17 Fern Cr at Old Bardstown Road	89	25	<.01	<.01*	.01*	.11	.32	.67	1.8
18 Northern Ditch at Preston Highway	89	28	<.01	<.01*	.01*	.16	.42	1.6	9.1
19 Fishpool Cr at Bost Road	88	33	<.01	<.01*	.01*	.07	.22	.45	.98
20 Southern Ditch at Minors Lane	88	29	<.01	<.01*	.01*	.11	.24	.45	3.6
21 Floyds Fork at Bardstown Road	90	36	<.01	<.01*	.01*	.06	.11	.35	2.3
22 Cedar Cr at Thixton Road	91	40	<.01	<.01*	<.01*	.06	.12	.38	4.0
23 Pennsylvania Run at Mt. Washington Road	90	20	<.01	.01*	.04	.20	.39	.69	2.8
24 Mill Cr Cutoff at Dover Road	78	33	<.01	<.01*	<.01*	.06	.22	.66	3.4
25 Harrods Cr at Hunting Cr Drive	89	46	<.01	<.01*	<.01*	.01*	.10	.19	.78
26 Long Run at State Highway 1531	65	35	<.01	<.01*	<.01*	.01*	.08	.24	1.4
Nitrogen, organic, dissolved, in mg/L									
1 Pond Cr at Pendleton Road	91	14	<.05	.06*	.24	.51	.70	1.1	1.8
2 Mill Cr at Orell Road	87	12	<.05	.04*	.11	.31	.67	.97	6.9
3 Pond Cr at Manslick Ro	91	13	<.05	.09*	.40	.67	.90	1.3	2.5
5 SF Beargrass Cr at Winter Avenue	92	16	<.05	.06*	.22	.47	.78	1.2	2.0
6 SF Beargrass Cr at Trevilian Way	92	16	<.05	.05*	.22	.39	.67	1.0	2.5
7 MF Beargrass Cr at Old Cannons Lane	92	23	<.05	.03*	.06*	.32	.48	.89	3.5
8 MF Beargrass Cr at Beals Branch Road	93	25	<.05	.02*	.06*	.28	.51	.86	3.1
9 Spring Ditch at Private Drive	91	13	<.05	.06*	.19	.64	.91	1.3	2.9
10 Muddy Fork at Mockingbird Valley Road	91	21	<.05	.03*	.07*	.31	.56	.75	4.0
11 Goose Cr at U.S. Highway 42	91	22	<.05	.03*	.08*	.43	.56	.86	6.9
12 Little Goose Cr at U.S. Highway 42	90	21	<.05	.03*	.07*	.39	.62	.90	2.7
13 Goose Cr at Old Westport Road	91	20	<.05	.04*	.13	.65	.95	1.4	4.8
14 Pope Lick at Pope Lick Road	93	10	<.05	.10*	.32	.60	.78	1.2	3.6
15 Floyds Fork at former State Highway 155	91	11	<.05	.07*	.17	.44	.73	1.0	3.4
16 Chenoweth Run at Gelhaus Road	91	20	<.05	.03*	.09*	.45	.80	1.2	3.9
17 Fern Cr at Old Bardstown Road	92	12	<.05	.07*	.20	.50	.84	1.2	4.2
18 Northern Ditch at Preston Highway	92	15	<.05	.05*	.11	.62	.95	1.5	4.8
19 Fishpool Cr at Bost Road	90	13	<.05	.07*	.22	.62	.84	1.3	1.8
20 Southern Ditch at Minors Lane	91	14	<.05	.06*	.17	.64	.84	1.1	1.9
21 Floyds Fork at Bardstown Road	90	13	<.05	.07*	.22	.50	.84	1.1	1.3
22 Cedar Cr at Thixton Road	93	10	<.05	.09*	.26	.50	.73	1.1	2.0

Table 13. Statistical summary of constituent concentrations in streams in Jefferson County, Kentucky, 1988-92--Continued

[N, number of observations; Cr, Creek; SF, South Fork; MF, Middle Fork; mg/L, milligrams per liter; °C, degrees Celsius; µg/L, micrograms per liter; ---, missing; <, less than; *, value estimated from log-normal fit program; percentiles not computed if fewer than 10 observations; the 10th and 90th percentiles are not shown if fewer than 30 observations]

Site number and name	N	N of censored data values	Minimum	Value at indicated percentile 10	25	50 (median)	75	90	Maximum
Nitrogen, organic, dissolved, in mg/L--Continued									
23 Pennsylvania Run at Mt. Washington Road	92	16	<0.05	0.06*	0.22	0.65	0.90	1.4	2.6
24 Mill Cr Cutoff at Dover Road	80	14	<.05	.06*	.22	.62	.95	1.3	3.4
25 Harrods Cr at Hunting Cr Drive	90	13	<.05	.06*	.12	.42	.65	1.0	2.5
26 Long Run at State Highway 1531	66	8	<.05	.07*	.18	.39	.67	.88	3.4
Phosphate, total, in mg/L as PO_4									
1 Pond Cr at Pendleton Road	91	0	.34	.86	1.1	1.7	3.0	4.2	14
2 Mill Cr at Orell Road	84	0	.03	.20	.28	.49	.86	1.6	2.9
3 Pond Cr at Manslick Road	91	0	.34	.93	1.3	2.2	3.5	4.5	16
5 SF Beargrass Cr at Winter Avenue	90	0	.03	.09	.15	.25	.47	1.2	3.2
6 SF Beargrass Cr at Trevilian Way	89	0	.03	.06	.09	.18	.25	.61	10
7 MF Beargrass Cr at Old Cannons Lane	85	0	.03	.06	.12	.22	.31	.64	7.3
8 MF Beargrass Cr at Beals Branch Road	87	0	.03	.09	.15	.28	.46	.71	1.8
9 Spring Ditch at Private Drive	88	0	.03	.80	1.2	1.8	2.7	4.2	9.2
10 Muddy Fork at Mockingbird Valley Road	89	0	.12	.64	1.2	2.0	3.9	4.6	16
11 Goose Cr at U.S. Highway 42	90	0	.15	.75	1.4	2.8	4.0	5.1	13
12 Little Goose Cr at U.S. Highway 42	91	0	.25	.55	1.2	2.4	3.8	5.4	11
13 Goose Cr at Old Westport Road	89	0	.15	.71	1.3	2.7	4.4	6.0	12
14 Pope Lick at Pope Lick Road	91	0	.09	.75	1.2	3.1	4.3	6.3	26
15 Floyds Fork at former State Highway 155	90	0	.03	.13	.22	.35	.58	1.1	3.6
16 Chenoweth Run at Gelhaus Road	87	0	.46	1.1	2.2	3.7	5.5	7.7	23
17 Fern Cr at Old Bardstown Road	90	0	.15	1.2	1.8	3.5	5.4	7.2	24
18 Northern Ditch at Preston Highway	89	0	.18	.95	2.0	3.6	4.3	6.8	17
19 Fishpool Cr at Bost Road	89	0	.15	.86	1.5	3.1	4.1	5.2	14
20 Southern Ditch at Minors Lane	90	0	.06	.80	1.3	2.4	3.5	4.4	14
21 Floyds Fork at Bardstown Road	89	0	.09	.31	.48	.86	1.6	3.4	13
22 Cedar Cr at Thixton Road	91	0	.31	.83	1.4	2.7	4.2	5.3	15
23 Pennsylvania Run at Mt. Washington Road	91	0	.22	.56	1.1	2.7	4.9	6.1	23
24 Mill Cr Cutoff at Dover Road	78	0	.09	.49	1.2	1.8	3.4	4.6	11
25 Harrods Cr at Hunting Cr Drive	88	0	.03	.18	.31	.63	1.4	2.2	5.2
26 Long Run at State Highway 1531	64	0	.03	.06	.09	.18	.43	.86	14
Phosphorus, total, in mg/L as P									
1 Pond Cr at Pendleton Road	88	0	.12	.33	.39	.59	1.1	2.0	7.4
2 Mill Cr at Orell Road	83	1	<.01	.08	.11	.20	.37	.84	2.5
3 Pond Cr at Manslick Road	86	0	.11	.37	.50	.77	1.2	2.1	9.1
5 SF Beargrass Cr at Winter Avenue	89	0	.02	.05	.08	.12	.24	.65	1.9
6 SF Beargrass Cr at Trevilian Way	87	0	.02	.03	.07	.08	.13	.28	3.7
7 MF Beargrass Cr at Old Cannons Lane	88	0	.01	.04	.06	.10	.16	.34	1.7
8 MF Beargrass Cr at Beals Branch Road	89	0	.02	.04	.08	.13	.23	.40	1.6
9 Spring Ditch at Private Drive	86	0	.11	.34	.51	.67	1.1	1.9	4.1
10 Muddy Fork at Mockingbird Valley Road	88	0	.13	.30	.48	.86	1.7	2.3	18
11 Goose Cr at U.S. Highway 42	88	0	.15	.28	.56	1.1	1.8	2.1	6.1
12 Little Goose Cr at U.S. Highway 42	88	0	.09	.24	.45	.96	1.5	2.5	7.2
13 Goose Cr at Old Westport Road	89	0	.12	.33	.56	1.2	2.0	2.7	5.8
14 Pope Lick at Pope Lick Road	88	0	.09	.34	.52	1.2	2.1	2.8	9.8
15 Floyds Fork at former State Highway 155	86	0	.03	.07	.11	.17	.28	.48	1.5
16 Chenoweth Run at Gelhaus Road	86	0	.15	.34	.80	1.6	2.6	3.5	12
17 Fern Cr at Old Bardstown Road	89	0	.19	.58	.75	1.7	2.6	3.5	32
18 Northern Ditch at Preston Highway	89	0	.14	.47	.79	1.4	2.1	3.1	9.9
19 Fishpool Cr at Bost Road	87	0	.09	.35	.58	1.1	1.7	2.4	6.8
20 Southern Ditch at Minors Lane	89	0	.10	.32	.52	.90	1.6	2.0	6.8
21 Floyds Fork at Bardstown Road	86	0	.05	.13	.23	.35	.79	1.3	5.8
22 Cedar Cr at Thixton Road	89	0	.12	.33	.58	1.0	1.8	2.6	6.0
23 Pennsylvania Run at Mt. Washington Road	90	0	.15	.22	.46	1.0	2.2	2.7	8.0
24 Mill Cr Cutoff at Dover Road	78	0	.05	.21	.47	.74	1.3	2.2	10
25 Harrods Cr at Hunting Cr Drive	87	0	.03	.09	.13	.26	.55	1.0	2.6
26 Long Run at State Highway 1531	65	0	.03	.04	.06	.11	.22	.58	5.9
Phosphorus, orthophosphate, total, in mg/L as P									
1 Pond Cr at Pendleton Road	91	0	.11	.28	.35	.54	.97	1.4	4.5
2 Mill Cr at Orell Road	85	1	<.01	.06	.09	.16	.28	.53	.96
3 Pond Cr at Manslick Road	91	0	.11	.30	.44	.73	1.1	1.5	5.2
5 SF Beargrass Cr at Winter Avenue	90	0	.01	.03	.05	.08	.15	.39	1.0
6 SF Beargrass Cr at Trevilian Way	90	1	<.01	.01	.03	.05	.08	.20	3.3
7 MF Beargrass Cr at Old Cannons Lane	89	4	<.01	.01	.03	.06	.10	.20	2.4
8 MF Beargrass Cr at Beals Branch Road	90	3	<.01	.02	.05	.08	.14	.23	.59
9 Spring Ditch at Private Drive	90	2	<.01	.21	.37	.60	.88	1.3	3.0
10 Muddy Fork at Mockingbird Valley Road	89	0	.04	.21	.40	.67	1.3	1.5	5.3
11 Goose Cr at U.S. Highway 42	90	0	.05	.24	.46	.90	1.3	1.7	4.2
12 Little Goose Cr at U.S. Highway 42	91	0	.08	.18	.39	.80	1.2	1.8	3.7
13 Goose Cr at Old Westport Road	89	0	.05	.23	.42	.89	1.4	2.0	4.0
14 Pope Lick at Pope Lick Road	91	0	.03	.24	.39	1.0	1.4	2.1	8.6

Table 13. Statistical summary of constituent concentrations in streams in Jefferson County, Kentucky, 1988-92--Continued

[N, number of observations; Cr, Creek; SF, South Fork; MF, Middle Fork; mg/L, milligrams per liter; °C, degrees Celsius; µg/L, micrograms per liter; ---, missing; <, less than; *, value estimated from log-normal fit program; percentiles not computed if fewer than 10 observations; the 10th and 90th percentiles are not shown if fewer than 30 observations]

Site number and name	N	N of censored data values	Minimum	Value at indicated percentile 10	25	50 (median)	75	90	Maximum
Phosphorus, orthophosphate, total, in mg/L as P--Continued									
15 Floyds Fork at former State Highway 155	90	0	0.01	0.04	0.07	0.11	0.19	0.36	1.2
16 Chenoweth Run at Gelhaus Road	87	0	.15	.35	.71	1.2	1.8	2.5	7.5
17 Fern Cr at Old Bardstown Road	90	0	.05	.38	.59	1.2	1.8	2.4	7.8
18 Northern Ditch at Preston Highway	90	1	<.01	.29	.65	1.2	1.4	2.3	5.4
19 Fishpool Cr at Bost Road	90	1	<.01	.27	.46	1.0	1.3	1.7	4.7
20 Southern Ditch at Minors Lane	91	1	<.01	.24	.43	.77	1.1	1.4	4.5
21 Floyds Fork at Bardstown Road	89	0	.03	.10	.16	.28	.52	1.1	4.4
22 Cedar Cr at Thixton Road	91	0	.10	.27	.47	.87	1.4	1.7	4.9
23 Pennsylvania Run at Mt. Washington Road	91	0	.07	.18	.35	.87	1.6	2.0	7.4
24 Mill Cr Cutoff at Dover Road	78	0	.03	.16	.38	.60	1.1	1.5	3.6
25 Harrods Cr at Hunting Cr Drive	88	0	.01	.06	.10	.20	.45	.72	1.7
26 Long Run at State Highway 1531	65	1	<.01	.02	.03	.06	.14	.28	4.6
Arsenic, total, in µg/L as As									
1 Pond Cr at Pendleton Road	18	13	<5.0	---	3.7*	4.3*	5.0	---	7.0
2 Mill Cr at Orell Road	15	14	<5.0	---	<5.0	<5.0	<5.0	---	6.0
3 Pond Cr at Manslick Road	18	13	<5.0	---	3.5*	4.2*	5.0	---	7.0
5 SF Beargrass Cr at Winter Avenue	16	16	<5.0	---	<5.0	<5.0	<5.0	---	<5.0
6 SF Beargrass Cr at Trevilian Way	16	16	<5.0	---	<5.0	<5.0	<5.0	---	<5.0
7 MF Beargrass Cr at Old Cannons Lane	16	16	<5.0	---	<5.0	<5.0	<5.0	---	<5.0
8 MF Beargrass Cr at Beals Branch Road	16	15	<5.0	---	<5.0	<5.0	<5.0	---	11
9 Spring Ditch at Private Drive	17	17	<5.0	---	<5.0	<5.0	<5.0	---	<5.0
10 Muddy Fork at Mockingbird Valley Road	17	16	<5.0	---	<5.0	<5.0	<5.0	---	9.0
11 Goose Cr at U.S. Highway 42	16	15	<5.0	---	<5.0	<5.0	<5.0	---	5.0
12 Little Goose Cr at U.S. Highway 42	16	15	<5.0	---	<5.0	<5.0	<5.0	---	12
13 Goose Cr at Old Westport Road	16	15	<5.0	---	<5.0	<5.0	<5.0	---	6.0
14 Pope Lick at Pope Lick Road	18	17	<5.0	---	<5.0	<5.0	<5.0	---	22
15 Floyds Fork at former State Highway 155	18	18	<5.0	---	<5.0	<5.0	<5.0	---	<5.0
16 Chenoweth Run at Gelhaus Road	18	18	<5.0	---	<5.0	<5.0	<5.0	---	<5.0
17 Fern Cr at Old Bardstown Road	17	15	<5.0	---	<5.0	<5.0	<5.0	---	19
18 Northern Ditch at Preston Highway	17	17	<5.0	---	<5.0	<5.0	<5.0	---	<10
19 Fishpool Cr at Bost Road	16	12	<5.0	---	<5.0	<5.0	<5.0	---	17
20 Southern Ditch at Minors Lane	16	15	<5.0	---	<5.0	<5.0	<5.0	---	28
21 Floyds Fork at Bardstown Road	17	17	<5.0	---	<5.0	<5.0	<5.0	---	<5.0
22 Cedar Cr at Thixton Road	17	17	<5.0	---	<5.0	<5.0	<5.0	---	<5.0
23 Pennsylvania Run at Mt. Washington Road	17	16	<5.0	---	<5.0	<5.0	<5.0	---	10
24 Mill Cr Cutoff at Dover Road	15	12	<5.0	---	<5.0	<5.0	<5.0	---	13
25 Harrods Cr at Hunting Cr Drive	16	15	<5.0	---	<5.0	<5.0	<5.0	---	7.0
26 Long Run at State Highway 1531	12	12	<5.0	---	<5.0	<5.0	<5.0	---	<5.0
Barium, total, in µg/L as Ba									
1 Pond Cr at Pendleton Road	18	0	12	---	40	43	49	---	60
2 Mill Cr at Orell Road	15	0	16	---	38	44	59	---	68
3 Pond Cr at Manslick Road	18	0	29	---	42	50	58	---	66
5 SF Beargrass Cr at Winter Avenue	16	0	38	---	48	54	63	---	87
6 SF Beargrass Cr at Trevilian Way	16	0	38	---	54	57	61	---	73
7 MF Beargrass Cr at Old Cannons Lane	16	0	37	---	44	52	56	---	67
8 MF Beargrass Cr at Beals Branch Road	16	0	36	---	43	52	57	---	70
9 Spring Ditch at Private Drive	16	0	24	---	38	42	45	---	53
10 Muddy Fork at Mockingbird Valley Road	17	0	35	---	44	48	55	---	86
11 Goose Cr at U.S. Highway 42	16	0	20	---	37	42	50	---	64
12 Little Goose Cr at U.S. Highway 42	16	0	19	---	40	47	52	---	86
13 Goose Cr at Old Westport Road	16	0	28	---	36	43	56	---	85
14 Pope Lick at Pope Lick Road	18	1	<2.0	---	34	41	47	---	56
15 Floyds Fork at former State Highway 155	18	0	10	---	29	38	50	---	60
16 Chenoweth Run at Gelhaus Road	18	0	10	---	31	37	43	---	110
17 Fern Cr at Old Bardstown Road	17	0	37	---	42	45	51	---	628
18 Northern Ditch at Preston Highway	16	0	24	---	39	40	45	---	64
19 Fishpool Cr at Bost Road	16	0	7.0	---	36	45	49	---	54
20 Southern Ditch at Minors Lane	16	0	26	---	32	42	47	---	56
21 Floyds Fork at Bardstown Road	17	0	29	---	35	42	48	---	57
22 Cedar Cr at Thixton Road	17	0	20	---	29	37	45	---	57
23 Pennsylvania Run at Mt. Washington Road	17	0	30	---	33	35	46	---	72
24 Mill Cr Cutoff at Dover Road	15	0	16	---	22	25	27	---	32
25 Harrods Cr at Hunting Cr Drive	16	0	9.0	---	39	51	62	---	157
26 Long Run at State Highway 1531	12	0	22	---	24	29	40	---	177
Beryllium, total, in µg/L as Be									
1 Pond Cr at Pendleton Road	17	16	<.20	---	<.50	<.60	<1.0	---	.60
2 Mill Cr at Orell Road	15	14	<.20	---	<.50	<.50	<1.0	---	1.0
3 Pond Cr at Manslick Road	18	18	<.20	---	<.40	<.50	<1.0	---	<1.0
5 SF Beargrass Cr at Winter Avenue	16	15	<.20	---	<.40	<.50	<1.0	---	.30
6 SF Beargrass Cr at Trevilian Way	16	15	<.20	---	<.40	<.50	<1.0	---	1.7
7 MF Beargrass Cr at Old Cannons Lane	16	15	<.20	---	<.50	<.50	<1.0	---	.60

Table 13. Statistical summary of constituent concentrations in streams in Jefferson County, Kentucky, 1988-92--Continued

[N, number of observations; Cr, Creek; SF, South Fork; MF, Middle Fork; mg/L, milligrams per liter; °C, degrees Celsius; µg/L, micrograms per liter; ---, missing; <, less than; *, value estimated from log-normal fit program; percentiles not computed if fewer than 10 observations; the 10th and 90th percentiles are not shown if fewer than 30 observations]

Site number and name	N	N of censored data values	Minimum	Value at indicated percentile 10	25	50 (median)	75	90	Maximum
Beryllium, total, in µg/L as Be--Continued									
8 MF Beargrass Cr at Beals Branch Road	16	15	<0.20	---	<0.50	<0.50	<1.0	---	0.20
9 Spring Ditch at Private Drive	16	13	<.20	---	.03*	.10*	.33*	---	3.5
10 Muddy Fork at Mockingbird Valley Road	17	17	<.20	---	<.50	<.50	<.90	---	<1.0
11 Goose Cr at U.S. Highway 42	10	8	<.20	---	<.40	<.50	<.60	---	.70
12 Little Goose Cr at U.S. Highway 42	12	9	<.20	---	.14*	.22*	.36*	---	1.0
13 Goose Cr at Old Westport Road	16	15	<.20	---	<.40	<.50	<1.0	---	.60
14 Pope Lick at Pope Lick Road	11	8	<.20	---	.11*	.19*	.33*	---	.70
15 Floyds Fork at former State Highway 155	18	18	<.20	---	<.50	<.50	<1.0	---	<1.0
16 Chenoweth Run at Gelhaus Road	18	17	<.20	---	<.50	<.60	<1.0	---	.50
17 Fern Cr at Old Bardstown Road	17	14	<.20	---	.03*	.09*	.28*	---	3.4
18 Northern Ditch at Preston Highway	12	10	<.20	---	<.50	<.50	<.50	---	.90
19 Fishpool Cr at Bost Road	16	16	<.20	---	<.40	<.50	<.90	---	<1.0
20 Southern Ditch at Minors Lane	12	10	<.20	---	<.20	<.50	<.60	---	1.0
21 Floyds Fork at Bardstown Road	17	16	<.20	---	<.50	<.50	<1.0	---	.90
22 Cedar Cr at Thixton Road	17	16	<.20	---	<.50	<.50	<1.0	---	.90
23 Pennsylvania Run at Mt. Washington Road	12	10	<.20	---	<.20	<.50	<.50	---	.60
24 Mill Cr Cutoff at Dover Road	12	10	<.20	---	<.20	<.50	<.90	---	1.0
25 Harrods Cr at Hunting Cr Drive	16	12	<.20	---	.09*	.20*	.44*	---	1.3
26 Long Run at State Highway 1531	12	11	<.20	---	<.50	<.50	<1.0		
Cadmium, total, in µg/L as Cd									
1 Pond Cr at Pendleton Road	18	17	<2.0	---	<4.0	<6.4	<9.0	---	3.0
2 Mill Cr at Orell Road	15	14	<2.0	---	<4.0	<6.0	<9.0	---	10
3 Pond Cr at Manslick Road	18	16	<2.0	---	<5.0	<6.0	<9.0	---	11
5 SF Beargrass Cr at Winter Avenue	16	16	<2.0	---	<4.0	<6.0	<6.9	---	<9.0
6 SF Beargrass Cr at Trevilian Way	16	16	<2.0	---	<4.0	<6.0	<6.4	---	<9.0
7 MF Beargrass Cr at Old Cannons Lane	16	16	<2.0	---	<4.0	<6.0	<6.4	---	<9.0
8 MF Beargrass Cr at Beals Branch Road	16	15	<2.0	---	<4.0	<6.0	<6.4	---	16
9 Spring Ditch at Private Drive	16	16	<2.0	---	<4.0	<6.0	<6.4	---	<9.0
10 Muddy Fork at Mockingbird Valley Road	17	17	<2.0	---	<4.0	<6.0	<6.9	---	<9.0
11 Goose Cr at U.S. Highway 42	16	16	<2.0	---	<4.0	<6.0	<6.9	---	<9.0
12 Little Goose Cr at U.S. Highway 42	16	15	<2.0	---	<4.0	<6.0	<9.0	---	4.0
13 Goose Cr at Old Westport Road	10	9	<1.0	---	<4.0	<9.0	<9.0	---	6.0
14 Pope Lick at Pope Lick Road	18	18	<2.0	---	<4.0	<6.0	<9.0	---	<9.0
15 Floyds Fork at former State Highway 155	18	16	<2.0	---	<6.0	<6.4	<9.0	---	19
16 Chenoweth Run at Gelhaus Road	18	16	<2.0	---	<4.0	<6.0	<9.0	---	11
17 Fern Cr at Old Bardstown Road	15	13	<2.0	---	<4.0	<6.0	<6.4	---	9.0
18 Northern Ditch at Preston Highway	16	15	<2.0	---	<4.0	<6.0	<6.9	---	3.0
19 Fishpool Cr at Bost Road	16	15	<2.0	---	<4.0	<6.0	<6.4	---	15
20 Southern Ditch at Minors Lane	16	16	<2.0	---	<4.0	<6.0	<6.4	---	<9.0
21 Floyds Fork at Bardstown Road	17	16	<2.0	---	<6.0	<6.0	<9.0	---	2.0
22 Cedar Cr at Thixton Road	17	17	<2.0	---	<4.0	<6.0	<9.0	---	<9.0
23 Pennsylvania Run at Mt. Washington Road	13	11	<4.0	---	<4.0	<6.0	<6.4	---	7.0
24 Mill Cr Cutoff at Dover Road	15	14	<2.0	---	<4.0	<6.0	<9.0	---	13
25 Harrods Cr at Hunting Cr Drive	16	15	<2.0	---	<4.0	<6.0	<9.0	---	2.0
26 Long Run at State Highway 1531	12	12	<3.0	---	<6.0	<6.0	<9.0	---	<9.0
Chromium, total, in µg/L as Cr									
1 Pond Cr at Pendleton Road	18	7	<4.0	---	3.1*	8.4*	13	---	520
2 Mill Cr at Orell Road	15	10	<4.0	---	.25*	1.7*	11	---	700
3 Pond Cr at Manslick Road	18	5	<5.0	---	4.3*	11*	20	---	510
5 SF Beargrass Cr at Winter Avenue	16	8	<4.0	---	3.9*	6.0*	12	---	13
6 SF Beargrass Cr at Trevilian Way	16	8	<4.0	---	.79*	4.4*	13	---	1,210
7 MF Beargrass Cr at Old Cannons Lane	16	9	<4.9	---	2.8*	5.9*	19	---	34
8 MF Beargrass Cr at Beals Branch Road	16	8	<4.9	---	2.4*	6.3*	15	---	142
9 Spring Ditch at Private Drive	16	6	<4.0	---	4.3*	13	20	---	44
10 Muddy Fork at Mockingbird Valley Road	17	11	<4.0	---	2.2*	4.0*	7.3*	---	17
11 Goose Cr at U.S. Highway 42	16	10	<4.9	---	3.7*	5.3*	7.7*	---	15
12 Little Goose Cr at U.S. Highway 42	16	9	<4.9	---	2.4*	5.2*	11*	---	79
13 Goose Cr at Old Westport Road	16	9	<4.9	---	1.1*	4.2*	15	---	520
14 Pope Lick at Pope Lick Road	18	11	<4.0	---	2.8*	4.7*	7.8*	---	21
15 Floyds Fork at former State Highway 155	18	10	<4.0	---	1.8*	4.6*	14	---	139
16 Chenoweth Run at Gelhaus Road	17	10	<4.0	---	1.0*	3.9*	14*	---	337
17 Fern Cr at Old Bardstown Road	17	9	<4.0	---	.87*	4.2*	16	---	1,200
18 Northern Ditch at Preston Highway	16	10	<4.0	---	3.4*	4.9*	7.2*	---	12
19 Fishpool Cr at Bost Road	16	11	<4.0	---	.10*	1.1*	12*	---	670
20 Southern Ditch at Minors Lane	16	9	<4.0	---	.85*	3.3*	13*	---	690
21 Floyds Fork at Bardstown Road	17	9	<4.0	---	1.3*	4.9*	16	---	510
22 Cedar Cr at Thixton Road	17	9	<4.0	---	1.5*	5.3*	17	---	530
23 Pennsylvania Run at Mt. Washington Road	17	12	<4.0	---	1.1*	2.7*	7.0*	---	29
24 Mill Cr Cutoff at Dover Road	15	7	<4.0	---	1.4*	4.8*	16*	---	684
25 Harrods Cr at Hunting Cr Drive	16	7	<4.9	---	1.9*	7.8*	24	---	1,210
26 Long Run at State Highway 1531	12	8	<4.9	---	.61*	2.7*	12*	---	189

Table 13. Statistical summary of constituent concentrations in streams in Jefferson County, Kentucky, 1988-92--Continued

[N, number of observations; Cr, Creek; SF, South Fork; MF, Middle Fork; mg/L, milligrams per liter; °C, degrees Celsius; µg/L, micrograms per liter; ---, missing; <, less than; *, value estimated from log-normal fit program; percentiles not computed if fewer than 10 observations; the 10th and 90th percentiles are not shown if fewer than 30 observations]

Site number and name	N	N of censored data values	Minimum	Value at indicated percentile 10	25	50 (median)	75	90	Maximum
Copper, total recoverable, in µg/L as Cu									
1 Pond Cr at Pendleton Road	18	8	<6.0	---	3.5*	8.5	25	---	96
2 Mill Cr at Orell Road	15	8	<6.0	---	3.0*	6.5*	15	---	55
3 Pond Cr at Manslick Road	18	8	<6.0	---	3.6*	11	36	---	77
5 SF Beargrass Cr at Winter Avenue	16	6	<6.0	---	5.0*	8.5	22	---	37
6 SF Beargrass Cr at Trevilian Way	16	8	<6.0	---	3.1*	7.1*	16*	---	73
7 MF Beargrass Cr at Old Cannons Lane	16	8	<5.0	---	2.3*	7.7*	36	---	146
8 MF Beargrass Cr at Beals Branch Road	16	5	<6.0	---	5.0*	9.0	29	---	130
9 Spring Ditch at Private Drive	16	3	<8.0	---	8.1*	14	28	---	51
10 Muddy Fork at Mockingbird Valley Road	17	5	<5.0	---	3.0*	10	20	---	1,820
11 Goose Cr at U.S. Highway 42	16	5	<6.0	---	5.6*	11	29	---	73
12 Little Goose Cr at U.S. Highway 42	16	8	<6.0	---	3.4*	7.0*	20	---	40
13 Goose Cr at Old Westport Road	16	4	<6.0	---	6.6*	12	31	---	62
14 Pope Lick at Pope Lick Road	18	4	<6.0	---	6.4*	11	20	---	56
15 Floyds Fork at former State Highway 155	18	6	<6.0	---	5.8*	11	22	---	57
16 Chenoweth Run at Gelhaus Road	18	8	<6.0	---	3.8*	9.2*	31	---	88
17 Fern Cr at Old Bardstown Road	17	6	<6.0	---	4.5*	10	30	---	87
18 Northern Ditch at Preston Highway	16	4	<6.0	---	8.0*	13	23	---	50
19 Fishpool Cr at Bost Road	16	8	<6.0	---	2.6*	7.4*	20	---	103
20 Southern Ditch at Minors Lane	16	6	<6.0	---	5.0*	11*	23	---	130
21 Floyds Fork at Bardstown Road	17	5	<6.0	---	6.1*	9.0	15	---	40
22 Cedar Cr at Thixton Road	17	6	<5.0	---	4.9*	9.0	19	---	37
23 Pennsylvania Run at Mt. Washington Road	17	5	<5.0	---	4.9*	9.0	14	---	82
24 Mill Cr Cutoff at Dover Road	15	7	<6.0	---	3.5*	8.0	15	---	74
25 Harrods Cr at Hunting Cr Drive	16	8	<5.0	---	2.6*	7.0*	24	---	120
26 Long Run at State Highway 1531	12	3	<6.0	---	7.9*	15	31	---	43
Iron, total, in µg/L as Fe									
1 Pond Cr at Pendleton Road	18	2	<10	---	265	707	1,210	---	16,900
2 Mill Cr at Orell Road	15	0	209	---	263	1,110	2,830	---	13,700
3 Pond Cr at Manslick Road	18	0	370	---	789	1,300	2,650	---	3,530
5 SF Beargrass Cr at Winter Avenue	16	0	160	---	475	995	1,840	---	10,800
6 SF Beargrass Cr at Trevilian Way	16	2	<10	---	213	506	1,170	---	6,120
7 MF Beargrass Cr at Old Cannons Lane	16	1	<10	---	173	252	900	---	2,720
8 MF Beargrass Cr at Beals Branch Road	16	1	<10	---	189	602	1,110	---	4,660
9 Spring Ditch at Private Drive	16	0	50	---	244	416	1,440	---	10,600
10 Muddy Fork at Mockingbird Valley Road	17	1	<40	---	253	580	1,080	---	3,580
11 Goose Cr at U.S. Highway 42	16	2	<10	---	78	229	565	---	1,760
12 Little Goose Cr at U.S. Highway 42	16	0	180	---	229	477	1,600	---	5,210
13 Goose Cr at Old Westport Road	16	1	<10	---	164	473	1,110	---	2,680
14 Pope Lick at Pope Lick Road	18	1	<10	---	164	267	1,150	---	17,700
15 Floyds Fork at former State Highway 155	18	0	10	---	255	744	2,110	---	19,500
16 Chenoweth Run at Gelhaus Road	18	1	<10	---	106	284	580	---	7,700
17 Fern Cr at Old Bardstown Road	17	3	<10	---	119	268	775	---	69,200
18 Northern Ditch at Preston Highway	16	0	90	---	168	225	691	---	2,850
19 Fishpool Cr at Bost Road	16	1	<10	---	214	268	391	---	2,810
20 Southern Ditch at Minors Lane	16	0	240	---	415	687	855	---	1,720
21 Floyds Fork at Bardstown Road	17	1	<10	---	238	520	935	---	5,530
22 Cedar Cr at Thixton Road	17	1	<10	---	120	190	370	---	2,200
23 Pennsylvania Run at Mt. Washington Road	17	1	<10	---	223	520	895	---	18,100
24 Mill Cr Cutoff at Dover Road	15	0	102	---	250	595	1,460	---	1,930
25 Harrods Cr at Hunting Cr Drive	16	1	<10	---	482	748	1,610	---	14,100
26 Long Run at State Highway 1531	12	0	149	---	249	680	1,800	---	3,080
Lead, total, in µg/L as Pb									
1 Pond Cr at Pendleton Road	18	15	<40	---	22*	30*	41*	---	70
2 Mill Cr at Orell Road	15	13	<10	---	<40	<50	<53	---	170
3 Pond Cr at Manslick Road	18	17	<40	---	<40	<50	<53	---	190
5 SF Beargrass Cr at Winter Avenue	16	15	<40	---	<40	<50	<50	---	<50
6 SF Beargrass Cr at Trevilian Way	16	16	<40	---	<40	<50	<53	---	<60
7 MF Beargrass Cr at Old Cannons Lane	15	13	<10	---	<40	<50	<53	---	60
9 Spring Ditch at Private Drive	13	10	<40	---	29*	35*	44*	---	60
10 Muddy Fork at Mockingbird Valley Road	17	17	<20	---	<40	<50	<50	---	<60
11 Goose Cr at U.S. Highway 42	16	16	<40	---	<40	<50	<50	---	<60
12 Little Goose Cr at U.S. Highway 42	16	12	<10	---	5.9*	15*	40*	---	150
13 Goose Cr at Old Westport Road	16	15	<40	---	<40	<50	<50	---	70
14 Pope Lick at Pope Lick Road	16	14	<40	---	<40	<50	<50	---	60
15 Floyds Fork at former State Highway 155	17	15	<40	---	<40	<50	<60	---	100
16 Chenoweth Run at Gelhaus Road	18	17	<40	---	<40	<50	<53	---	70
17 Fern Cr at Old Bardstown Road	17	15	<10	---	<40	<50	<55	---	120
18 Northern Ditch at Preston Highway	16	16	<40	---	<40	<50	<53	---	<60
19 Fishpool Cr at Bost Road	16	15	<40	---	<40	<50	<53	---	100
20 Southern Ditch at Minors Lane	16	16	<40	---	<40	<50	<50	---	<60
21 Floyds Fork at Bardstown Road	17	17	<10	---	<40	<50	<50	---	<60
22 Cedar Cr at Thixton Road	17	16	<40	---	<40	<50	<53	---	80

Table 13. Statistical summary of constituent concentrations in streams in Jefferson County, Kentucky, 1988-92--Continued

[N, number of observations; Cr, Creek; SF, South Fork; MF, Middle Fork; mg/L, milligrams per liter; °C, degrees Celsius; µg/L, micrograms per liter; ---, missing; <, less than; *, value estimated from log-normal fit program; percentiles not computed if fewer than 10 observations; the 10th and 90th percentiles are not shown if fewer than 30 observations]

Site number and name	N	N of censored data values	Minimum	Value at indicated percentile 10	25	50 (median)	75	90	Maximum
Lead, total, in µg/L as Pb--Continued									
23 Pennsylvania Run at Mt. Washington Road	17	16	<40	---	<50	<50	<55	---	50
24 Mill Cr Cutoff at Dover Road	15	13	<40	---	<40	<50	<55	---	170
25 Harrods Cr at Hunting Cr Drive	16	16	<40	---	<40	<50	<53	---	<60
26 Long Run at State Highway 1531	12	11	<40	---	<40	<50	<60	---	130
Mercury, total recoverable, in µg/L as Hg									
1 Pond Cr at Pendleton Road	17	12	<.20	---	<.20	<.20	.20	---	.70
2 Mill Cr at Orell Road	15	11	<.20	---	<.01*	.02*	.07*	---	.30
3 Pond Cr at Manslick Road	17	12	<.20	---	.05*	.11*	.30	---	.90
5 SF Beargrass Cr at Winter Avenue	16	10	<.20	---	.08*	.15*	.30	---	1.0
6 SF Beargrass Cr at Trevilian Way	16	9	<.20	---	.01*	.05*	.37	---	3.1
7 MF Beargrass Cr at Old Cannons Lane	16	9	<.20	---	.11*	.19*	.40	---	.50
8 MF Beargrass Cr at Beals Branch Road	16	12	<.20	---	.05*	.10*	.21*	---	.70
9 Spring Ditch at Private Drive	17	10	<.20	---	.07*	.15*	.25	---	1.6
10 Muddy Fork at Mockingbird Valley Road	17	9	<.20	---	.12*	.20*	.40	---	.60
11 Goose Cr at U.S. Highway 42	16	12	<.20	---	.03*	.07*	.20*	---	1.6
12 Little Goose Cr at U.S. Highway 42	16	11	<.20	---	<.20	<.20	.20	---	.70
13 Goose Cr at Old Westport Road	13	8	<.20	---	.07*	.14*	.25	---	1.1
14 Pope Lick at Pope Lick Road	17	9	<.20	---	.09*	.18*	.35*	---	1.5
15 Floyds Fork at former State Highway 155	17	9	<.20	---	.10*	.18*	.34*	---	1.5
16 Chenoweth Run at Gelhaus Road	18	12	<.20	---	.03*	.09*	.30	---	6.0
17 Fern Cr at Old Bardstown Road	16	9	<.20	---	.08*	.17*	.55	---	1.0
18 Northern Ditch at Preston Highway	17	12	<.20	---	.08*	.13*	.25	---	.50
19 Fishpool Cr at Bost Road	15	10	<.20	---	.09*	.15*	.30	---	.60
20 Southern Ditch at Minors Lane	15	9	<.20	---	.10*	.16*	.25*	---	.90
21 Floyds Fork at Bardstown Road	17	7	<.20	---	.10*	.20	.65	---	4.0
22 Cedar Cr at Thixton Road	17	7	<.20	---	.10*	.20	.45	---	5.2
23 Pennsylvania Run at Mt. Washington Road	17	8	<.20	---	.10*	.20	.55	---	1.0
24 Mill Cr Cutoff at Dover Road	15	11	<.20	---	.05*	.11*	.20	---	.60
25 Harrods Cr at Hunting Cr Drive	15	10	<.20	---	.06*	.13*	.30	---	1.0
26 Long Run at State Highway 1531	12	11	<.20	---	<.20	<.20	<.20	---	.90
Nickel, total, in µg/L as Ni									
1 Pond Cr at Pendleton Road	18	12	<7.0	---	5.8*	9.3*	15*	---	31
2 Mill Cr at Orell Road	15	12	<7.0	---	3.1*	5.3*	8.9*	---	25
3 Pond Cr at Manslick Road	18	11	<7.0	---	4.4*	9.0*	19*	---	89
5 SF Beargrass Cr at Winter Avenue	12	12	<6.7	---	<10	<20	<20	---	13
6 SF Beargrass Cr at Trevilian Way	10	2	<10	---	8.5*	10*	12*	---	16
7 MF Beargrass Cr at Old Cannons Lane	16	13	<6.7	---	.42*	1.7*	6.7*	---	99
8 MF Beargrass Cr at Beals Branch Road	16	13	<6.7	---	2.5*	4.5*	8.1*	---	22
9 Spring Ditch at Private Drive	16	6	<7.0	---	8.1*	13*	20*	---	39
10 Muddy Fork at Mockingbird Valley Road	17	13	<6.7	---	2.0*	4.3*	9.4*	---	50
11 Goose Cr at U.S. Highway 42	16	12	<7.0	---	2.5*	5.4*	11*	---	47
12 Little Goose Cr at U.S. Highway 42	16	11	<7.0	---	5.6*	7.8*	11*	---	23
13 Goose Cr at Old Westport Road	11	10	<7.0	---	<10	<20	<20	---	13
14 Pope Lick at Pope Lick Road	18	14	<6.7	---	1.8*	4.1*	9.3*	---	49
15 Floyds Fork at former State Highway 155	18	13	<6.0	---	2.0*	5.0*	13*	---	61
16 Chenoweth Run at Gelhaus Road	18	14	<7.0	---	2.0*	4.4*	9.8*	---	30
17 Fern Cr at Old Bardstown Road	17	13	<7.0	---	1.2*	3.4*	9.5*	---	81
18 Northern Ditch at Preston Highway	16	12	<6.7	---	.74*	2.7*	9.7*	---	100
19 Fishpool Cr at Bost Road	11	11	<6.7	---	<10	<20	<20	---	10
20 Southern Ditch at Minors Lane	16	10	<6.7	---	3.2*	6.8*	14*	---	44
21 Floyds Fork at Bardstown Road	17	14	<7.0	---	1.8*	3.8*	8.3*	---	28
22 Cedar Cr at Thixton Road	11	8	<7.0	---	3.6*	5.5*	8.4*	---	20
23 Pennsylvania Run at Mt. Washington Road	17	13	<7.0	---	1.6*	3.9*	9.2*	---	50
24 Mill Cr Cutoff at Dover Road	15	12	<7.0	---	2.4*	4.9*	9.7*	---	30
25 Harrods Cr at Hunting Cr Drive	16	13	<6.7	---	2.4*	4.5*	8.4*	---	30
26 Long Run at State Highway 1531	12	7	<7.0	---	4.0*	6.7*	11*	---	31
Silver, total, in µg/L as Ag									
1 Pond Cr at Pendleton Road	14	11	<1.0	---	.50*	1.0*	2.1*	---	6.0
2 Mill Cr at Orell Road	15	12	<1.0	---	.22*	.75*	2.5*	---	17
3 Pond Cr at Manslick Road	18	17	<1.0	---	<1.0	<4.7	<5.0	---	7.0
5 SF Beargrass Cr at Winter Avenue	16	16	<1.0	---	<1.0	<4.0	<5.0	---	<8.0
6 SF Beargrass Cr at Trevilian Way	16	14	<1.0	---	<1.0	<4.7	<5.0	---	11
7 MF Beargrass Cr at Old Cannons Lane	14	11	<1.0	---	.26*	.68*	1.8*	---	7.0
8 MF Beargrass Cr at Beals Branch Road	10	8	<1.0	---	<1.0	<2.0	<4.0	---	4.0
9 Spring Ditch at Private Drive	11	9	<1.0	---	<1.0	<4.0	<5.0	---	2.0
10 Muddy Fork at Mockingbird Valley Road	17	16	<1.0	---	<1.0	<4.0	<5.0	---	5.0
11 Goose Cr at U.S. Highway 42	16	14	<1.0	---	<1.0	<4.0	<5.0	---	10
12 Little Goose Cr at U.S. Highway 42	11	9	<1.0	---	<1.0	<4.0	<4.7	---	5.0
13 Goose Cr at Old Westport Road	16	12	<1.0	---	.05*	.35*	2.6*	---	166
14 Pope Lick at Pope Lick Road	17	11	<1.0	---	.91*	1.7*	3.1*	---	7.0
15 Floyds Fork at former State Highway 155	16	14	<1.0	---	<1.0	<4.0	<5.0	---	6.0

Table 13. Statistical summary of constituent concentrations in streams in Jefferson County, Kentucky, 1988-92--Continued

[N, number of observations; Cr, Creek; SF, South Fork; MF, Middle Fork; mg/L, milligrams per liter; °C, degrees Celsius; µg/L, micrograms per liter; ---, missing; <, less than; *, value estimated from log-normal fit program; percentiles not computed if fewer than 10 observations; the 10th and 90th percentiles are not shown if fewer than 30 observations]

Site number and name	N	N of censored data values	Minimum	Value at indicated percentile 10	25	50 (median)	75	90	Maximum
Silver, total, in µg/L as Ag--Continued									
16 Chenoweth Run at Gelhaus Road	17	14	<1.0	---	0.22*	0.58*	1.5*	---	9.0
17 Fern Cr at Old Bardstown Road	17	13	<1.0	---	.04*	.31*	2.3*	---	110
18 Northern Ditch at Preston Highway	16	12	<1.0	---	.50*	1.2*	2.7*	---	14
19 Fishpool Cr at Bost Road	16	15	<1.0	---	<1.0	<4.7	<5.0	---	1.0
20 Southern Ditch at Minors Lane	15	13	<1.0	---	<1.0	<4.7	<5.0	---	9.0
21 Floyds Fork at Bardstown Road	16	14	<1.0	---	<1.0	<4.0	<5.0	---	6.0
22 Cedar Cr at Thixton Road	12	10	<1.0	---	<1.0	<4.0	<4.0	---	4.0
23 Pennsylvania Run at Mt. Washington Road	17	17	<.80	---	<1.0	<4.0	<5.0	---	<10
24 Mill Cr Cutoff at Dover Road	14	12	<1.0	---	<1.0	<4.7	<5.0	---	6.0
25 Harrods Cr at Hunting Cr Drive	16	13	<1.0	---	.02*	.17*	1.3*	---	110
26 Long Run at State Highway 1531	12	12	<1.0	---	<4.0	<5.0	<5.0	---	<9.0
Zinc, total, in µg/L as Zn									
1 Pond Cr at Pendleton Road	18	3	<6.0	---	11	44	128	---	1,660
2 Mill Cr at Orell Road	15	3	<6.0	---	7.0	40	55	---	107
3 Pond Cr at Manslick Road	18	3	<6.0	---	25	60	102	---	351
5 SF Beargrass Cr at Winter Avenue	16	2	<6.0	---	24	66	98	---	117
6 SF Beargrass Cr at Trevilian Way	16	4	<5.0	---	10*	54	165	---	1,230
7 MF Beargrass Cr at Old Cannons Lane	16	2	<6.0	---	35	50	104	---	327
8 MF Beargrass Cr at Beals Branch Road	16	2	<6.0	---	26*	47	101	---	154
9 Spring Ditch at Private Drive	16	1	<6.0	---	43	86	140	---	500
10 Muddy Fork at Mockingbird Valley Road	17	1	<6.0	---	19	52	130	---	590
11 Goose Cr at U.S. Highway 42	16	2	<5.0	---	20	43	196	---	310
12 Little Goose Cr at U.S. Highway 42	16	2	<6.0	---	21	41	81	---	364
13 Goose Cr at Old Westport Road	16	2	<6.0	---	9.2	52	122	---	622
14 Pope Lick at Pope Lick Road	18	0	15	---	36	48	89	---	502
15 Floyds Fork at former State Highway 155	18	1	<6.0	---	25	35	66	---	268
16 Chenoweth Run at Gelhaus Road	18	4	<6.0	---	14*	51	69	---	244
17 Fern Cr at Old Bardstown Road	17	3	<6.0	---	14	52	205	---	417
18 Northern Ditch at Preston Highway	16	1	<6.0	---	29	48	117	---	527
19 Fishpool Cr at Bost Road	16	2	<6.0	---	16	44	81	---	490
20 Southern Ditch at Minors Lane	16	1	<6.0	---	24	62	149	---	545
21 Floyds Fork at Bardstown Road	17	2	<6.0	---	22	36	55	---	258
22 Cedar Cr at Thixton Road	17	2	<6.0	---	25	36	70	---	123
23 Pennsylvania Run at Mt. Washington Road	17	1	<6.0	---	29	43	81	---	854
24 Mill Cr Cutoff at Dover Road	14	0	19	---	43	86	187	---	917
25 Harrods Cr at Hunting Cr Drive	16	2	<6.0	---	13	28	65	---	440
26 Long Run at State Highway 1531	12	1	<6.0	---	17	33	81	---	114
Selenium, total, in µg/L as Se									
1 Pond Cr at Pendleton Road	18	17	<5.0	---	<5.0	<10	<10	---	5.0
2 Mill Cr at Orell Road	15	15	<5.0	---	<5.0	<10	<10	---	<50
3 Pond Cr at Manslick Road	18	18	<5.0	---	<5.0	<5.0	<10	---	<50
5 SF Beargrass Cr at Winter Avenue	16	15	<5.0	---	<5.0	<10	<10	---	6.0
6 SF Beargrass Cr at Trevilian Way	16	16	<5.0	---	<5.0	<5.0	<10	---	<50
7 MF Beargrass Cr at Old Cannons Lane	16	16	<5.0	---	<5.0	<5.0	<10	---	<50
8 MF Beargrass Cr at Beals Branch Road	16	16	<5.0	---	<5.0	<5.0	<10	---	<50
9 Spring Ditch at Private Drive	14	12	<5.0	---	<5.0	<10	<10	---	11
10 Muddy Fork at Mockingbird Valley Road	11	11	<5.0	---	<10	<10	<50	---	9.0
11 Goose Cr at U.S. Highway 42	16	15	<5.0	---	<5.0	<10	<10	---	6.0
12 Little Goose Cr at U.S. Highway 42	16	16	<5.0	---	<5.0	<5.0	<10	---	<50
13 Goose Cr at Old Westport Road	16	15	<5.0	---	<5.0	<10	<10	---	7.0
14 Pope Lick at Pope Lick Road	16	14	<5.0	---	<5.0	<10	<10	---	11
15 Floyds Fork at former State Highway 155	18	18	<5.0	---	<5.0	<10	<10	---	<50
16 Chenoweth Run at Gelhaus Road	18	18	<5.0	---	<5.0	<10	<10	---	<50
17 Fern Cr at Old Bardstown Road	17	17	<5.0	---	<5.0	<10	<10	---	<50
18 Northern Ditch at Preston Highway	17	17	<5.0	---	<5.0	<10	<10	---	<50
19 Fishpool Cr at Bost Road	16	15	<5.0	---	<5.0	<10	<10	---	7.0
20 Southern Ditch at Minors Lane	16	15	<5.0	---	<5.0	<10	<10	---	15
21 Floyds Fork at Bardstown Road	17	16	<5.0	---	<5.0	<10	<10	---	5.0
22 Cedar Cr at Thixton Road	17	17	<5.0	---	<5.0	<10	<10	---	<50
23 Pennsylvania Run at Mt. Washington Road	17	16	<5.0	---	<5.0	<10	<20	---	5.0
24 Mill Cr Cutoff at Dover Road	13	11	<5.0	---	<5.0	<10	<10	---	12
25 Harrods Cr at Hunting Cr Drive	16	16	<5.0	---	<5.0	<10	<10	---	<50
26 Long Run at State Highway 1531	9	9	<5.0	---	---	---	---	---	8.0
Cyanide, total, in mg/L as Cn									
1 Pond Cr at Pendleton Road	17	16	<.01	---	<.02	<.02	<.02	---	.01
2 Mill Cr at Orell Road	15	15	<.02	---	<.02	<.02	<.02	---	<.02
3 Pond Cr at Manslick Road	11	8	<.01	---	<.01	<.01	<.02	---	<.02
5 SF Beargrass Cr at Winter Avenue	16	15	<.01	---	<.02	<.02	<.02	---	.01
6 SF Beargrass Cr at Trevilian Way	15	13	<.01	---	<.01	<.01	<.01	---	.01
7 MF Beargrass Cr at Old Cannons Lane	16	15	<.01	---	<.02	<.02	<.02	---	.01
8 MF Beargrass Cr at Beals Branch Road	9	7	<.01	---	---	---	---	---	<.02

Table 13. Statistical summary of constituent concentrations in streams in Jefferson County, Kentucky, 1988-92--Continued

[N, number of observations; Cr, Creek; SF, South Fork; MF, Middle Fork; mg/L, milligrams per liter; °C, degrees Celsius; µg/L, micrograms per liter; ---, missing; <, less than; *, value estimated from log-normal fit program; percentiles not computed if fewer than 10 observations; the 10th and 90th percentiles are not shown if fewer than 30 observations]

Site number and name	N	N of censored data values	Minimum	Value at indicated percentile 10	25	50 (median)	75	90	Maximum
Cyanide, total, in mg/L as Cn--Continued									
9 Spring Ditch at Private Drive	12	18	<0.01	---	<0.01	<0.01	<0.01	---	<0.02
10 Muddy Fork at Mockingbird Valley Road	16	11	<.01	---	<.01*	<.01*	.01*	---	.03
11 Goose Cr at U.S. Highway 42	14	10	<.01	---	<.01	<.01	.01	---	.01
12 Little Goose Cr at U.S. Highway 42	10	7	<.01	---	<.01	<.01	.01	---	.01
13 Goose Cr at Old Westport Road	15	8	<.01	---	.01*	.01*	.01*	---	.03
14 Pope Lick at Pope Lick Road	18	10	<.01	---	<.01*	.01*	.01*	---	.05
15 Floyds Fork at former State Highway 155	18	18	<.01	---	<.02	<.02	<.02	---	<.02
16 Chenoweth Run at Gelhaus Road	17	9	<.01	---	<.01*	.01*	.01*	---	.02
17 Fern Cr at Old Bardstown Road	16	11	<.01	---	<.01*	<.01*	.01*	---	.04
18 Northern Ditch at Preston Highway	17	11	<.01	---	<.01*	.01*	.01*	---	.03
19 Fishpool Cr at Bost Road	16	10	<.01	---	<.01*	.01*	.01*	---	.02
20 Southern Ditch at Minors Lane	16	11	<.01	---	<.01*	<.01*	.01*	---	.02
21 Floyds Fork at Bardstown Road	16	15	<.01	---	<.02	<.02	<.02	---	.01
22 Cedar Cr at Thixton Road	16	14	<.01	---	<.02	<.02	<.02	---	.05
23 Pennsylvania Run at Mt. Washington Road	17	9	<.01	---	<.01*	.01*	.02	---	.07
24 Mill Cr Cutoff at Dover Road	11	9	<.01	---	<.01	<.01	<.01	---	.02
25 Harrods Cr at Hunting Cr Drive	16	16	<.01	---	<.02	<.02	<.02	---	<.02
26 Long Run at State Highway 1531	12	11	<.01	---	<.02	<.02	<.02	---	.01
Chlordane, total, in µg/L									
1 Pond Cr at Pendleton Road	14	14	<3.1	---	<3.1	<6.2	<6.2	---	<6.2
2 Mill Cr at Orell Road	12	12	<3.1	---	<3.1	<6.2	<6.2	---	<6.2
3 Pond Cr at Manslick Road	14	14	<3.1	---	<3.1	<6.2	<6.2	---	<6.2
5 SF Beargrass Cr at Winter Avenue	13	13	<3.1	---	<3.1	<6.2	<6.2	---	<6.2
6 SF Beargrass Cr at Trevilian Way	13	13	<3.1	---	<3.1	<6.2	<6.2	---	<6.2
7 MF Beargrass Cr at Old Cannons Lane	12	12	<3.1	---	<3.1	<3.1	<6.2	---	<6.2
8 MF Beargrass Cr at Beals Branch Road	13	13	<3.1	---	<3.1	<3.1	<6.2	---	<6.2
9 Spring Ditch at Private Drive	14	14	<3.1	---	<3.1	<3.1	<6.2	---	<6.2
10 Muddy Fork at Mockingbird Valley Road	14	14	<3.1	---	<3.1	<3.1	<6.2	---	<6.2
11 Goose Cr at U.S. Highway 42	13	13	<3.1	---	<3.1	<6.2	<6.2	---	<6.2
12 Little Goose Cr at U.S. Highway 42	13	13	<3.1	---	<3.1	<6.2	<6.2	---	<6.2
13 Goose Cr at Old Westport Road	12	12	<3.1	---	<3.1	<6.2	<6.2	---	<6.2
14 Pope Lick at Pope Lick Road	15	15	<3.1	---	<3.1	<6.2	<6.2	---	<6.2
15 Floyds Fork at former State Highway 155	15	15	<3.1	---	<3.1	<6.2	<6.2	---	<6.2
16 Chenoweth Run at Gelhaus Road	15	15	<3.1	---	<3.1	<6.2	<6.2	---	<6.3
17 Fern Cr at Old Bardstown Road	14	14	<3.1	---	<3.1	<3.1	<6.2	---	<6.2
18 Northern Ditch at Preston Highway	13	13	<3.1	---	<3.1	<6.2	<6.2	---	<6.2
19 Fishpool Cr at Bost Road	13	13	<3.1	---	<3.1	<6.2	<6.2	---	<6.2
20 Southern Ditch at Minors Lane	12	12	<3.1	---	<3.1	<6.2	<6.2	---	<6.2
21 Floyds Fork at Bardstown Road	14	14	<3.1	---	<3.1	<6.2	<6.2	---	<6.2
22 Cedar Cr at Thixton Road	14	14	<3.1	---	<3.1	<6.2	<6.2	---	<6.2
23 Pennsylvania Run at Mt. Washington Road	14	14	<3.1	---	<3.1	<3.1	<6.2	---	<6.2
24 Mill Cr Cutoff at Dover Road	12	12	<3.1	---	<3.1	<3.1	<6.2	---	<6.2
25 Harrods Cr at Hunting Cr Drive	13	13	<3.1	---	<3.1	<6.2	<6.2	---	<6.2
26 Long Run at State Highway 1531	10	10	<3.1	---	<3.1	<3.1	<6.2	---	<6.2
Endrin, total, in µg/L									
1 Pond Cr at Pendleton Road	12	10	<.02	---	<.04	<.08	<.18	---	<.39
2 Mill Cr at Orell Road	12	12	<.02	---	<.02	<.04	<.18	---	<.39
3 Pond Cr at Manslick Road	14	14	<.02	---	<.02	<.05	<.16	---	<.39
5 SF Beargrass Cr at Winter Avenue	13	13	<.02	---	<.02	<.03	<.08	---	<.39
6 SF Beargrass Cr at Trevilian Way	13	12	<.02	---	<.02	<.03	<.18	---	.50
7 MF Beargrass Cr at Old Cannons Lane	12	12	<.02	---	<.02	.04	<.08	---	<.39
8 MF Beargrass Cr at Beals Branch Road	13	13	<.02	---	<.02	<.04	<.04	---	<.39
9 Spring Ditch at Private Drive	14	13	<.02	---	<.02	<.05	<.08	---	.49
10 Muddy Fork at Mockingbird Valley Road	13	13	<.02	---	<.05	<.05	<.06	---	<.39
11 Goose Cr at U.S. Highway 42	11	9	<.01	---	<.02	<.05	<.18	---	.20
12 Little Goose Cr at U.S. Highway 42	13	12	<.02	---	<.05	<.05	<.18	---	.18
13 Goose Cr at Old Westport Road	12	11	<.02	---	<.02	<.05	<.39	---	.04
14 Pope Lick at Pope Lick Road	15	15	<.02	---	<.02	<.04	<.16	---	<.39
15 Floyds Fork at former State Highway 155	15	14	<.02	---	<.02	<.04	<.18	---	.11
16 Chenoweth Run at Gelhaus Road	15	15	<.02	---	<.02	<.04	<.16	---	<.39
17 Fern Cr at Old Bardstown Road	14	13	<.02	---	<.02	<.05	<.18	---	.22
18 Northern Ditch at Preston Highway	13	12	<.01	---	<.02	<.05	<.08	---	.09
19 Fishpool Cr at Bost Road	13	12	<.01	---	<.02	<.04	<.16	---	1.1
20 Southern Ditch at Minors Lane	12	10	<.02	---	<.04	<.06	<.39	---	.98
21 Floyds Fork at Bardstown Road	14	13	<.02	---	<.02	<.06	<.16	---	.30
22 Cedar Cr at Thixton Road	14	14	<.02	---	<.02	<.06	<.08	---	<.39
23 Pennsylvania Run at Mt. Washington Road	14	14	<.02	---	<.02	<.05	<.08	---	<.39
24 Mill Cr Cutoff at Dover Road	12	11	<.02	---	<.02	<.05	<.08	---	.05
25 Harrods Cr at Hunting Cr Drive	13	13	<.02	---	<.02	<.05	<.08	---	<.39
26 Long Run at State Highway 1531	10	10	<.02	---	<.02	<.05	<.05	---	<.08

Table 13. Statistical summary of constituent concentrations in streams in Jefferson County, Kentucky, 1988-92--Continued

[N, number of observations; Cr, Creek; SF, South Fork; MF, Middle Fork; mg/L, milligrams per liter; °C, degrees Celsius; µg/L, micrograms per liter; ---, missing; <, less than; *, value estimated from log-normal fit program; percentiles not computed if fewer than 10 observations; the 10th and 90th percentiles are not shown if fewer than 30 observations]

Site number and name	N	N of censored data values	Minimum	Value at indicated percentile 10	25	50 (median)	75	90	Maximum
Lindane, total, in µg/L									
1 Pond Cr at Pendleton Road	12	10	<0.01	---	<0.01	<0.03	<0.21	---	0.39
2 Mill Cr at Orell Road	12	12	<.01	---	<.02	<.02	<.21	---	<.62
3 Pond Cr at Manslick Road	11	8	<.01	---	<.01*	.01*	.03	---	.08
5 SF Beargrass Cr at Winter Avenue	10	8	<.01	---	<.02	<.02	<.04	---	.08
6 SF Beargrass Cr at Trevilian Way	13	12	<.01	---	<.02	<.04	<.21	---	.05
7 MF Beargrass Cr at Old Cannons Lane	10	8	<.01	---	<.02	<.02	<.07	---	.12
8 MF Beargrass Cr at Beals Branch Road	10	10	<.01	---	<.01	<.04	<.07	---	<.62
9 Spring Ditch at Private Drive	12	9	<.01	---	<.01*	.01*	.02*	---	.22
10 Muddy Fork at Mockingbird Valley Road	11	7	<.01	---	<.01*	.01*	.15	---	.58
11 Goose Cr at U.S. Highway 42	13	12	<.01	---	<.02	<.04	<.21	---	.01
12 Little Goose Cr at U.S. Highway 42	13	12	<.01	---	<.02	<.04	<.21	---	.02
13 Goose Cr at Old Westport Road	10	7	<.01	---	<.03	<.10	<.21	---	<.62
14 Pope Lick at Pope Lick Road	12	9	<.01	---	<.01*	.01*	.02*	---	.09
15 Floyds Fork at former State Highway 155	12	10	<.01	---	<.02	<.02	<.04	---	.13
16 Chenoweth Run at Gelhaus Road	13	9	<.01	---	<.01*	.01*	.02*	---	.21
17 Fern Cr at Old Bardstown Road	12	10	<.01	---	<.02	<.04	<.21	---	.61
18 Northern Ditch at Preston Highway	11	8	<.01	---	<.01*	.01*	.03*	---	.13
19 Fishpool Cr at Bost Road	10	8	<.01	---	<.02	<.02	<.03	---	.04
20 Southern Ditch at Minors Lane	10	9	<.01	---	<.01	<.04	<.62	---	<.62
21 Floyds Fork at Bardstown Road	12	8	<.01	---	<.01*	.01*	.03*	---	.22
22 Cedar Cr at Thixton Road	12	8	<.01	---	<.01*	.01*	.05*	---	.36
23 Pennsylvania Run at Mt. Washington Road	12	8	<.01	---	<.01*	.01*	.03*	---	.49
24 Mill Cr Cutoff at Dover Road	11	9	<.01	---	<.02	<.04	<.08	---	.30
25 Harrods Cr at Hunting Cr Drive	13	12	<.01	---	<.02	<.04	<.21	---	.04
26 Long Run at State Highway 1531	10	8	<.01	---	<.02	<.04	<.09	---	.11
Methoxychlor, total, in µg/L									
1 Pond Cr at Pendleton Road	14	13	<.05	---	<.08	<.13	<.51	---	.12
2 Mill Cr at Orell Road	12	12	<.05	---	<.08	<.16	<.51	---	<1.3
3 Pond Cr at Manslick Road	14	14	<.05	---	<.08	<.10	<.40	---	<1.3
5 SF Beargrass Cr at Winter Avenue	13	13	<.05	---	<.08	<.08	<.18	---	<1.3
6 SF Beargrass Cr at Trevilian Way	11	9	<.05	---	<.08	<.10	<.51	---	.74
7 MF Beargrass Cr at Old Cannons Lane	9	8	<.08	---	---	---	---	---	<1.3
8 MF Beargrass Cr at Beals Branch Road	13	12	<.08	---	<.08	<.10	<.20	---	.10
9 Spring Ditch at Private Drive	14	14	<.06	---	<.08	<.14	<.18	---	<1.3
10 Muddy Fork at Mockingbird Valley Road	13	12	<.06	---	<.08	<.10	<.18	---	.10
11 Goose Cr at U.S. Highway 42	13	12	<.05	---	<.08	<.10	<.51	---	.22
12 Little Goose Cr at U.S. Highway 42	13	11	<.07	---	<.08	<.25	<.51	---	<1.3
13 Goose Cr at Old Westport Road	12	12	<.05	---	<.08	<.13	<.51	---	<1.3
14 Pope Lick at Pope Lick Road	15	15	<.06	---	<.08	<.10	<.41	---	<1.3
15 Floyds Fork at former State Highway 155	15	14	<.08	---	<.08	<.14	<.51	---	.26
16 Chenoweth Run at Gelhaus Road	15	15	<.08	---	<.08	<.10	<.41	---	<3.1
17 Fern Cr at Old Bardstown Road	14	13	<.07	---	<.08	<.17	<.51	---	.37
18 Northern Ditch at Preston Highway	13	13	<.05	---	<.08	<.10	<.18	---	<1.3
19 Fishpool Cr at Bost Road	13	11	<.05	---	<.08	<.10	<1.3	---	2.1
20 Southern Ditch at Minors Lane	10	7	<.08	---	<.09	<.11	<.17	---	<1.3
21 Floyds Fork at Bardstown Road	14	13	<.05	---	<.08	<.17	<.41	---	.12
22 Cedar Cr at Thixton Road	14	13	<.05	---	<.08	<.17	<.41	---	.24
23 Pennsylvania Run at Mt. Washington Road	14	14	<.05	---	<.08	<.10	<.18	---	<1.3
24 Mill Cr Cutoff at Dover Road	12	11	<.05	---	<.08	<.14	<.20	---	2.6
25 Harrods Cr at Hunting Cr Drive	13	12	<.06	---	<.08	<.13	<.51	---	.08
26 Long Run at State Highway 1531	10	10	<.08	---	<.08	<.08	<.16	---	<.20
Toxaphene, total, in µg/L									
1 Pond Cr at Pendleton Road	14	13	<6.3	---	<12	<12	<13	---	12
2 Mill Cr at Orell Road	12	12	<6.3	---	<6.3	<12	<13	---	<13
3 Pond Cr at Manslick Road	14	13	<6.3	---	<12	<12	<13	---	12
5 SF Beargrass Cr at Winter Avenue	13	13	<6.3	---	<12	<12	<13	---	<13
6 SF Beargrass Cr at Trevilian Way	13	13	<6.3	---	<12	<12	<13	---	<13
7 MF Beargrass Cr at Old Cannons Lane	12	11	<6.3	---	<6.3	<12	<13	---	12
8 MF Beargrass Cr at Beals Branch Road	13	12	<6.3	---	<12	<13	<13	---	12
9 Spring Ditch at Private Drive	14	14	<6.3	---	<12	<12	<13	---	<13
10 Muddy Fork at Mockingbird Valley Road	14	14	<6.3	---	<6.3	<12	<13	---	<13
11 Goose Cr at U.S. Highway 42	13	13	<6.3	---	<12	<12	<13	---	<13
12 Little Goose Cr at U.S. Highway 42	13	13	<6.3	---	<12	<12	<13	---	<13
13 Goose Cr at Old Westport Road	12	12	<6.3	---	<12	<12	<13	---	<13
14 Pope Lick at Pope Lick Road	15	15	<6.3	---	<12	<12	<13	---	<13
15 Floyds Fork at former State Highway 155	15	15	<6.3	---	<12	<12	<13	---	<13
16 Chenoweth Run at Gelhaus Road	15	15	<6.3	---	<12	<12	<13	---	<13
17 Fern Cr at Old Bardstown Road	14	14	<6.3	---	<12	<12	<13	---	<13
18 Northern Ditch at Preston Highway	13	13	<6.3	---	<12	<12	<13	---	<13
19 Fishpool Cr at Bost Road	13	13	<6.3	---	<12	<12	<13	---	<13
20 Southern Ditch at Minors Lane	12	12	<6.3	---	<12	<12	<13	---	<13
21 Floyds Fork at Bardstown Road	14	14	<6.3	---	<12	<12	<13	---	<13
22 Cedar Cr at Thixton Road	14	14	<6.3	---	<12	<12	<13	---	<13

Table 13. Statistical summary of constituent concentrations in streams in Jefferson County, Kentucky, 1988-92--Continued

[N, number of observations; Cr, Creek; SF, South Fork; MF, Middle Fork; mg/L, milligrams per liter; °C, degrees Celsius; µg/L, micrograms per liter; ---, missing; <, less than; *, value estimated from log-normal fit program; percentiles not computed if fewer than 10 observations; the 10th and 90th percentiles are not shown if fewer than 30 observations]

Site number and name	N	N of censored data values	Minimum	Value at indicated percentile 10	25	50 (median)	75	90	Maximum
Toxaphene, total, in µg/L									
23 Pennsylvania Run at Mt. Washington Road	14	14	<6.3	---	<6.3	<12	<13	---	<13
24 Mill Cr Cutoff at Dover Road	12	12	<6.3	---	<6.3	<12	<13	---	<13
25 Harrods Cr at Hunting Cr Drive	13	12	<6.3	---	<12	<12	<13	---	12
26 Long Run at State Highway 1531	10	10	<6.3	---	<6.3	<12	<13	---	<13
2,4-D, total, in µg/L									
1 Pond Cr at Pendleton Road	18	9	<.03	---	.04*	.11*	.32*	---	1.0
2 Mill Cr at Orell Road	15	7	<.01	---	.01*	.04*	.43	---	.92
3 Pond Cr at Manslick Road	18	9	<.01	---	.01*	.06*	.44	---	.95
5 SF Beargrass Cr at Winter Avenue	16	7	<.01	---	.02*	.13*	1.1	---	5.0
6 SF Beargrass Cr at Trevilian Way	16	6	<.01	---	.03*	.11*	.46	---	3.5
7 MF Beargrass Cr at Old Cannons Lane	15	8	<.01	---	.01*	.04*	.48	---	1.8
8 MF Beargrass Cr at Beals Branch Road	16	8	<.01	---	.01*	.06*	.71	---	1.3
9 Spring Ditch at Private Drive	17	13	<.01	---	<.01*	.01*	.04*	---	.52
10 Muddy Fork at Mockingbird Valley Road	16	12	<.01	---	<.01*	<.01*	.06*	---	1.6
11 Goose Cr at U.S. Highway 42	16	10	<.03	---	.01*	.04*	.10*	---	.37
12 Little Goose Cr at U.S. Highway 42	16	12	<.01	---	<.01*	.01*	.05*	---	.74
13 Goose Cr at Old Westport Road	15	13	<.02	---	<.04	<.15	<.35	---	.65
14 Pope Lick at Pope Lick Road	18	11	<.01	---	.01*	.03*	.12*	---	.89
15 Floyds Fork at former State Highway 155	16	11	<.01	---	<.01*	.02*	.06*	---	.27
16 Chenoweth Run at Gelhaus Road	18	14	<.01	---	<.01*	<.01*	.03*	---	1.6
17 Fern Cr at Old Bardstown Road	17	13	<.01	---	<.01*	.01*	.04*	---	.93
18 Northern Ditch at Preston Highway	16	10	<.01	---	<.01*	.02*	.18*	---	3.6
19 Fishpool Cr at Bost Road	16	8	<.01	---	.01*	.05*	.25*	---	8.8
20 Southern Ditch at Minors Lane	16	8	<.03	---	.01*	.06*	.30*	---	12
21 Floyds Fork at Bardstown Road	17	9	<.01	---	.01*	.05*	.20*	---	.94
22 Cedar Cr at Thixton Road	17	10	<.01	---	.01*	.04*	.23*	---	1.6
23 Pennsylvania Run at Mt. Washington Road	17	9	<.01	---	.01*	.04*	.17*	---	1.8
24 Mill Cr Cutoff at Dover Road	15	8	<.01	---	.01*	.04*	.30*	---	3.4
25 Harrods Cr at Hunting Cr Drive	16	12	<.01	---	<.01*	.01*	.05*	---	.58
26 Long Run at State Highway 1531	12	9	<.01	---	<.01*	<.01*	.03*	---	.56
Silvex, total, in µg/L									
1 Pond Cr at Pendleton Road	18	16	<.01	---	<.01	<.05	<.10	---	.58
2 Mill Cr at Orell Road	15	14	<.01	---	<.01	<.01	<.05	---	.23
3 Pond Cr at Manslick Road	18	17	<.01	---	<.01	<.01	<.05	---	.25
5 SF Beargrass Cr at Winter Avenue	16	15	<.01	---	<.01	<.01	<.05	---	.08
6 SF Beargrass Cr at Trevilian Way	16	15	<.01	---	<.01	<.01	<.05	---	.11
7 MF Beargrass Cr at Old Cannons Lane	15	14	<.01	---	<.01	<.01	<.10	---	.02
8 MF Beargrass Cr at Beals Branch Road	16	15	<.01	---	<.01	<.01	<.05	---	.07
9 Spring Ditch at Private Drive	15	12	<.01	---	<.01*	<.01*	.01*	---	.13
10 Muddy Fork at Mockingbird Valley Road	16	15	<.01	---	<.01	<.01	<.06	---	.03
11 Goose Cr at U.S. Highway 42	16	16	<.01	---	<.01	<.01	<.05	---	<.43
12 Little Goose Cr at U.S. Highway 42	16	15	<.01	---	<.01	<.01	<.05	---	.12
13 Goose Cr at Old Westport Road	15	15	<.01	---	<.01	<.01	<.05	---	<.43
14 Pope Lick at Pope Lick Road	18	17	<.01	---	<.01	<.05	<.10	---	.07
15 Floyds Fork at former State Highway 155	11	9	<.01	---	<.01	<.01	<.01	---	.03
16 Chenoweth Run at Gelhaus Road	16	14	<.01	---	<.01	<.01	<.05	---	.30
17 Fern Cr at Old Bardstown Road	17	17	<.01	---	<.01	<.01	<.05	---	<.43
18 Northern Ditch at Preston Highway	16	16	<.01	---	<.01	<.01	<.05	---	<.43
19 Fishpool Cr at Bost Road	11	9	<.01	---	<.01	<.01	<.04	---	.05
20 Southern Ditch at Minors Lane	10	9	<.01	---	<.05	<.05	<.43	---	<.43
21 Floyds Fork at Bardstown Road	17	16	<.01	---	<.01	<.01	<.05	---	.41
22 Cedar Cr at Thixton Road	15	13	<.01	---	<.01	<.05	<.05	---	.26
23 Pennsylvania Run at Mt. Washington Road	17	16	<.01	---	<.01	<.05	<.10	---	.02
24 Mill Cr Cutoff at Dover Road	15	14	<.01	---	<.01	<.01	<.05	---	.04
25 Harrods Cr at Hunting Cr Drive	16	15	<.01	---	<.01	<.01	<.05	---	.01
26 Long Run at State Highway 1531	12	11	<.01	---	<.01	<.01	<.05	---	.02

Table 14. Estimates of mean annual constituent loads in runoff from urban watersheds of Jefferson County, Kentucky, 1988-92

[Cr, Creek; SF, South Fork; MF, Middle Fork; °C, degrees Celsius]

Site number and name	Number of observations	Mean annual load, in tons	Standard error of regression	Flow duration of greatest sampled discharge, in percent	Percentage of load estimated beyond range of sampled discharge
Dissolved oxygen					
1 Pond Cr at Pendleton Road	93	880	15.7	0.5	9.7
2 Mill Cr at Orell Road	87	93.0	16.7	.9	16.7
3 Pond Cr at Manslick Road	95	819	20.5	1.8	26.0
5 SF Beargrass Cr at Winter Avenue	95	303	27.2	.3	8.9
6 SF Beargrass Cr at Trevilian Way	94	201	13.5	.5	10.1
7 MF Beargrass Cr at Old Cannons Lane	95	271	26.3	1.3	23.0
8 MF Beargrass Cr at Beals Branch Road	95	318	26.3	1.2	27.2
9 Spring Ditch at Private Drive	94	35.4	30.9	0	0
10 Muddy Fork at Mockingbird Valley Road	95	82.3	15.7	1.0	18.2
11 Goose Cr at U.S. Highway 42	95	135	10.6	.6	6.9
12 Little Goose Cr at U.S. Highway 42	96	103	11.8	.2	4.1
13 Goose Cr at Old Westport Road	95	102	20.9	0	0
14 Pope Lick at Pope Lick Road	96	39.8	16.5	.3	6.8
15 Floyds Fork at former State Highway 155	95	2,540	19.9	0	0
16 Chenoweth Run at Gelhaus Road	94	253	17.7	0	0
17 Fern Cr at Old Bardstown Road	95	69.5	14.2	0	0
18 Northern Ditch at Preston Highway	96	211	21.2	.1	1.7
19 Fishpool Cr at Bost Road	96	86.5	27.3	0	0
20 Southern Ditch at Minors Lane	96	145	26.6	0	0
21 Floyds Fork at Bardstown Road	95	4,080	17.8	1.3	30.1
22 Cedar Cr at Thixton Road	96	171	15.5	.5	9.1
23 Pennsylvania Run at Mt. Washington Road	96	85.7	16.0	.8	15.1
24 Mill Cr Cutoff at Dover Road	84	135	27.4	.2	9.9
25 Harrods Cr at Hunting Cr Drive	91	1,370	19.0	1.2	18.8
26 Long Run at State Highway 1531	71	417	14.3	0	0
Chemical oxygen demand, 0.25N dicromate					
1 Pond Cr at Pendleton Road	89	2,000	55.0	.5	13.3
2 Mill Cr at Orell Road	84	284	56.2	.9	22.2
3 Pond Cr at Manslick Road	89	2,630	54.0	1.8	36.0
5 SF Beargrass Cr at Winter Avenue	88	592	73.2	.3	12.3
6 SF Beargrass Cr at Trevilian Way	89	431	73.5	.5	21.1
7 MF Beargrass Cr at Old Cannons Lane	89	324	66.5	1.3	26.3
8 MF Beargrass Cr at Beals Branch Road	90	472	69.8	1.2	25.2
9 Spring Ditch at Private Drive	90	184	65.9	0	0
10 Muddy Fork at Mockingbird Valley Road	89	172	67.2	1.0	24.9
11 Goose Cr at U.S. Highway 42	88	209	71.9	.6	9.1
12 Little Goose Cr at U.S. Highway 42	89	248	76.5	.2	5.0
13 Goose Cr at Old Westport Road	87	190	62.6	0	0
14 Pope Lick at Pope Lick Road	92	83.5	56.1	.3	11.3
15 Floyds Fork at former State Highway 155	89	4,060	63.1	0	0
16 Chenoweth Run at Gelhaus Road	89	417	60.7	0	0
17 Fern Cr at Old Bardstown Road	89	91.7	70.4	0	0
18 Northern Ditch at Preston Highway	91	412	65.3	.1	2.5
19 Fishpool Cr at Bost Road	89	172	57.4	0	0
20 Southern Ditch at Minors Lane	90	357	63.3	0	0
21 Floyds Fork at Bardstown Road	90	6,430	63.9	1.3	29.0
22 Cedar Cr at Thixton Road	91	343	62.6	.5	15.1
23 Pennsylvania Run at Mt. Washington Road	92	184	55.8	.8	14.6
24 Mill Cr Cutoff at Dover Road	76	475	49.1	.2	12.3
25 Harrods Cr at Hunting Cr Drive	89	2,290	63.8	1.2	19.1
26 Long Run at State Highway 1531	63	783	62.8	0	0
Biochemical oxygen demand, 5-day at 20°C					
1 Pond Cr at Pendleton Road	89	756	74.4	.5	16.3
2 Mill Cr at Orell Road	85	63.6	61.7	.9	18.6
3 Pond Cr at Manslick Road	90	789	65.5	1.8	34.0
5 SF Beargrass Cr at Winter Avenue	91	317	72.2	.3	18.9
6 SF Beargrass Cr at Trevilian Way	91	228	78.7	.5	25.7
7 MF Beargrass Cr at Old Cannons Lane	91	118	62.9	1.3	20.7
8 MF Beargrass Cr at Beals Branch Road	92	118	67.3	1.2	21.9
9 Spring Ditch at Private Drive	91	28.6	65.4	0	0
10 Muddy Fork at Mockingbird Valley Road	90	37.2	65.1	1.0	19.7
11 Goose Cr at U.S. Highway 42	90	84.0	71.3	.6	10.7
12 Little Goose Cr at U.S. Highway 42	91	61.9	74.5	.2	4.1
13 Goose Cr at Old Westport Road	90	67.9	75.6	0	0
14 Pope Lick at Pope Lick Road	92	23.6	58.5	.3	9.6
15 Floyds Fork at former State Highway 155	91	1,000	66.1	0	0
16 Chenoweth Run at Gelhaus Road	90	197	69.7	0	0
17 Fern Cr at Old Bardstown Road	91	55.4	70.3	0	0
18 Northern Ditch at Preston Highway	92	140	72.0	.1	2.3
19 Fishpool Cr at Bost Road	91	42.9	66.6	0	0
20 Southern Ditch at Minors Lane	91	81.1	51.2	0	0
21 Floyds Fork at Bardstown Road	90	1,630	60.8	1.3	24.7
22 Cedar Cr at Thixton Road	92	114	74.0	.5	15.2
23 Pennsylvania Run at Mt. Washington Road	92	54.5	63.2	.8	17.2
24 Mill Cr Cutoff at Dover Road	79	173	64.8	.2	15.2
25 Harrods Cr at Hunting Cr Drive	89	751	68.6	1.2	19.9
26 Long Run at State Highway 1531	65	235	74.3	0	0

Table 14. Estimates of mean annual constituent loads in runoff from urban watersheds of Jefferson County, Kentucky, 1988-92--Continued

[Cr, Creek; SF, South Fork; MF, Middle Fork; °C, degrees Celsius]

Site number and name	Number of observations	Mean annual load, in tons	Standard error of regression	Flow duration of greatest sampled discharge, in percent	Percentage of load estimated beyond range of sampled discharge
Calcium, total as Ca					
1 Pond Cr at Pendleton Road	17	4,650	13.5	10.1	51.0
2 Mill Cr at Orell Road	15	221	39.7	.9	8.9
3 Pond Cr at Manslick Road	18	4,630	10.6	19.4	71.7
5 SF Beargrass Cr at Winter Avenue	16	1,430	30.0	1.2	17.7
6 SF Beargrass Cr at Trevilian Way	16	1,070	18.4	1.5	18.2
7 MF Beargrass Cr at Old Cannons Lane	16	1,360	20.2	1.3	17.8
8 MF Beargrass Cr at Beals Branch Road	16	1,640	16.2	1.6	23.3
9 Spring Ditch at Private Drive	16	185	19.5	6.7	31.5
10 Muddy Fork at Mockingbird Valley Road	17	697	20.1	3.0	27.7
11 Goose Cr at U.S. Highway 42	16	721	11.7	8.0	36.0
12 Little Goose Cr at U.S. Highway 42	16	549	11.8	6.7	35.2
13 Goose Cr at Old Westport Road	16	518	15.1	10.0	39.3
14 Pope Lick at Pope Lick Road	18	296	12.3	12.9	60.8
15 Floyds Fork at former State Highway 155	18	12,300	13.8	3.0	40.6
16 Chenoweth Run at Gelhaus Road	18	1,540	19.2	11.9	68.8
17 Fern Cr at Old Bardstown Road	17	394	21.1	0	0
18 Northern Ditch at Preston Highway	16	1,020	6.8	8.3	38.3
19 Fishpool Cr at Bost Road	16	511	33.6	12.3	70.6
20 Southern Ditch at Minors Lane	16	941	16.7	18.0	78.7
21 Floyds Fork at Bardstown Road	17	22,600	24.6	7.3	64.6
22 Cedar Cr at Thixton Road	17	1,110	36.9	8.5	54.7
23 Pennsylvania Run at Mt. Washington Road	17	402	24.5	12.4	60.9
24 Mill Cr Cutoff at Dover Road	15	316	21.5	8.2	65.8
25 Harrods Cr at Hunting Cr Drive	16	9,880	101	3.6	40.2
26 Long Run at State Highway 1531	12	2,400	27.5	3.9	50.3
Magnesium, total as Mg					
1 Pond Cr at Pendleton Road	17	1,710	15.1	10.1	50.8
2 Mill Cr at Orell Road	15	68.2	48.4	.9	7.6
3 Pond Cr at Manslick Road	18	1,700	8.9	19.4	71.4
5 SF Beargrass Cr at Winter Avenue	16	408	34.7	1.2	25.4
6 SF Beargrass Cr at Trevilian Way	16	248	23.8	1.5	17.7
7 MF Beargrass Cr at Old Cannons Lane	16	306	19.7	1.3	18.6
8 MF Beargrass Cr at Beals Branch Road	16	350	16.8	1.6	23.8
9 Spring Ditch at Private Drive	16	47.3	24.4	6.7	33.4
10 Muddy Fork at Mockingbird Valley Road	17	88.1	20.9	3.0	23.4
11 Goose Cr at U.S. Highway 42	16	263	12.1	8.0	33.3
12 Little Goose Cr at U.S. Highway 42	16	189	11.5	6.7	35.6
13 Goose Cr at Old Westport Road	16	203	15.1	10.0	37.7
14 Pope Lick at Pope Lick Road	18	131	12.1	12.9	63.4
15 Floyds Fork at former State Highway 155	18	2,720	18.8	3.0	36.6
16 Chenoweth Run at Gelhaus Road	17	700	16.7	11.9	74.8
17 Fern Cr at Old Bardstown Road	17	168	23.1	0	0
18 Northern Ditch at Preston Highway	16	434	13.5	8.3	42.3
19 Fishpool Cr at Bost Road	16	245	47.3	12.3	72.9
20 Southern Ditch at Minors Lane	16	430	21.6	18.0	79.3
21 Floyds Fork at Bardstown Road	17	5,450	24.5	7.3	58.9
22 Cedar Cr at Thixton Road	17	565	41.0	8.5	57.6
23 Pennsylvania Run at Mt. Washington Road	17	221	19.7	12.4	64.4
24 Mill Cr Cutoff at Dover Road	15	101	29.6	8.2	65.7
25 Harrods Cr at Hunting Cr Drive	16	2,650	12.9	3.6	26.4
26 Long Run at State Highway 1531	12	407	26.6	3.9	53.5
Alkalinity, titration to 4.5, as $CaCO_3$					
1 Pond Cr at Pendleton Road	91	12,900	26.5	.5	8.9
2 Mill Cr at Orell Road	86	1,050	49.8	.9	11.0
3 Pond Cr at Manslick Road	91	12,200	17.3	1.8	21.5
5 SF Beargrass Cr at Winter Avenue	90	4,420	27.6	.3	8.0
6 SF Beargrass Cr at Trevilian Way	90	3,500	30.9	.5	11.2
7 MF Beargrass Cr at Old Cannons Lane	91	4,230	22.8	1.3	19.7
8 MF Beargrass Cr at Beals Branch Road	92	4,800	22.0	1.2	20.2
9 Spring Ditch at Private Drive	91	495	28.1	0	0
10 Muddy Fork at Mockingbird Valley Road	90	1,820	23.9	1.0	17.3
11 Goose Cr at U.S. Highway 42	91	2,110	17.6	.6	5.4
12 Little Goose Cr at U.S. Highway 42	91	1,570	18.8	.2	2.7
13 Goose Cr at Old Westport Road	90	1,570	24.4	0	0
14 Pope Lick at Pope Lick Road	92	807	53.2	.3	6.8
15 Floyds Fork at former State Highway 155	91	36,400	25.5	0	0
16 Chenoweth Run at Gelhaus Road	90	3,750	49.6	0	0
17 Fern Cr at Old Bardstown Road	90	1,420	32.1	0	0
18 Northern Ditch at Preston Highway	92	3,300	18.5	.1	1.6
19 Fishpool Cr at Bost Road	91	1,100	34.8	0	0
20 Southern Ditch at Minors Lane	91	1,990	25.5	0	0
21 Floyds Fork at Bardstown Road	90	62,200	42.6	1.3	26.0
22 Cedar Cr at Thixton Road	92	2,700	38.6	.5	9.5
23 Pennsylvania Run at Mt. Washington Road	92	1,330	21.2	.8	13.7
24 Mill Cr Cutoff at Dover Road	78	1,500	35.2	.2	10.9
25 Harrods Cr at Hunting Cr Drive	89	23,000	19.0	1.2	15.0
26 Long Run at State Highway 1531	65	7,030	19.8	0	0

Table 14. Estimates of mean annual constituent loads in runoff from urban watersheds of Jefferson County, Kentucky, 1988-92--Continued

[Cr, Creek; SF, South Fork; MF, Middle Fork; °C, degrees Celsius]

Site number and name	Number of observations	Mean annual load, in tons	Standard error of regression	Flow duration of greatest sampled discharge, in percent	Percentage of load estimated beyond range of sampled discharge
Dissolved solids, residue at 105°C					
1 Pond Cr at Pendleton Road	91	29,800	27.7	0.5	8.3
2 Mill Cr at Orell Road	86	2,000	43.0	.9	12.5
3 Pond Cr at Manslick Road	91	28,000	20.1	1.8	20.6
5 SF Beargrass Cr at Winter Avenue	91	10,500	38.5	.3	9.2
6 SF Beargrass Cr at Trevilian Way	91	6,920	24.3	.5	10.0
7 MF Beargrass Cr at Old Cannons Lane	91	7,220	19.7	1.3	19.7
8 MF Beargrass Cr at Beals Branch Road	91	8,690	24.5	1.2	20.4
9 Spring Ditch at Private Drive	91	999	17.6	0	0
10 Muddy Fork at Mockingbird Valley Road	90	3,650	15.3	1.0	16.3
11 Goose Cr at U.S. Highway 42	91	3,660	15.0	.6	5.1
12 Little Goose Cr at U.S. Highway 42	91	2,880	20.5	.2	2.8
13 Goose Cr at Old Westport Road	90	2,910	30.1	0	0
14 Pope Lick at Pope Lick Road	91	1,450	22.5	.3	6.3
15 Floyds Fork at former State Highway 155	91	68,700	23.3	0	0
16 Chenoweth Run at Gelhaus Road	89	9,230	26.4	0	0
17 Fern Cr at Old Bardstown Road	90	2,270	20.9	0	0
18 Northern Ditch at Preston Highway	91	6,090	22.7	.1	1.1
19 Fishpool Cr at Bost Road	90	2,540	20.4	0	0
20 Southern Ditch at Minors Lane	88	4,780	17.4	0	0
21 Floyds Fork at Bardstown Road	90	99,300	27.1	1.3	24.9
22 Cedar Cr at Thixton Road	91	5,540	29.1	.5	7.9
23 Pennsylvania Run at Mt. Washington Road	92	2,880	33.2	.8	12.7
24 Mill Cr Cutoff at Dover Road	79	4,060	37.6	.2	10.1
25 Harrods Cr at Hunting Cr Drive	89	35,900	19.1	1.2	13.7
26 Long Run at State Highway 1531	64	9,850	20.8	0	0
Suspended solids, residue at 105°C					
1 Pond Cr at Pendleton Road	91	21,500	84.4	.5	43.4
2 Mill Cr at Orell Road	86	1,240	100	.9	34.0
3 Pond Cr at Manslick Road	91	22,400	73.1	1.8	56.4
5 SF Beargrass Cr at Winter Avenue	90	7,480	86.2	.3	40.0
6 SF Beargrass Cr at Trevilian Way	91	4,990	98.0	.5	48.3
7 MF Beargrass Cr at Old Cannons Lane	91	839	88.6	1.3	43.0
8 MF Beargrass Cr at Beals Branch Road	91	1,190	105	1.2	35.7
9 Spring Ditch at Private Drive	91	222	90.5	0	0
10 Muddy Fork at Mockingbird Valley Road	90	580	99.2	1.0	33.1
11 Goose Cr at U.S. Highway 42	91	536	92.7	.6	19.7
12 Little Goose Cr at U.S. Highway 42	91	639	98.1	.2	7.2
13 Goose Cr at Old Westport Road	90	687	109	0	0
14 Pope Lick at Pope Lick Road	92	367	101	.3	31.7
15 Floyds Fork at former State Highway 155	91	20,100	107	0	0
16 Chenoweth Run at Gelhaus Road	89	2,570	88.4	0	0
17 Fern Cr at Old Bardstown Road	90	577	100	0	0
18 Northern Ditch at Preston Highway	92	1,470	92.3	.1	6.4
19 Fishpool Cr at Bost Road	91	508	104	0	0
20 Southern Ditch at Minors Lane	90	1,140	97.2	0	0
21 Floyds Fork at Bardstown Road	90	64,000	90.6	1.3	51.1
22 Cedar Cr at Thixton Road	91	455	106	.5	22.8
23 Pennsylvania Run at Mt. Washington Road	92	211	102	.8	14.8
24 Mill Cr Cutoff at Dover Road	79	1,440	90.8	.2	20.0
25 Harrods Cr at Hunting Cr Drive	89	7,870	93.7	1.2	23.2
26 Long Run at State Highway 1531	65	3,770	98.3	0	0
Residue, volatile, nonfilterable					
1 Pond Cr at Pendleton Road	91	3,280	106	.5	31.0
2 Mill Cr at Orell Road	86	285	132	.9	31.4
3 Pond Cr at Manslick Road	91	4,690	116	1.8	52.0
5 SF Beargrass Cr at Winter Avenue	90	3,240	126	.3	36.4
6 SF Beargrass Cr at Trevilian Way	91	1,770	105	.5	48.7
7 MF Beargrass Cr at Old Cannons Lane	91	534	109	1.3	38.7
8 MF Beargrass Cr at Beals Branch Road	91	302	103	1.2	32.3
9 Spring Ditch at Private Drive	91	54.2	101	0	0
10 Muddy Fork at Mockingbird Valley Road	90	123	106	1.0	26.7
11 Goose Cr at U.S. Highway 42	91	136	125	.6	13.9
12 Little Goose Cr at U.S. Highway 42	91	167	118	.2	6.6
13 Goose Cr at Old Westport Road	90	212	130	0	0
14 Pope Lick at Pope Lick Road	92	62.9	108	.3	16.5
15 Floyds Fork at former State Highway 155	59	5,940	147	0	0
16 Chenoweth Run at Gelhaus Road	89	743	169	0	0
17 Fern Cr at Old Bardstown Road	90	216	115	0	0
18 Northern Ditch at Preston Highway	92	256	121	.1	3.8
19 Fishpool Cr at Bost Road	91	147	127	0	0
20 Southern Ditch at Minors Lane	90	330	132	0	0
21 Floyds Fork at Bardstown Road	90	13,400	101	1.3	47.8
22 Cedar Cr at Thixton Road	91	136	120	.5	14.5
23 Pennsylvania Run at Mt. Washington Road	92	58.2	112	.8	13.3
24 Mill Cr Cutoff at Dover Road	79	293	104	.2	19.0
26 Long Run at State Highway 1531	65	409	109	0	0

Table 14. Estimates of mean annual constituent loads in runoff from urban watersheds of Jefferson County, Kentucky, 1988-92--Continued

[Cr, Creek; SF, South Fork; MF, Middle Fork; °C, degrees Celsius]

Site number and name	Number of observations	Mean annual load, in tons	Standard error of regression	Flow duration of greatest sampled discharge, in percent	Percentage of load estimated beyond range of sampled discharge
Suspended solids, nonvolatile					
1 Pond Cr at Pendleton Road	20	5,210	141	10.1	77.0
2 Mill Cr at Orell Road	21	309	120	.9	29.9
3 Pond Cr at Manslick Road	21	25,400	115	7.1	88.0
5 SF Beargrass Cr at Winter Avenue	20	1,840	277	1.2	52.7
7 MF Beargrass Cr at Old Cannons Lane	20	553	69.5	3.1	68.9
8 MF Beargrass Cr at Beals Branch Road	21	433	114	3.0	52.0
9 Spring Ditch at Private Drive	20	40.1	65.8	6.1	49.5
10 Muddy Fork at Mockingbird Valley Road	19	8,440	94.5	3.0	82.2
11 Goose Cr at U.S. Highway 42	20	88.1	100	3.1	26.4
12 Little Goose Cr at U.S. Highway 42	20	239	102	6.7	57.7
13 Goose Cr at Old Westport Road	20	466	104	5.1	38.8
14 Pope Lick at Pope Lick Road	20	602	235	1.5	71.2
15 Floyds Fork at former State Highway 155	20	13,300	121	4.3	75.0
16 Chenoweth Run at Gelhaus Road	19	452	245	21.7	21.4
17 Fern Cr at Old Bardstown Road	20	505	102	5.1	80.6
18 Northern Ditch at Preston Highway	21	176	90.0	9.3	58.3
19 Fishpool Cr at Bost Road	19	302	69.7	3.9	72.9
20 Southern Ditch at Minors Lane	20	723	108	.4	23.2
21 Floyds Fork at Bardstown Road	19	98,700	291	4.1	83.1
23 Pennsylvania Run at Mt. Washington Road	20	75.9	96.8	2.2	29.9
24 Mill Cr Cutoff at Dover Road	19	6,450	78.1	.2	33.9
26 Long Run at State Highway 1531	14	716	92.1	5.6	80.4
Nitrogen, nitrate, total as N					
1 Pond Cr at Pendleton Road	91	212	85.8	.5	10.1
2 Mill Cr at Orell Road	85	11.7	112	.9	23.5
3 Pond Cr at Manslick Road	91	182	85.9	1.8	22.2
5 SF Beargrass Cr at Winter Avenue	89	56.9	88.4	.3	7.6
6 SF Beargrass Cr at Trevilian Way	89	40.8	86.6	.5	11.6
7 MF Beargrass Cr at Old Cannons Lane	90	48.5	99.8	1.3	21.1
8 MF Beargrass Cr at Beals Branch Road	91	54.9	93.0	1.2	22.8
9 Spring Ditch at Private Drive	91	8.20	89.9	0	0
10 Muddy Fork at Mockingbird Valley Road	89	22.4	92.4	1.0	7.7
11 Goose Cr at U.S. Highway 42	90	40.7	45.7	.6	6.1
12 Little Goose Cr at U.S. Highway 42	89	38.4	46.7	.2	3.6
13 Goose Cr at Old Westport Road	89	29.6	63.9	0	0
14 Pope Lick at Pope Lick Road	92	10.6	83.0	.3	3.6
15 Floyds Fork at former State Highway 155	90	310	93.1	0	0
16 Chenoweth Run at Gelhaus Road	89	44.5	73.1	0	0
17 Fern Cr at Old Bardstown Road	90	26.0	91.4	0	0
18 Northern Ditch at Preston Highway	92	56.9	110	.1	.8
19 Fishpool Cr at Bost Road	91	20.8	91.9	0	0
20 Southern Ditch at Minors Lane	91	37.8	95.0	0	0
21 Floyds Fork at Bardstown Road	90	594	111	1.3	29.9
22 Cedar Cr at Thixton Road	92	33.6	77.6	.5	6.1
23 Pennsylvania Run at Mt. Washington Road	92	16.8	86.4	.8	7.0
24 Mill Cr Cutoff at Dover Road	77	41.8	82.6	.2	9.3
25 Harrods Cr at Hunting Cr Drive	88	261	55.4	1.2	18.8
26 Long Run at State Highway 1531	65	51.8	106	0	0
Nitrogen, nitrite, total as N					
1 Pond Cr at Pendleton Road	91	12.1	75.5	.5	19.5
3 Pond Cr at Manslick Road	91	15.5	66.1	1.8	36.3
5 SF Beargrass Cr at Winter Avenue	90	1.76	64.5	.3	14.9
6 SF Beargrass Cr at Trevilian Way	90	1.50	65.0	.5	27.8
7 MF Beargrass Cr at Old Cannons Lane	90	.54	80.0	1.3	24.6
8 MF Beargrass Cr at Beals Branch Road	91	.64	81.6	1.2	20.8
9 Spring Ditch at Private Drive	91	.22	75.2	0	0
10 Muddy Fork at Mockingbird Valley Road	90	.50	76.1	1.0	19.0
11 Goose Cr at U.S. Highway 42	91	1.16	91.3	.6	13.5
12 Little Goose Cr at U.S. Highway 42	91	.62	84.4	.2	7.2
13 Goose Cr at Old Westport Road	90	1.06	104	0	0
14 Pope Lick at Pope Lick Road	92	.38	79.6	.3	8.4
15 Floyds Fork at former State Highway 155	91	13.3	74.4	0	0
16 Chenoweth Run at Gelhaus Road	90	1.94	117	0	0
17 Fern Cr at Old Bardstown Road	91	.80	101	0	0
18 Northern Ditch at Preston Highway	92	1.36	61.5	.1	1.4
19 Fishpool Cr at Bost Road	91	1.12	97.8	0	0
20 Southern Ditch at Minors Lane	91	1.68	72.4	0	0
21 Floyds Fork at Bardstown Road	90	27.2	79.6	1.3	41.0
22 Cedar Cr at Thixton Road	92	.96	81.1	.5	14.8
23 Pennsylvania Run at Mt. Washington Road	92	1.18	87.3	.8	18.7
24 Mill Cr Cutoff at Dover Road	79	2.56	100	.2	11.8
25 Harrods Cr at Hunting Cr Drive	89	8.34	97.4	1.2	24.5
26 Long Run at State Highway 1531	67	1.28	68.5	0	0

Table 14. Estimates of mean annual constituent loads in runoff from urban watersheds of Jefferson County, Kentucky, 1988-92--Continued

[Cr, Creek; SF, South Fork; MF, Middle Fork; °C, degrees Celsius]

Site number and name	Number of observations	Mean annual load, in tons	Standard error of regression	Flow duration of greatest sampled discharge, in percent	Percentage of load estimated beyond range of sampled discharge
Nitrogen, ammonia, total as N					
1 Pond Cr at Pendleton Road	89	27.4	176	0.5	8.1
2 Mill Cr at Orell Road	84	.68	159	.9	16.1
3 Pond Cr at Manslick Road	89	48.4	196	1.8	35.9
5 SF Beargrass Cr at Winter Avenue	89	13.7	187	.3	16.4
6 SF Beargrass Cr at Trevilian Way	89	6.20	191	.5	9.2
7 MF Beargrass Cr at Old Cannons Lane	89	2.42	167	1.3	19.4
8 MF Beargrass Cr at Beals Branch Road	90	2.12	170	1.2	13.4
9 Spring Ditch at Private Drive	88	.68	196	0	0
10 Muddy Fork at Mockingbird Valley Road	89	.78	172	1.0	15.8
11 Goose Cr at U.S. Highway 42	91	1.82	184	.6	8.4
12 Little Goose Cr at U.S. Highway 42	90	.72	163	.6	8.0
14 Pope Lick at Pope Lick Road	92	1.04	191	.3	1.8
17 Fern Cr at Old Bardstown Road	89	2.34	186	0	0
18 Northern Ditch at Preston Highway	89	4.52	212	.1	.8
19 Fishpool Cr at Bost Road	88	1.68	185	.2	6.3
20 Southern Ditch at Minors Lane	88	4.96	186	.4	15.3
21 Floyds Fork at Bardstown Road	90	28.1	169	1.3	17.0
22 Cedar Cr at Thixton Road	91	2.76	185	.5	11.1
23 Pennsylvania Run at Mt. Washington Road	90	3.00	190	.8	13.6
24 Mill Cr Cutoff at Dover Road	78	12.1	176	.2	16.5
Nitrogen, organic, dissolved as N					
1 Pond Cr at Pendleton Road	90	57.0	132	.5	12.2
2 Mill Cr at Orell Road	86	4.84	136	.9	16.1
3 Pond Cr at Manslick Road	90	54.0	128	1.8	22.8
5 SF Beargrass Cr at Winter Avenue	91	30.3	135	.3	16.2
6 SF Beargrass Cr at Trevilian Way	91	14.3	132	.5	16.8
7 MF Beargrass Cr at Old Cannons Lane	91	8.58	141	1.3	21.1
8 MF Beargrass Cr at Beals Branch Road	92	9.14	142	1.2	19.8
9 Spring Ditch at Private Drive	90	4.24	139	0	0
10 Muddy Fork at Mockingbird Valley Road	90	2.72	137	1.0	14.6
11 Goose Cr at U.S. Highway 42	90	6.30	142	.6	9.1
12 Little Goose Cr at U.S. Highway 42	89	3.62	145	.2	2.6
13 Goose Cr at Old Westport Road	90	7.40	155	0	0
14 Pope Lick at Pope Lick Road	92	3.64	119	.3	10.8
15 Floyds Fork at former State Highway 155	90	188	113	0	0
16 Chenoweth Run at Gelhaus Road	90	13.1	151	0	0
17 Fern Cr at Old Bardstown Road	91	4.18	129	0	0
18 Northern Ditch at Preston Highway	91	18.8	148	.1	3.0
19 Fishpool Cr at Bost Road	89	5.60	134	.2	5.4
20 Southern Ditch at Minors Lane	90	12.1	140	.4	13.8
21 Floyds Fork at Bardstown Road	89	198	129	1.3	28.3
22 Cedar Cr at Thixton Road	92	11.0	117	.5	13.3
23 Pennsylvania Run at Mt. Washington Road	91	9.00	142	.8	18.7
24 Mill Cr Cutoff at Dover Road	79	26.2	133	.2	13.9
25 Harrods Cr at Hunting Cr Drive	89	89.7	124	1.2	25.2
26 Long Run at State Highway 1531	65	33.2	111	0	0
Phosphate, total as PO_4					
1 Pond Cr at Pendleton Road	91	135	57.4	.5	7.7
2 Mill Cr at Orell Road	84	11.9	76.4	.9	27.7
3 Pond Cr at Manslick Road	91	149	54.7	1.8	19.3
5 SF Beargrass Cr at Winter Avenue	90	24.1	84.7	.3	21.5
6 SF Beargrass Cr at Trevilian Way	89	19.2	89.6	.5	33.5
7 MF Beargrass Cr at Old Cannons Lane	85	13.6	93.2	1.3	33.9
8 MF Beargrass Cr at Beals Branch Road	87	8.80	75.0	1.2	24.3
9 Spring Ditch at Private Drive	88	5.70	69.7	0	0
10 Muddy Fork at Mockingbird Valley Road	89	9.44	54.8	1.0	4.5
11 Goose Cr at U.S. Highway 42	90	23.3	53.4	.6	3.2
12 Little Goose Cr at U.S. Highway 42	91	17.0	59.4	.2	1.5
13 Goose Cr at Old Westport Road	89	19.9	70.2	0	0
14 Pope Lick at Pope Lick Road	91	7.36	67.3	.3	3.3
15 Floyds Fork at former State Highway 155	90	168	76.1	0	0
16 Chenoweth Run at Gelhaus Road	87	50.4	61.1	0	0
17 Fern Cr at Old Bardstown Road	90	15.8	71.9	0	0
18 Northern Ditch at Preston Highway	89	44.3	64.2	.1	.6
19 Fishpool Cr at Bost Road	89	13.6	68.4	0	0
20 Southern Ditch at Minors Lane	90	22.0	70.4	0	0
21 Floyds Fork at Bardstown Road	89	247	68.5	1.3	19.2
22 Cedar Cr at Thixton Road	91	24.7	63.5	.5	4.6
23 Pennsylvania Run at Mt. Washington Road	91	14.0	68.9	.8	5.1
24 Mill Cr Cutoff at Dover Road	78	51.8	99.4	.2	12.1
25 Harrods Cr at Hunting Cr Drive	88	97.8	83.7	1.2	16.5
26 Long Run at State Highway 1531	64	73.4	94.1	0	0

Table 14. Estimates of mean annual constituent loads in runoff from urban watersheds of Jefferson County, Kentucky, 1988-92--Continued

[Cr, Creek; SF, South Fork; MF, Middle Fork; °C, degrees Celsius]

Site number and name	Number of observations	Mean annual load, in tons	Standard error of regression	Flow duration of greatest sampled discharge, in percent	Percentage of load estimated beyond range of sampled discharge
Phosphorus, total as P					
1 Pond Cr at Pendleton Road	88	57.8	65.4	0.5	8.2
2 Mill Cr at Orell Road	83	6.64	85.8	.9	29.4
3 Pond Cr at Manslick Road	86	60.4	60.3	1.8	19.2
5 SF Beargrass Cr at Winter Avenue	89	17.3	81.8	.3	24.2
6 SF Beargrass Cr at Trevilian Way	87	8.44	78.7	.5	35.8
7 MF Beargrass Cr at Old Cannons Lane	88	7.04	82.4	1.3	37.4
8 MF Beargrass Cr at Beals Branch Road	89	6.14	85.1	1.2	26.2
9 Spring Ditch at Private Drive	86	2.62	60.5	0	0
10 Muddy Fork at Mockingbird Valley Road	88	4.82	63.3	1.0	6.0
11 Goose Cr at U.S. Highway 42	88	10.7	63.7	.6	4.0
12 Little Goose Cr at U.S. Highway 42	88	7.82	73.1	.6	4.7
13 Goose Cr at Old Westport Road	89	9.08	70.1	0	0
14 Pope Lick at Pope Lick Road	88	4.22	73.3	.3	5.4
15 Floyds Fork at former State Highway 155	86	98.4	63.7	0	0
16 Chenoweth Run at Gelhaus Road	86	16.8	73.2	8.6	29.4
17 Fern Cr at Old Bardstown Road	89	8.42	72.3	0	0
18 Northern Ditch at Preston Highway	89	21.0	69.0	.1	.5
19 Fishpool Cr at Bost Road	87	6.42	68.1	0	0
20 Southern Ditch at Minors Lane	89	10.6	66.1	0	0
21 Floyds Fork at Bardstown Road	86	135	76.0	1.3	21.6
22 Cedar Cr at Thixton Road	89	10.5	63.5	.5	4.1
23 Pennsylvania Run at Mt. Washington Road	90	6.48	72.5	.8	5.8
24 Mill Cr Cutoff at Dover Road	78	16.5	91.9	.2	9.5
25 Harrods Cr at Hunting Cr Drive	87	49.2	86.9	1.2	18.0
26 Long Run at State Highway 1531	65	24.7	94.4	0	0
Phosphorus, orthophosphate, total as P					
1 Pond Cr at Pendleton Road	91	43.9	57.4	.5	7.7
2 Mill Cr at Orell Road	85	4.14	81.8	.9	28.9
3 Pond Cr at Manslick Road	91	48.6	54.7	1.8	19.3
5 SF Beargrass Cr at Winter Avenue	90	7.86	84.7	.3	21.5
6 SF Beargrass Cr at Trevilian Way	90	6.42	92.1	.5	35.1
7 MF Beargrass Cr at Old Cannons Lane	89	4.20	104	1.3	34.7
8 MF Beargrass Cr at Beals Branch Road	90	2.74	85.7	1.2	23.0
9 Spring Ditch at Private Drive	90	1.82	93.1	0	0
10 Muddy Fork at Mockingbird Valley Road	89	3.08	54.8	1.0	4.5
11 Goose Cr at U.S. Highway 42	90	7.60	53.4	.6	3.2
12 Little Goose Cr at U.S. Highway 42	91	5.54	59.4	.2	1.5
13 Goose Cr at Old Westport Road	89	6.48	70.2	0	0
14 Pope Lick at Pope Lick Road	91	2.40	67.3	.3	3.3
15 Floyds Fork at former State Highway 155	90	54.8	76.2	0	0
16 Chenoweth Run at Gelhaus Road	87	16.4	61.1	0	0
17 Fern Cr at Old Bardstown Road	90	5.14	71.9	0	0
18 Northern Ditch at Preston Highway	90	14.0	82.0	.1	.3
19 Fishpool Cr at Bost Road	90	4.42	83.8	0	0
20 Southern Ditch at Minors Lane	91	7.16	84.0	0	0
21 Floyds Fork at Bardstown Road	89	80.5	68.5	1.3	19.2
22 Cedar Cr at Thixton Road	91	8.04	63.5	.5	4.6
23 Pennsylvania Run at Mt. Washington Road	91	4.56	69.0	.8	5.1
24 Mill Cr Cutoff at Dover Road	78	16.9	99.3	.2	12.1
25 Harrods Cr at Hunting Cr Drive	88	31.9	83.7	1.2	16.5
26 Long Run at State Highway 1531	65	22.3	100	0	0
Barium, total as Ba					
1 Pond Cr at Pendleton Road	18	4.52	31.8	10.1	60.6
2 Mill Cr at Orell Road	15	.40	35.9	.9	16.0
3 Pond Cr at Manslick Road	18	4.32	17.8	19.4	74.9
5 SF Beargrass Cr at Winter Avenue	16	1.98	23.1	1.2	27.4
6 SF Beargrass Cr at Trevilian Way	16	1.22	15.4	1.5	24.2
7 MF Beargrass Cr at Old Cannons Lane	16	1.12	13.7	1.3	22.2
8 MF Beargrass Cr at Beals Branch Road	16	1.46	16.5	1.6	28.6
9 Spring Ditch at Private Drive	16	.14	15.4	6.7	37.0
10 Muddy Fork at Mockingbird Valley Road	17	.46	20.2	3.0	33.3
11 Goose Cr at U.S. Highway 42	16	.52	24.9	8.0	34.0
12 Little Goose Cr at U.S. Highway 42	16	.54	30.5	6.7	41.6
13 Goose Cr at Old Westport Road	16	.40	30.9	10.0	34.1
14 Pope Lick at Pope Lick Road	18	.14	89.1	12.9	50.8
15 Floyds Fork at former State Highway 155	18	8.16	36.0	3.0	44.0
16 Chenoweth Run at Gelhaus Road	18	1.06	44.9	11.9	68.6
17 Fern Cr at Old Bardstown Road	17	.60	34.5	0	0
18 Northern Ditch at Preston Highway	16	.98	17.7	8.3	49.4
19 Fishpool Cr at Bost Road	16	.46	46.4	12.3	75.0
20 Southern Ditch at Minors Lane	16	.70	15.9	18.0	77.7
21 Floyds Fork at Bardstown Road	17	17.9	14.7	7.3	68.7
22 Cedar Cr at Thixton Road	17	.78	23.5	8.5	58.6
23 Pennsylvania Run at Mt. Washington Road	17	.32	17.6	12.4	58.5
24 Mill Cr Cutoff at Dover Road	15	.62	15.7	8.2	83.9
25 Harrods Cr at Hunting Cr Drive	16	6.18	62.1	3.6	25.8
26 Long Run at State Highway 1531	12	.90	42.0	3.9	43.8

Table 14. Estimates of mean annual constituent loads in runoff from urban watersheds of Jefferson County, Kentucky, 1988-92--Continued

[Cr, Creek; SF, South Fork; MF, Middle Fork; °C, degrees Celsius]

Site number and name	Number of observations	Mean annual load, in tons	Standard error of regression	Flow duration of greatest sampled discharge, in percent	Percentage of load estimated beyond range of sampled discharge
Chromium, total as Cr					
1 Pond Cr at Pendleton Road	18	2.74	118	10.1	62.3
3 Pond Cr at Manslick Road	18	1.24	110	19.4	57.1
9 Spring Ditch at Private Drive	16	.12	78.9	6.7	63.8
Copper, total recoverable as Cu					
1 Pond Cr at Pendleton Road	18	1.90	87.1	10.1	64.1
3 Pond Cr at Manslick Road	18	2.22	115	19.4	81.4
5 SF Beargrass Cr at Winter Avenue	16	.70	93.6	1.2	35.3
8 MF Beargrass Cr at Beals Branch Road	16	1.24	94.6	1.6	43.4
9 Spring Ditch at Private Drive	16	.06	84.1	6.7	36.1
11 Goose Cr at U.S. Highway 42	16	.22	107	8.0	34.4
13 Goose Cr at Old Westport Road	16	.12	98.1	10.0	26.1
14 Pope Lick at Pope Lick Road	18	.04	84.4	12.9	44.2
15 Floyds Fork at former State Highway 155	18	5.80	87.7	3.0	51.1
16 Chenoweth Run at Gelhaus Road	18	.40	112	11.9	64.5
17 Fern Cr at Old Bardstown Road	17	.14	115	0	0
18 Northern Ditch at Preston Highway	16	.20	67.3	8.3	21.9
20 Southern Ditch at Minors Lane	16	.22	114	18.0	66.3
21 Floyds Fork at Bardstown Road	17	3.16	80.0	7.3	57.9
22 Cedar Cr at Thixton Road	17	.18	92.2	8.5	48.8
23 Pennsylvania Run at Mt. Washington Road	17	.12	104	12.4	55.1
24 Mill Cr Cutoff at Dover Road	15	.08	101	8.2	64.6
26 Long Run at State Highway 1531	12	1.90	72.6	3.9	68.6
Iron, total as Fe					
2 Mill Cr at Orell Road	15	83.2	111	.9	33.2
3 Pond Cr at Manslick Road	18	251	63.8	19.4	85.4
5 SF Beargrass Cr at Winter Avenue	16	857	79.5	1.2	74.8
6 SF Beargrass Cr at Trevilian Way	16	36.7	205	1.5	34.4
7 MF Beargrass Cr at Old Cannons Lane	16	31.4	139	1.3	45.5
8 MF Beargrass Cr at Beals Branch Road	16	55.9	155	1.6	46.9
9 Spring Ditch at Private Drive	16	10.3	140	6.7	60.8
10 Muddy Fork at Mockingbird Valley Road	17	282	105	3.0	85.2
11 Goose Cr at U.S. Highway 42	16	7.92	168	8.0	48.5
12 Little Goose Cr at U.S. Highway 42	16	25.5	101	6.7	60.0
13 Goose Cr at Old Westport Road	16	7.48	173	10.0	38.6
15 Floyds Fork at former State Highway 155	18	3,000	140	3.0	62.4
16 Chenoweth Run at Gelhaus Road	18	5.88	150	11.9	35.3
17 Fern Cr at Old Bardstown Road	17	73.1	164	0	0
18 Northern Ditch at Preston Highway	16	39.2	67.2	8.3	82.5
19 Fishpool Cr at Bost Road	16	4.30	117	12.3	73.1
20 Southern Ditch at Minors Lane	16	8.18	51.9	18.0	70.4
21 Floyds Fork at Bardstown Road	17	1,610	160	7.3	84.6
22 Cedar Cr at Thixton Road	17	6.30	135	8.5	51.2
23 Pennsylvania Run at Mt. Washington Road	17	3.72	166	12.4	34.9
24 Mill Cr Cutoff at Dover Road	15	128	66.4	8.2	93.9
25 Harrods Cr at Hunting Cr Drive	16	1,860	153	3.6	71.0
26 Long Run at State Highway 1531	12	45.7	109	3.9	56.2
Mercury, total recoverable as Hg					
21 Floyds Fork at Bardstown Road	17	.58	99.1	7.3	84.5
22 Cedar Cr at Thixton Road	17	.02	110	8.5	60.9
23 Pennsylvania Run at Mt. Washington Road	17	<.01	84.9	12.4	46.3
Nickel, total as Ni					
6 SF Beargrass Cr at Trevilian Way	15	.24	30.6	1.5	25.7
9 Spring Ditch at Private Drive	16	.06	74.1	6.7	46.5

Table 14. Estimates of mean annual constituent loads in runoff from urban watersheds of Jefferson County, Kentucky, 1988-92--Continued

[Cr, Creek; SF, South Fork; MF, Middle Fork; °C, degrees Celsius]

Site number and name	Number of observations	Mean annual load, in tons	Standard error of regression	Flow duration of greatest sampled discharge, in percent	Percentage of load estimated beyond range of sampled discharge
		Zinc, total as Zn			
1 Pond Cr at Pendleton Road	18	4.44	169	10.1	10.4
2 Mill Cr at Orell Road	15	.42	131	.9	17.7
3 Pond Cr at Manslick Road	18	4.02	144	19.4	61.3
5 SF Beargrass Cr at Winter Avenue	16	15.1	96.1	1.2	67.3
6 SF Beargrass Cr at Trevilian Way	16	9.36	143	1.5	51.5
7 MF Beargrass Cr at Old Cannons Lane	16	3.00	92.1	1.3	32.4
8 MF Beargrass Cr at Beals Branch Road	16	2.90	73.2	1.6	42.2
9 Spring Ditch at Private Drive	16	.82	102	6.7	61.0
10 Muddy Fork at Mockingbird Valley Road	17	10.5	132	3.0	80.2
11 Goose Cr at U.S. Highway 42	16	2.34	137	8.0	47.5
12 Little Goose Cr at U.S. Highway 42	16	.36	112	6.7	20.9
13 Goose Cr at Old Westport Road	16	1.02	164	10.0	39.0
14 Pope Lick at Pope Lick Road	18	.22	78.8	12.9	43.1
15 Floyds Fork at former State Highway 155	18	18.0	85.3	3.0	49.5
16 Chenoweth Run at Gelhaus Road	18	.44	119	11.9	22.5
17 Fern Cr at Old Bardstown Road	17	.90	155	0	0
18 Northern Ditch at Preston Highway	16	1.86	121	8.3	42.2
19 Fishpool Cr at Bost Road	16	.82	119	12.3	77.6
20 Southern Ditch at Minors Lane	16	3.00	120	18.0	85.6
21 Floyds Fork at Bardstown Road	17	9.78	113	7.3	48.5
22 Cedar Cr at Thixton Road	17	.36	98.7	8.5	32.7
23 Pennsylvania Run at Mt. Washington Road	17	.36	116	12.4	37.4
24 Mill Cr Cutoff at Dover Road	14	5.20	94.8	8.2	84.9
25 Harrods Cr at Hunting Cr Drive	16	8.46	149	3.6	27.7
26 Long Run at State Highway 1531	12	4.26	81.0	3.9	65.7
		2,4-D, total			
2 Mill Cr at Orell Road	15	<.01	172	.9	5.5
5 SF Beargrass Cr at Winter Avenue	16	.02	201	1.2	18.2
6 SF Beargrass Cr at Trevilian Way	16	.02	182	1.5	23.9

Table 15. Estimates of mean annual loads of constituents in base flow in urban watersheds of Jefferson County, Kentucky, 1988-92

[Cr, Creek; SF, South Fork; MF, Middle Fork; °C, degrees Celsius]

Site number and name	Number of observations	Mean annual load, in tons	Standard error of regression	Flow duration of greatest sampled discharge, in percent	Percentage of load estimated beyond range of sampled discharge
Dissolved oxygen					
1 Pond Cr at Pendleton Road	65	372	15.4	3.7	22.8
2 Mill Cr at Orell Road	63	29.4	15.7	7.6	54.7
3 Pond Cr at Manslick Road	55	263	16.6	2.6	22.3
5 SF Beargrass Cr at Winter Avenue	72	105	28.9	.4	4.4
6 SF Beargrass Cr at Trevilian Way	61	85.8	12.1	8.2	31.4
7 MF Beargrass Cr at Old Cannons Lane	64	124	24.5	.8	6.2
8 MF Beargrass Cr at Beals Branch Road	70	99.0	24.0	.6	6.0
9 Spring Ditch at Private Drive	70	18.2	28.3	.1	.7
10 Muddy Fork at Mockingbird Valley Road	74	35.8	16.0	2.5	13.3
11 Goose Cr at U.S. Highway 42	68	86.5	11.2	.1	.3
12 Little Goose Cr at U.S. Highway 42	74	58.9	12.4	.3	1.5
13 Goose Cr at old Westport Road	69	71.7	23.3	.6	2.5
14 Pope Lick at Pope Lick Road	63	19.0	17.8	2.4	13.4
15 Floyds Fork at former State Highway 155	37	665	18.8	3.3	18.0
16 Chenoweth Run at Gelhaus Road	69	91.6	17.7	3.8	21.6
17 Fern Cr at Old Bardstown Road	65	33.5	12.1	3.2	13.6
18 Northern Ditch at Preston Highway	71	128	19.4	.4	2.0
19 Fishpool Cr at Bost Road	63	32.0	28.9	.3	3.5
20 Southern Ditch at Minors Lane	59	49.8	23.4	.5	4.4
21 Floyds Fork at Bardstown Road	54	1,060	17.9	9.4	41.9
22 Cedar Cr at Thixton Road	64	85.2	14.1	5.9	35.1
23 Pennsylvania Run at Mt. Washington Road	63	34.7	16.9	1.7	15.1
24 Mill Cr Cutoff at Dover Road	50	17.2	20.0	7.0	36.4
25 Harrods Cr at Hunting Cr Drive	55	612	21.8	1.3	8.1
26 Long Run at State Highway 1531	34	97.2	13.0	2.7	23.7
Chemical oxygen demand, 0.25N dicromate					
1 Pond Cr at Pendleton Road	61	518	57.2	3.7	13.5
2 Mill Cr at Orell Road	60	55.0	57.3	7.6	54.0
3 Pond Cr at Manslick Road	50	403	50.5	2.6	12.5
5 SF Beargrass Cr at Winter Avenue	67	124	66.1	.4	2.5
8 MF Beargrass Cr at Beals Branch Road	66	89.2	62.7	.6	3.2
9 Spring Ditch at Private Drive	65	58.3	71.6	.1	1.5
10 Muddy Fork at Mockingbird Valley Road	69	40.6	63.1	2.5	7.8
11 Goose Cr at U.S. Highway 42	63	109	68.8	.1	.2
12 Little Goose Cr at U.S. Highway 42	68	121	75.9	.3	1.6
13 Goose Cr at old Westport Road	64	96.2	59.8	.6	1.5
14 Pope Lick at Pope Lick Road	59	24.2	59.2	2.4	9.3
15 Floyds Fork at former State Highway 155	34	698	51.3	3.3	13.7
16 Chenoweth Run at Gelhaus Road	64	119	57.2	3.8	16.1
17 Fern Cr at Old Bardstown Road	61	34.8	61.5	3.2	9.8
18 Northern Ditch at Preston Highway	67	162	66.2	.4	1.0
19 Fishpool Cr at Bost Road	58	43.5	60.6	.3	2.1
20 Southern Ditch at Minors Lane	53	63.2	58.3	.7	3.2
21 Floyds Fork at Bardstown Road	50	1,100	65.7	9.4	33.9
22 Cedar Cr at Thixton Road	60	79.7	61.2	5.9	23.7
23 Pennsylvania Run at Mt. Washington Road	60	62.6	51.5	1.7	18.6
24 Mill Cr Cutoff at Dover Road	45	39.6	37.5	7.0	42.2
25 Harrods Cr at Hunting Cr Drive	52	659	56.2	1.3	3.6
26 Long Run at State Highway 1531	30	91.1	58.4	2.7	22.1
Biochemical oxygen demand, 5-day at 20°C					
1 Pond Cr at Pendleton Road	61	192	74.7	3.7	17.2
2 Mill Cr at Orell Road	60	10.5	60.1	7.6	39.6
3 Pond Cr at Manslick Road	51	155	62.3	2.6	23.9
5 SF Beargrass Cr at Winter Avenue	69	54.6	74.9	.4	4.4
6 SF Beargrass Cr at Trevilian Way	59	51.2	73.5	8.2	22.5
7 MF Beargrass Cr at Old Cannons Lane	61	38.3	57.4	.8	2.9
8 MF Beargrass Cr at Beals Branch Road	68	30.2	62.0	.6	2.7
9 Spring Ditch at Private Drive	66	10.5	68.4	.1	1.1
10 Muddy Fork at Mockingbird Valley Road	70	13.0	63.7	2.5	8.4
11 Goose Cr at U.S. Highway 42	64	45.3	74.0	.1	.2
12 Little Goose Cr at U.S. Highway 42	70	27.8	77.1	.3	1.2
13 Goose Cr at old Westport Road	66	43.0	73.3	.6	1.6
14 Pope Lick at Pope Lick Road	59	8.90	57.9	2.4	10.5
15 Floyds Fork at former State Highway 155	35	236	56.3	3.3	12.5
16 Chenoweth Run at Gelhaus Road	65	48.7	60.6	3.8	16.9
17 Fern Cr at Old Bardstown Road	62	14.9	68.4	3.2	13.8
18 Northern Ditch at Preston Highway	68	63.2	75.7	.4	1.6
19 Fishpool Cr at Bost Road	59	11.9	62.4	.3	1.8
20 Southern Ditch at Minors Lane	54	23.3	48.6	.7	5.1
21 Floyds Fork at Bardstown Road	50	416	65.5	9.4	33.4
22 Cedar Cr at Thixton Road	61	31.2	76.7	5.9	24.6
23 Pennsylvania Run at Mt. Washington Road	60	16.4	59.7	1.7	24.3
24 Mill Cr Cutoff at Dover Road	47	11.6	74.5	7.0	29.8
25 Harrods Cr at Hunting Cr Drive	52	262	74.2	1.3	7.0
26 Long Run at State Highway 1531	30	37.4	70.3	2.7	17.7

Table 15. Estimates of mean annual loads of constituents in base flow in urban watersheds of Jefferson County, Kentucky, 1988-92--Continued

[Cr, Creek; SF, South Fork; MF, Middle Fork; °C, degrees Celsius]

Site number and name	Number of observations	Mean annual load, in tons	Standard error of regression	Flow duration of greatest sampled discharge, in percent	Percentage of load estimated beyond range of sampled discharge
Calcium, total as Ca					
1 Pond Cr at Pendleton Road	15	2,170	14.6	5.9	23.9
2 Mill Cr at Orell Road	14	108	41.0	10.6	43.7
3 Pond Cr at Manslick Road	13	1,620	11.8	2.6	19.4
5 SF Beargrass Cr at Winter Avenue	14	765	22.2	4.4	27.1
6 SF Beargrass Cr at Trevilian Way	12	605	10.7	8.2	31.3
9 Spring Ditch at Private Drive	13	123	15.7	3.7	13.4
10 Muddy Fork at Mockingbird Valley Road	12	384	8.8	11.0	47.0
11 Goose Cr at U.S. Highway 42	14	458	11.8	19.6	47.5
12 Little Goose Cr at U.S. Highway 42	13	320	12.9	.3	1.3
13 Goose Cr at old Westport Road	14	344	13.7	8.2	23.1
14 Pope Lick at Pope Lick Road	15	116	9.4	8.7	32.0
15 Floyds Fork at former State Highway 155	10	3,860	10.1	11.9	43.2
16 Chenoweth Run at Gelhaus Road	16	472	20.2	5.9	28.1
17 Fern Cr at Old Bardstown Road	12	192	8.1	4.5	17.2
18 Northern Ditch at Preston Highway	12	614	7.7	.4	1.8
21 Floyds Fork at Bardstown Road	10	6,180	17.9	25.8	69.7
22 Cedar Cr at Thixton Road	12	586	28.7	5.9	39.2
23 Pennsylvania Run at Mt. Washington Road	13	162	28.8	1.7	16.4
25 Harrods Cr at Hunting Cr Drive	10	3,010	10.1	8.6	30.6
Magnesium, total as Mg					
1 Pond Cr at Pendleton Road	15	800	15.9	5.9	23.7
2 Mill Cr at Orell Road	14	38.1	49.5	10.6	42.5
3 Pond Cr at Manslick Road	13	629	9.8	2.6	19.7
5 SF Beargrass Cr at Winter Avenue	14	164	20.4	4.4	27.3
6 SF Beargrass Cr at Trevilian Way	12	143	7.9	8.2	30.4
9 Spring Ditch at Private Drive	13	32.2	16.3	3.7	14.4
10 Muddy Fork at Mockingbird Valley Road	12	51.9	14.4	11.0	40.5
11 Goose Cr at U.S. Highway 42	14	193	12.3	19.6	49.2
12 Little Goose Cr at U.S. Highway 42	13	110	12.5	.3	1.3
13 Goose Cr at old Westport Road	14	144	12.4	8.2	23.7
14 Pope Lick at Pope Lick Road	15	50.0	9.8	8.7	34.5
15 Floyds Fork at former State Highway 155	10	966	12.7	11.9	39.8
16 Chenoweth Run at Gelhaus Road	15	177	15.9	5.9	32.4
17 Fern Cr at Old Bardstown Road	12	84.1	10.2	4.5	17.7
18 Northern Ditch at Preston Highway	12	242	12.7	.4	2.0
21 Floyds Fork at Bardstown Road	10	2,290	15.4	25.8	74.5
22 Cedar Cr at Thixton Road	12	302	36.1	5.9	44.4
23 Pennsylvania Run at Mt. Washington Road	13	80.4	21.6	1.7	18.0
25 Harrods Cr at Hunting Cr Drive	10	1,380	10.6	8.6	27.9
Alkalinity, titration to 4.5, as $CaCO_3$					
1 Pond Cr at Pendleton Road	63	6,060	25.3	3.7	20.2
2 Mill Cr at Orell Road	61	603	42.8	7.6	60.6
3 Pond Cr at Manslick Road	52	5,270	16.2	2.6	23.8
5 SF Beargrass Cr at Winter Avenue	68	2,010	22.1	.4	4.4
6 SF Beargrass Cr at Trevilian Way	58	1,860	20.4	8.2	40.6
7 MF Beargrass Cr at Old Cannons Lane	61	2,090	18.5	.8	5.8
8 MF Beargrass Cr at Beals Branch Road	68	2,030	14.1	.6	5.1
9 Spring Ditch at Private Drive	66	313	29.7	.1	.4
10 Muddy Fork at Mockingbird Valley Road	70	851	21.7	2.5	14.2
11 Goose Cr at U.S. Highway 42	65	1,560	14.8	.1	.3
12 Little Goose Cr at U.S. Highway 42	70	1,060	13.1	.3	1.4
13 Goose Cr at old Westport Road	66	1,160	19.9	.6	2.5
14 Pope Lick at Pope Lick Road	59	417	15.1	2.4	12.9
15 Floyds Fork at former State Highway 155	35	10,700	28.0	3.3	15.8
16 Chenoweth Run at Gelhaus Road	65	1,510	17.2	3.8	24.6
17 Fern Cr at Old Bardstown Road	62	734	27.7	3.2	18.0
18 Northern Ditch at Preston Highway	68	2,110	13.5	.4	2.1
19 Fishpool Cr at Bost Road	59	502	16.6	.3	3.2
20 Southern Ditch at Minors Lane	54	807	18.4	.7	5.8
21 Floyds Fork at Bardstown Road	50	21,000	40.3	9.4	43.4
22 Cedar Cr at Thixton Road	61	1,600	39.7	5.9	40.0
23 Pennsylvania Run at Mt. Washington Road	60	570	22.0	1.7	17.6
24 Mill Cr Cutoff at Dover Road	46	233	27.3	7.2	36.1
25 Harrods Cr at Hunting Cr Drive	52	11,500	14.7	1.3	6.8
26 Long Run at State Highway 1531	30	1,730	16.5	2.7	25.0

Table 15. Estimates of mean annual loads of constituents in base flow in urban watersheds of Jefferson County, Kentucky, 1988-92--Continued

[Cr, Creek; SF, South Fork; MF, Middle Fork; °C, degrees Celsius]

Site number and name	Number of observations	Mean annual load, in tons	Standard error of regression	Flow duration of greatest sampled discharge, in percent	Percentage of load estimated beyond range of sampled discharge
Dissolved solids, residue at 105°C					
1 Pond Cr at Pendleton Road	63	13,300	22.4	3.7	16.0
2 Mill Cr at Orell Road	61	838	47.4	7.6	48.0
3 Pond Cr at Manslick Road	52	11,200	20.7	2.6	16.4
5 SF Beargrass Cr at Winter Avenue	69	3,690	35.6	.4	3.1
6 SF Beargrass Cr at Trevilian Way	59	3,160	13.2	8.2	31.7
7 MF Beargrass Cr at Old Cannons Lane	61	3,440	16.2	.8	5.4
8 MF Beargrass Cr at Beals Branch Road	68	3,430	18.2	.6	4.9
9 Spring Ditch at Private Drive	66	669	15.2	.1	.5
10 Muddy Fork at Mockingbird Valley Road	70	1,700	14.4	2.5	12.7
11 Goose Cr at U.S. Highway 42	65	2,520	11.6	.1	.2
12 Little Goose Cr at U.S. Highway 42	70	1,790	11.1	.3	1.2
13 Goose Cr at old Westport Road	66	2,050	32.6	.6	1.9
14 Pope Lick at Pope Lick Road	58	694	13.1	2.4	9.6
15 Floyds Fork at former State Highway 155	35	17,400	13.0	3.3	15.8
16 Chenoweth Run at Gelhaus Road	65	2,780	10.3	3.8	17.0
17 Fern Cr at Old Bardstown Road	61	1,260	12.4	3.2	11.2
18 Northern Ditch at Preston Highway	67	4,030	23.8	.4	1.3
19 Fishpool Cr at Bost Road	59	1,090	18.5	.3	2.9
20 Southern Ditch at Minors Lane	53	1,840	12.6	.7	5.4
21 Floyds Fork at Bardstown Road	50	28,300	14.9	9.4	36.4
22 Cedar Cr at Thixton Road	60	2,770	24.3	5.9	25.2
23 Pennsylvania Run at Mt. Washington Road	60	1,290	32.0	1.7	17.4
24 Mill Cr Cutoff at Dover Road	47	538	20.6	7.0	39.5
25 Harrods Cr at Hunting Cr Drive	52	16,200	14.0	1.3	4.9
26 Long Run at State Highway 1531	30	2,450	14.6	2.7	24.1
Suspended solids, residue at 105°C					
1 Pond Cr at Pendleton Road	63	1,000	78.1	3.7	29.4
2 Mill Cr at Orell Road	61	27.7	73.7	7.6	27.3
3 Pond Cr at Manslick Road	52	1,100	53.1	2.6	21.4
5 SF Beargrass Cr at Winter Avenue	68	228	78.9	.4	3.8
6 SF Beargrass Cr at Trevilian Way	59	148	71.8	8.2	29.7
7 MF Beargrass Cr at Old Cannons Lane	61	66.6	72.1	.8	4.1
8 MF Beargrass Cr at Beals Branch Road	68	96.4	91.3	.6	3.7
9 Spring Ditch at Private Drive	66	45.6	93.8	.1	.9
10 Muddy Fork at Mockingbird Valley Road	70	90.0	93.2	2.5	11.1
11 Goose Cr at U.S. Highway 42	65	80.8	70.7	.1	.3
12 Little Goose Cr at U.S. Highway 42	70	96.5	82.7	.3	1.5
13 Goose Cr at old Westport Road	66	157	98.6	.6	2.0
14 Pope Lick at Pope Lick Road	59	26.2	86.3	2.4	13.0
15 Floyds Fork at former State Highway 155	35	662	85.3	3.3	12.1
16 Chenoweth Run at Gelhaus Road	65	75.9	84.5	3.8	23.3
17 Fern Cr at Old Bardstown Road	61	56.5	81.6	3.2	17.4
18 Northern Ditch at Preston Highway	68	124	79.6	.4	1.8
19 Fishpool Cr at Bost Road	59	46.6	89.7	.3	2.8
20 Southern Ditch at Minors Lane	53	79.5	73.0	.7	6.7
21 Floyds Fork at Bardstown Road	50	1,230	71.6	9.4	40.4
22 Cedar Cr at Thixton Road	60	47.2	88.5	5.9	14.1
23 Pennsylvania Run at Mt. Washington Road	60	64.1	105	1.7	8.0
24 Mill Cr Cutoff at Dover Road	47	16.9	74.3	7.0	42.7
25 Harrods Cr at Hunting Cr Drive	52	1,200	72.6	1.3	3.0
26 Long Run at State Highway 1531	30	110	90.7	2.7	21.9
Residue, volatile nonfilterable					
1 Pond Cr at Pendleton Road	63	179	83.8	3.7	13.5
2 Mill Cr at Orell Road	61	20.8	134	7.6	47.7
3 Pond Cr at Manslick Road	52	233	103	2.6	11.5
5 SF Beargrass Cr at Winter Avenue	68	158	127	.4	3.9
6 SF Beargrass Cr at Trevilian Way	59	62.4	99.7	8.2	32.8
7 MF Beargrass Cr at Old Cannons Lane	61	85.6	109	.8	5.0
8 MF Beargrass Cr at Beals Branch Road	68	35.7	93.7	.6	3.1
9 Spring Ditch at Private Drive	66	16.1	94.8	.1	.5
10 Muddy Fork at Mockingbird Valley Road	70	25.1	99.1	2.5	9.9
11 Goose Cr at U.S. Highway 42	65	39.4	127	.1	.2
12 Little Goose Cr at U.S. Highway 42	70	60.9	125	.3	1.3
13 Goose Cr at old Westport Road	66	66.7	129	.6	1.9
14 Pope Lick at Pope Lick Road	59	13.2	100	2.4	9.5
15 Floyds Fork at former State Highway 155	35	202	106	3.3	12.5
16 Chenoweth Run at Gelhaus Road	65	36.5	167	3.8	14.3
17 Fern Cr at Old Bardstown Road	61	23.7	100	3.2	16.6
18 Northern Ditch at Preston Highway	68	65.1	117	.4	1.7
19 Fishpool Cr at Bost Road	59	20.9	128	.3	3.0
20 Southern Ditch at Minors Lane	53	32.3	109	.7	4.8
21 Floyds Fork at Bardstown Road	50	548	101	9.4	46.6
22 Cedar Cr at Thixton Road	60	38.0	130	5.9	28.9
23 Pennsylvania Run at Mt. Washington Road	60	20.7	124	1.7	12.3
24 Mill Cr Cutoff at Dover Road	47	6.40	91.4	7.0	34.9
25 Harrods Cr at Hunting Cr Drive	52	526	125	1.3	3.9
26 Long Run at State Highway 1531	30	27.2	96.0	2.7	18.1

Table 15. Estimates of mean annual loads of constituents in base flow in urban watersheds of Jefferson County, Kentucky, 1988-92--Continued

[Cr, Creek; SF, South Fork; MF, Middle Fork; °C, degrees Celsius]

Site number and name	Number of observations	Mean annual load, in tons	Standard error of regression	Flow duration of greatest sampled discharge, in percent	Percentage of load estimated beyond range of sampled discharge
Suspended solids, nonvolatile					
1 Pond Cr at Pendleton Road	16	537	123	12.0	44.2
2 Mill Cr at Orell Road	16	110	60.8	9.8	69.1
3 Pond Cr at Manslick Road	14	851	78.3	2.6	24.4
5 SF Beargrass Cr at Winter Avenue	15	120	316	.4	4.0
7 MF Beargrass Cr at Old Cannons Lane	13	24.1	66.6	.8	8.2
8 MF Beargrass Cr at Beals Branch Road	16	30.9	54.9	.6	5.1
9 Spring Ditch at Private Drive	15	10.0	52.8	.1	.5
10 Muddy Fork at Mockingbird Valley Road	13	23.9	101	4.3	20.3
11 Goose Cr at U.S. Highway 42	13	27.0	79.3	.9	2.1
12 Little Goose Cr at U.S. Highway 42	15	39.7	81.8	.3	1.4
13 Goose Cr at old Westport Road	13	148	88.4	2.0	1.7
14 Pope Lick at Pope Lick Road	13	104	287	19.2	90.4
16 Chenoweth Run at Gelhaus Road	15	1,440	274	7.6	5.5
17 Fern Cr at Old Bardstown Road	15	21.4	78.1	3.4	16.0
18 Northern Ditch at Preston Highway	14	72.3	51.8	19.6	27.9
19 Fishpool Cr at Bost Road	12	22.5	52.8	13.0	64.6
20 Southern Ditch at Minors Lane	12	23.8	63.7	10.0	31.7
21 Floyds Fork at Bardstown Road	10	711	48.2	9.4	44.3
23 Pennsylvania Run at Mt. Washington Road	13	15.7	82.8	1.7	10.8
24 Mill Cr Cutoff at Dover Road	14	18.6	60.4	20.4	87.5
25 Harrods Cr at Hunting Cr Drive	11	554	74.4	8.1	23.9
Nitrogen, nitrate, total as N					
1 Pond Cr at Pendleton Road	63	78.4	82.8	3.7	19.1
2 Mill Cr at Orell Road	61	2.38	110	7.6	38.5
3 Pond Cr at Manslick Road	52	55.5	92.8	2.6	13.4
5 SF Beargrass Cr at Winter Avenue	68	25.5	75.3	.4	7.2
6 SF Beargrass Cr at Trevilian Way	58	16.1	86.1	8.2	35.7
7 MF Beargrass Cr at Old Cannons Lane	61	23.8	88.4	.8	6.2
8 MF Beargrass Cr at Beals Branch Road	68	22.4	82.1	.6	6.1
9 Spring Ditch at Private Drive	66	4.02	95.8	.1	.7
10 Muddy Fork at Mockingbird Valley Road	70	12.8	89.3	2.5	6.0
11 Goose Cr at U.S. Highway 42	64	27.6	50.7	.1	.3
12 Little Goose Cr at U.S. Highway 42	68	24.2	48.5	.3	1.5
13 Goose Cr at old Westport Road	65	20.3	66.2	.6	2.5
14 Pope Lick at Pope Lick Road	59	5.08	91.0	2.4	6.5
15 Floyds Fork at former State Highway 155	35	49.7	113	3.3	13.8
16 Chenoweth Run at Gelhaus Road	64	26.0	79.2	3.8	10.7
17 Fern Cr at Old Bardstown Road	61	13.9	87.9	3.2	10.2
18 Northern Ditch at Preston Highway	68	36.6	111	.4	.8
19 Fishpool Cr at Bost Road	59	8.82	104	.3	2.3
20 Southern Ditch at Minors Lane	54	12.7	97.8	.7	6.2
21 Floyds Fork at Bardstown Road	50	111	65.1	9.4	36.6
22 Cedar Cr at Thixton Road	61	18.1	63.0	5.9	18.9
23 Pennsylvania Run at Mt. Washington Road	60	9.84	84.1	1.7	11.2
24 Mill Cr Cutoff at Dover Road	46	3.66	90.0	7.0	37.0
25 Harrods Cr at Hunting Cr Drive	51	115	49.2	1.3	8.8
26 Long Run at State Highway 1531	30	7.98	118	2.7	22.8
Nitrogen, nitrite, total as N					
1 Pond Cr at Pendleton Road	63	2.86	71.5	3.7	26.6
3 Pond Cr at Manslick Road	52	2.60	57.4	2.6	20.3
5 SF Beargrass Cr at Winter Avenue	69	.46	58.1	.4	2.1
6 SF Beargrass Cr at Trevilian Way	59	.28	48.7	8.2	20.0
7 MF Beargrass Cr at Old Cannons Lane	61	.16	78.4	.8	2.8
8 MF Beargrass Cr at Beals Branch Road	68	.16	62.4	.6	2.4
9 Spring Ditch at Private Drive	66	.08	57.6	.1	.5
10 Muddy Fork at Mockingbird Valley Road	70	.20	73.5	2.5	11.8
11 Goose Cr at U.S. Highway 42	65	.40	74.9	.1	.4
12 Little Goose Cr at U.S. Highway 42	70	.24	83.1	.3	1.5
13 Goose Cr at old Westport Road	66	.64	110	.6	3.0
14 Pope Lick at Pope Lick Road	59	.16	82.7	2.4	8.3
15 Floyds Fork at former State Highway 155	35	1.18	80.5	3.3	14.8
16 Chenoweth Run at Gelhaus Road	65	.76	117	3.8	14.5
17 Fern Cr at Old Bardstown Road	62	.20	89.1	3.2	12.0
18 Northern Ditch at Preston Highway	68	.68	56.7	.4	.8
19 Fishpool Cr at Bost Road	59	.32	111	.3	2.1
20 Southern Ditch at Minors Lane	54	.36	70.6	.7	5.0
21 Floyds Fork at Bardstown Road	50	1.62	66.5	9.4	38.1
22 Cedar Cr at Thixton Road	61	.24	79.9	5.9	19.4
23 Pennsylvania Run at Mt. Washington Road	60	.42	81.9	1.7	16.9
24 Mill Cr Cutoff at Dover Road	47	.30	104	7.0	53.9
25 Harrods Cr at Hunting Cr Drive	52	2.64	98.7	1.3	7.0

Table 15. Estimates of mean annual loads of constituents in base flow in urban watersheds of Jefferson County, Kentucky, 1988-92--Continued

[Cr, Creek; SF, South Fork; MF, Middle Fork; °C, degrees Celsius]

Site number and name	Number of observations	Mean annual load, in tons	Standard error of regression	Flow duration of greatest sampled discharge, in percent	Percentage of load estimated beyond range of sampled discharge
Nitrogen, ammonia, total as N					
1 Pond Cr at Pendleton Road	61	8.48	173	3.7	22.4
2 Mill Cr at Orell Road	59	.10	149	7.6	9.4
3 Pond Cr at Manslick Road	51	15.5	198	2.6	44.0
5 SF Beargrass Cr at Winter Avenue	67	2.98	193	.4	4.8
6 SF Beargrass Cr at Trevilian Way	58	3.00	184	8.2	9.8
7 MF Beargrass Cr at Old Cannons Lane	59	.48	156	.8	2.9
8 MF Beargrass Cr at Beals Branch Road	66	.86	165	.6	1.6
9 Spring Ditch at Private Drive	65	.34	197	.1	.7
10 Muddy Fork at Mockingbird Valley Road	69	.24	158	2.5	4.5
11 Goose Cr at U.S. Highway 42	65	.98	178	.1	.3
12 Little Goose Cr at U.S. Highway 42	70	.44	161	.3	1.5
14 Pope Lick at Pope Lick Road	59	.40	167	2.4	1.9
17 Fern Cr at Old Bardstown Road	60	.70	190	3.2	16.2
18 Northern Ditch at Preston Highway	68	3.08	215	.4	.6
19 Fishpool Cr at Bost Road	59	.30	177	.3	2.3
20 Southern Ditch at Minors Lane	54	.72	185	.7	6.9
21 Floyds Fork at Bardstown Road	50	11.7	173	9.4	30.0
22 Cedar Cr at Thixton Road	60	1.02	179	5.9	10.4
23 Pennsylvania Run at Mt. Washington Road	58	.56	177	1.7	9.8
24 Mill Cr Cutoff at Dover Road	46	.78	160	7.0	64.7
Nitrogen, organic, dissolved as N					
1 Pond Cr at Pendleton Road	62	22.4	121	3.7	23.0
2 Mill Cr at Orell Road	61	.72	124	7.6	28.6
3 Pond Cr at Manslick Road	51	16.3	111	2.6	15.7
5 SF Beargrass Cr at Winter Avenue	69	5.06	140	.4	3.1
6 SF Beargrass Cr at Trevilian Way	59	2.88	130	8.2	24.7
7 MF Beargrass Cr at Old Cannons Lane	61	2.54	132	.8	4.0
8 MF Beargrass Cr at Beals Branch Road	68	2.18	128	.6	2.4
9 Spring Ditch at Private Drive	66	1.38	152	.1	1.1
10 Muddy Fork at Mockingbird Valley Road	70	1.00	137	2.5	7.4
11 Goose Cr at U.S. Highway 42	65	3.16	145	.1	.3
12 Little Goose Cr at U.S. Highway 42	69	1.78	141	.3	.9
13 Goose Cr at old Westport Road	66	3.68	154	.6	2.3
14 Pope Lick at Pope Lick Road	59	1.10	132	2.4	12.6
15 Floyds Fork at former State Highway 155	35	27.3	105	3.3	16.9
16 Chenoweth Run at Gelhaus Road	65	4.30	151	3.8	21.0
17 Fern Cr at Old Bardstown Road	62	1.30	119	3.2	5.6
18 Northern Ditch at Preston Highway	68	7.62	154	.4	2.1
19 Fishpool Cr at Bost Road	59	1.28	140	.3	2.4
20 Southern Ditch at Minors Lane	54	2.24	149	.7	5.8
21 Floyds Fork at Bardstown Road	49	30.9	127	9.4	33.3
22 Cedar Cr at Thixton Road	61	3.56	120	5.9	32.0
23 Pennsylvania Run at Mt. Washington Road	60	3.30	141	1.7	20.5
24 Mill Cr Cutoff at Dover Road	47	1.38	143	7.0	49.2
25 Harrods Cr at Hunting Cr Drive	52	33.3	123	1.3	9.6
26 Long Run at State Highway 1531	30	2.00	116	2.7	18.1
Phosphate, total as PO_4					
1 Pond Cr at Pendleton Road	63	59.4	47.7	3.7	12.2
2 Mill Cr at Orell Road	59	2.30	78.4	7.6	59.4
3 Pond Cr at Manslick Road	52	57.2	50.1	2.6	9.2
5 SF Beargrass Cr at Winter Avenue	68	4.14	86.7	.4	5.2
6 SF Beargrass Cr at Trevilian Way	57	1.84	79.2	8.2	36.3
7 MF Beargrass Cr at Old Cannons Lane	56	3.06	104	3.8	15.6
8 MF Beargrass Cr at Beals Branch Road	64	1.86	72.7	3.8	13.4
9 Spring Ditch at Private Drive	63	3.28	74.7	.1	.3
10 Muddy Fork at Mockingbird Valley Road	69	7.14	52.0	2.5	2.9
11 Goose Cr at U.S. Highway 42	65	16.6	47.1	.1	.1
12 Little Goose Cr at U.S. Highway 42	70	10.3	55.5	.3	.6
13 Goose Cr at old Westport Road	65	12.9	70.0	.6	1.0
14 Pope Lick at Pope Lick Road	58	3.82	59.1	2.4	4.2
15 Floyds Fork at former State Highway 155	35	22.1	77.3	3.3	14.3
16 Chenoweth Run at Gelhaus Road	62	20.9	44.4	3.8	8.5
17 Fern Cr at Old Bardstown Road	61	9.28	70.8	3.2	6.7
18 Northern Ditch at Preston Highway	67	30.1	66.7	.4	.7
19 Fishpool Cr at Bost Road	57	6.78	68.5	.3	1.6
20 Southern Ditch at Minors Lane	53	9.02	57.8	.7	3.5
21 Floyds Fork at Bardstown Road	49	47.0	55.6	9.4	20.6
22 Cedar Cr at Thixton Road	60	15.0	62.4	5.9	19.1
23 Pennsylvania Run at Mt. Washington Road	59	10.2	68.2	1.7	14.7
24 Mill Cr Cutoff at Dover Road	46	7.06	109	7.0	61.0
25 Harrods Cr at Hunting Cr Drive	51	29.7	76.4	1.3	2.8
26 Long Run at State Highway 1531	30	2.84	83.2	2.7	35.1

Table 15. Estimates of mean annual loads of constituents in base flow in urban watersheds of Jefferson County, Kentucky, 1988-92--Continued

[Cr, Creek; SF, South Fork; MF, Middle Fork; °C, degrees Celsius]

Site number and name	Number of obser-vations	Mean annual load, in tons	Standard error of regression	Flow duration of greatest sampled discharge, in percent	Percentage of load estimated beyond range of sampled discharge
		Phosphorus, total as P			
1 Pond Cr at Pendleton Road	61	22.0	52.0	3.7	9.4
2 Mill Cr at Orell Road	60	1.24	85.2	7.6	60.6
3 Pond Cr at Manslick Road	49	21.7	50.9	2.6	7.9
5 SF Beargrass Cr at Winter Avenue	68	2.34	84.6	.4	5.1
6 SF Beargrass Cr at Trevilian Way	56	.80	67.7	8.2	28.9
7 MF Beargrass Cr at Old Cannons Lane	59	1.36	89.6	.8	5.3
8 MF Beargrass Cr at Beals Branch Road	65	1.34	85.4	.6	3.1
9 Spring Ditch at Private Drive	61	1.58	62.5	.1	.5
10 Muddy Fork at Mockingbird Valley Road	68	3.20	64.7	2.5	4.2
11 Goose Cr at U.S. Highway 42	63	6.70	51.8	.1	.1
12 Little Goose Cr at U.S. Highway 42	68	4.98	75.9	.3	.6
13 Goose Cr at old Westport Road	65	5.52	68.1	.6	1.0
14 Pope Lick at Pope Lick Road	56	1.82	68.1	2.4	3.9
15 Floyds Fork at former State Highway 155	32	11.1	68.2	3.3	18.5
16 Chenoweth Run at Gelhaus Road	63	9.06	64.4	3.8	8.3
17 Fern Cr at Old Bardstown Road	60	4.78	70.4	3.2	6.9
18 Northern Ditch at Preston Highway	65	14.4	69.1	.4	1.1
19 Fishpool Cr at Bost Road	55	3.02	66.7	.3	1.8
20 Southern Ditch at Minors Lane	52	3.80	63.7	.7	3.4
21 Floyds Fork at Bardstown Road	46	19.6	57.5	9.4	21.0
22 Cedar Cr at Thixton Road	58	6.56	60.8	5.9	17.7
23 Pennsylvania Run at Mt. Washington Road	58	4.82	76.0	1.7	12.2
24 Mill Cr Cutoff at Dover Road	47	2.58	92.6	7.0	57.9
25 Harrods Cr at Hunting Cr Drive	51	13.2	71.6	1.3	3.3
26 Long Run at State Highway 1531	30	1.22	86.6	2.7	28.0
		Phosphorus, orthophosphate, total as P			
1 Pond Cr at Pendleton Road	63	19.4	47.7	3.7	12.2
2 Mill Cr at Orell Road	60	.76	85.6	7.6	59.4
3 Pond Cr at Manslick Road	52	18.6	50.1	2.6	9.2
5 SF Beargrass Cr at Winter Avenue	68	1.36	86.8	.4	5.2
6 SF Beargrass Cr at Trevilian Way	58	.58	83.9	8.2	35.4
7 MF Beargrass Cr at Old Cannons Lane	60	.88	117	.8	4.2
8 MF Beargrass Cr at Beals Branch Road	67	.54	82.6	.6	2.3
9 Spring Ditch at Private Drive	65	1.04	103	.1	.3
10 Muddy Fork at Mockingbird Valley Road	69	2.34	52.0	2.5	2.9
11 Goose Cr at U.S. Highway 42	65	5.40	47.1	.1	.1
12 Little Goose Cr at U.S. Highway 42	70	3.34	55.5	.3	.6
13 Goose Cr at old Westport Road	65	4.22	70.0	.6	1.0
14 Pope Lick at Pope Lick Road	58	1.24	59.1	2.4	4.2
15 Floyds Fork at former State Highway 155	35	7.22	77.3	3.3	14.3
16 Chenoweth Run at Gelhaus Road	62	6.82	44.4	3.8	8.5
17 Fern Cr at Old Bardstown Road	61	3.02	70.8	3.2	6.7
18 Northern Ditch at Preston Highway	67	9.84	66.7	.4	.7
19 Fishpool Cr at Bost Road	58	2.10	92.3	.3	1.4
20 Southern Ditch at Minors Lane	54	2.66	84.3	.7	2.8
21 Floyds Fork at Bardstown Road	49	15.3	55.6	9.4	20.6
22 Cedar Cr at Thixton Road	60	4.90	62.4	5.9	19.1
23 Pennsylvania Run at Mt. Washington Road	59	3.32	68.2	1.7	14.7
24 Mill Cr Cutoff at Dover Road	46	2.30	109	7.0	61.0
25 Harrods Cr at Hunting Cr Drive	51	9.68	76.4	1.3	2.8
26 Long Run at State Highway 1531	30	.92	83.3	2.7	35.1
		Barium, total as Ba			
1 Pond Cr at Pendleton Road	15	1.50	34.2	5.9	25.8
2 Mill Cr at Orell Road	14	.12	37.1	10.6	54.0
3 Pond Cr at Manslick Road	13	1.34	20.7	2.6	21.8
5 SF Beargrass Cr at Winter Avenue	14	.56	19.1	4.4	20.2
6 SF Beargrass Cr at Trevilian Way	12	.48	12.8	8.2	27.7
9 Spring Ditch at Private Drive	13	.08	13.8	3.7	13.4
10 Muddy Fork at Mockingbird Valley Road	12	.18	14.9	11.0	38.7
11 Goose Cr at U.S. Highway 42	14	.34	26.8	19.6	46.8
12 Little Goose Cr at U.S. Highway 42	13	.24	27.4	.3	1.3
13 Goose Cr at old Westport Road	14	.28	33.5	8.2	19.9
14 Pope Lick at Pope Lick Road	15	.06	33.1	8.7	29.4
15 Floyds Fork at former State Highway 155	10	1.46	44.0	11.9	35.9
16 Chenoweth Run at Gelhaus Road	16	.34	35.3	5.9	32.7
17 Fern Cr at Old Bardstown Road	12	.14	9.8	4.5	17.6
18 Northern Ditch at Preston Highway	12	.42	15.9	.4	2.2
21 Floyds Fork at Bardstown Road	10	3.04	13.4	25.8	64.5
22 Cedar Cr at Thixton Road	12	.28	26.8	5.9	35.3
23 Pennsylvania Run at Mt. Washington Road	13	.12	19.5	1.7	12.6
25 Harrods Cr at Hunting Cr Drive	10	1.62	29.7	8.6	11.4

Table 15. Estimates of mean annual loads of constituents in base flow in urban watersheds of Jefferson County, Kentucky, 1988-92--Continued

[Cr, Creek; SF, South Fork; MF, Middle Fork; °C, degrees Celsius]

Site number and name	Number of obser-vations	Mean annual load, in tons	Standard error of regression	Flow duration of greatest sampled discharge, in percent	Percentage of load estimated beyond range of sampled discharge
Chromium, total as Cr					
1 Pond Cr at Pendleton Road	15	0.80	128	5.9	14.8
3 Pond Cr at Manslick Road	13	.66	131	2.6	2.2
9 Spring Ditch at Private Drive	13	.02	79.0	3.7	18.8
Copper, total recoverable as Cu					
1 Pond Cr at Pendleton Road	15	.40	96.5	5.9	12.7
3 Pond Cr at Manslick Road	13	.64	94.9	2.6	26.0
5 SF Beargrass Cr at Winter Avenue	14	.14	100	4.4	24.4
9 Spring Ditch at Private Drive	13	.02	79.8	3.7	9.8
11 Goose Cr at U.S. Highway 42	14	.14	116	19.6	44.1
13 Goose Cr at old Westport Road	14	.06	80.7	8.2	8.5
14 Pope Lick at Pope Lick Road	15	.02	61.9	8.7	27.0
15 Floyds Fork at former State Highway 155	10	.66	91.5	11.9	32.4
17 Fern Cr at Old Bardstown Road	12	.04	94.4	4.5	11.5
18 Northern Ditch at Preston Highway	12	.14	42.0	.4	.7
22 Cedar Cr at Thixton Road	12	.04	79.6	5.9	13.7
23 Pennsylvania Run at Mt. Washington Road	13	.04	94.3	1.7	9.8
Iron, total as Fe					
2 Mill Cr at Orell Road	14	8.82	116	10.6	60.5
3 Pond Cr at Manslick Road	13	53.3	81.6	2.6	26.3
5 SF Beargrass Cr at Winter Avenue	14	7.80	72.3	4.4	8.5
6 SF Beargrass Cr at Trevilian Way	12	3.58	156	8.2	9.0
9 Spring Ditch at Private Drive	13	1.32	129	3.7	13.6
10 Muddy Fork at Mockingbird Valley Road	12	2.36	106	11.0	37.9
11 Goose Cr at U.S. Highway 42	14	3.20	178	19.6	49.3
12 Little Goose Cr at U.S. Highway 42	13	3.08	78.2	.3	1.1
13 Goose Cr at old Westport Road	14	4.24	182	8.2	19.9
15 Floyds Fork at former State Highway 155	10	164	222	11.9	37.6
16 Chenoweth Run at Gelhaus Road	16	3.20	149	5.9	6.0
17 Fern Cr at Old Bardstown Road	12	1.38	171	4.5	2.7
18 Northern Ditch at Preston Highway	12	2.88	53.7	.4	2.9
21 Floyds Fork at Bardstown Road	10	26.4	155	25.8	20.3
22 Cedar Cr at Thixton Road	12	1.58	154	5.9	15.2
23 Pennsylvania Run at Mt. Washington Road	13	2.32	184	1.7	4.4
25 Harrods Cr at Hunting Cr Drive	10	64.7	188	8.6	12.7
Mercury, total recoverable as Hg					
6 SF Beargrass Cr at Trevilian Way	12	<.01	130	8.2	40.3
22 Cedar Cr at Thixton Road	12	<.01	69.7	5.9	18.2
23 Pennsylvania Run at Mt. Washington Road	13	<.01	90.8	1.7	11.0
Nickel, total as Ni					
9 Spring Ditch at Private Drive	13	.02	78.1	3.7	12.7
Zinc, total as Zn					
1 Pond Cr at Pendleton Road	15	4.02	142	5.9	2.3
2 Mill Cr at Orell Road	14	.08	131	10.6	43.2
3 Pond Cr at Manslick Road	13	1.32	154	2.6	3.4
5 SF Beargrass Cr at Winter Avenue	14	.50	97.2	4.4	13.9
6 SF Beargrass Cr at Trevilian Way	12	.90	132	8.2	3.6
9 Spring Ditch at Private Drive	13	.20	98.1	3.7	15.7
10 Muddy Fork at Mockingbird Valley Road	12	.88	128	11.0	70.3
11 Goose Cr at U.S. Highway 42	14	.94	146	19.6	46.4
12 Little Goose Cr at U.S. Highway 42	13	.14	87.3	.3	.4
13 Goose Cr at old Westport Road	14	.38	149	8.2	6.9
14 Pope Lick at Pope Lick Road	15	.16	91.3	8.7	31.5
15 Floyds Fork at former State Highway 155	10	2.42	89.3	11.9	28.2
16 Chenoweth Run at Gelhaus Road	16	.40	105	5.9	25.1
17 Fern Cr at Old Bardstown Road	12	.10	124	4.5	3.8
18 Northern Ditch at Preston Highway	12	.66	113	.4	1.5
21 Floyds Fork at Bardstown Road	10	4.06	111	25.8	65.7
22 Cedar Cr at Thixton Road	12	.32	103	5.9	28.2
23 Pennsylvania Run at Mt. Washington Road	13	.20	127	1.7	6.1
25 Harrods Cr at Hunting Cr Drive	10	5.10	132	8.6	16.1
Cyanide, total as Cn					
13 Goose Cr at old Westport Road	13	.06	79.4	8.2	22.5
16 Chenoweth Run at Gelhaus Road	15	.06	67.1	5.9	14.9
2,4-D, total					
1 Pond Cr at Pendleton Road	15	<.01	108	5.9	5.6
2 Mill Cr at Orell Road	14	<.01	179	10.6	24.2
6 SF Beargrass Cr at Trevilian Way	12	<.01	184	8.2	24.6