

Compilation of Atrazine and Selected Herbicide Data from Previous Surface-Water- Quality Investigations within the Big Blue River Basin, Nebraska, 1983-92

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CONVERSION FACTORS

	Multiply	By	To obtain
	inch	2.54	centimeter
	foot	0.3048	meter
	mile	1.609	kilometer
	square mile	2.590	square kilometer
	cubic foot per second	0.02832	cubic meter per second
	degree Fahrenheit (°F)	(¹)	degree Celsius (°C)

¹Temperature can be converted to degrees Celsius (°C) or degrees Fahrenheit (°F) by the equations:

$$^{\circ}\text{C} = (^{\circ}\text{F}-32)/1.8$$

$$^{\circ}\text{F} = 1.8(^{\circ}\text{C}) + 32.$$

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ABSTRACT

The Big Blue River Basin in Nebraska has a surface area of approximately 7,200 square miles and is located in the southeastern part of the State. The primary streams within the basin are the Big Blue and the Little Blue Rivers. Atrazine, the most extensively applied herbicide in the basin, has been detected in the basin's surface water during every month of the year. The purpose of this report was to compile recent (1983-92) data describing the occurrence of atrazine and related herbicides in surface water of the Big Blue River Basin in Nebraska.

The U.S. Geological Survey has conducted three recent studies within the basin that analyzed surface-water samples for the presence of herbicides. A pilot study for the U.S. Geological Survey's National Water-Quality Assessment Program was conducted in the lower Kansas River Basin from 1987-90, and samples were analyzed from 31 sites within the Big Blue River Basin in Nebraska for the presence of atrazine and other herbicides. A herbicide reconnaissance study in 1989 to determine the seasonal and geographic distribution of herbicides and nitrate in 147 streams across the Nation included the collection of samples from 4 sites within the basin. Finally, samples were collected for a temporal variability study from 9 streams throughout the Midwest, including the West Fork of the Big Blue River, to determine the variation in herbicide concentrations during storm runoff. Individual sites within the basin also have been sampled by the Upper Big Blue (1992) and the

Little Blue (1983-85) Natural Resources Districts.

In the samples analyzed by gas chromatography/mass spectrometry during these studies, atrazine was the herbicide detected most frequently within the Big Blue River Basin. Of the 385 samples analyzed, 369 contained atrazine in detectable concentrations with detection levels that varied from 0 to 0.10 microgram per liter. The concentrations of atrazine within the samples varied from 0.05 to 166 micrograms per liter, with a median concentration of 2.7 micrograms per liter. The largest concentrations of atrazine generally occurred during May and June.

Other herbicides frequently detected in the Big Blue River Basin were alachlor, cyanazine, metolachlor, and simazine, and two metabolites of atrazine, desethylatrazine and deisopropylatrazine. In the 226 samples in which alachlor was detected, the concentrations of the herbicide ranged from 0.05 to 56 micrograms per liter, and the median concentration was 1.1 micrograms per liter. Cyanazine was detected in 210 of 365 samples collected with concentrations that ranged from 0.05 to 8.6 micrograms per liter, with a median concentration of 0.4 microgram per liter. The maximum concentrations of metolachlor and simazine were 26 and 35 micrograms per liter, respectively. The median concentrations of these herbicides were 1.0 and 0.1 microgram per liter, respectively. The maximum concentration of desethylatrazine was 3.7 micrograms per liter, with a median concentration of 1.0 microgram per liter. Deisopropylatrazine was detected in 152 samples with a maximum concentration of 2.6 micrograms per liter and a

median concentration of 0.6 microgram per liter.

INTRODUCTION

Nebraska is one of several Midwestern States that rely on large quantities of inorganic fertilizers and herbicides to sustain crop production. Agricultural herbicides usually are applied during the spring to row crops, such as corn, sorghum, and soybeans, for control of broadleaf weeds and grasses. The occurrence of herbicides in surface water depends primarily on their rate of use, rate of degradation (persistence), and on properties determining their rate of transportation in the hydrologic environment (solubility) (Bevans and others, 1993). Within the States that form the Upper Midwest, the herbicides alachlor, atrazine, cyanazine, and metolachlor accounted for about 73 percent of the pesticides used in 1982 (Goolsby and others, 1991). Atrazine has a solubility of approximately 33,000 $\mu\text{g/L}$ (micrograms per liter) and a persistence of approximately 1 year in soil (Gilliom and others, 1985). Atrazine also has been detected during every month of the year in the surface water of the Big Blue River Basin in Nebraska (Bevans, 1991).

Although generally referred to as the Big Blue River Basin, the basin consists of the Big Blue River and the Little Blue River watersheds. The Big Blue River is the largest downstream tributary of the Kansas River, contributing 27 percent of the mean flow rate of the Kansas River measured at its confluence with the Missouri River from 1971-86 (Dugan and others, 1991). The occurrence of agricultural pesticides in surface water is an important water-quality issue in eastern Kansas and other areas where crop production is a principal economic and land-use activity, and where public-water supplies are derived primarily from surface-water resources (Bevans and others, 1993).

Three reports have been written compiling available surface-water-quality data for areas that include the Big Blue River Basin. Jordan and Stamer (1991) analyzed available surface-water-quality data for the lower Kansas River Basin in Kansas and Nebraska. Bevans and others (1993) documented the occurrence and transport of agricultural pesticides in the Tuttle Creek Lake

watershed in Kansas and Nebraska. Both reports included available data for surface-water-quality samples, which were analyzed for the presence of atrazine and other herbicides through 1986. Fallon and McChesney (1993) summarized water-quality data from water and sediment samples collected as part of the lower Kansas River Basin National Water-Quality Assessment pilot study (1987-90) in Kansas and Nebraska.

This report presents available data from past surface-water-quality studies, within the Big Blue River Basin in Nebraska, in which water samples were analyzed for atrazine and other related herbicides. The number of detections, the range in concentrations, and the median concentration of the herbicides detected are documented. The drinking-water regulations associated with atrazine and other herbicides as stated by the U.S. Environmental Protection Agency (1992) and the water-quality criteria for freshwater-aquatic life as stated by the Nebraska Department of Environmental Quality (1993) also are presented.

DESCRIPTION OF THE STUDY AREA

The Big Blue River Basin in southeastern Nebraska consists of the Big Blue River and the Little Blue River watersheds. The basin has a surface area of approximately 7,200 square miles and includes all or parts of 19 counties (fig. 1). Principal tributaries of the Big Blue and Little Blue Rivers include: the North Branch and West Fork of the Big Blue River, and Beaver, Big Indian, Big Sandy, Cub, Dry Sandy, Elk, Flessner, Lincoln, Little Sandy, Plum, Rose, School, Spring, Squaw, Swan, and Turkey Creeks.

Agriculture accounts for about 95 percent of the land use in the upper Big Blue River Basin, with 75 percent of the land being used for cultivated crops (Dugan and others, 1991). In 1990, the primary cultivated crops produced in southeast and south-central Nebraska included corn, sorghum, and soybeans (Nebraska Department of Agriculture, 1991). Land use in the southeastern part of the Big Blue River Basin is also predominantly agricultural, although more topographic relief and less available ground water make the area less suited for cultivated and irrigated crops (Dugan and others, 1991).

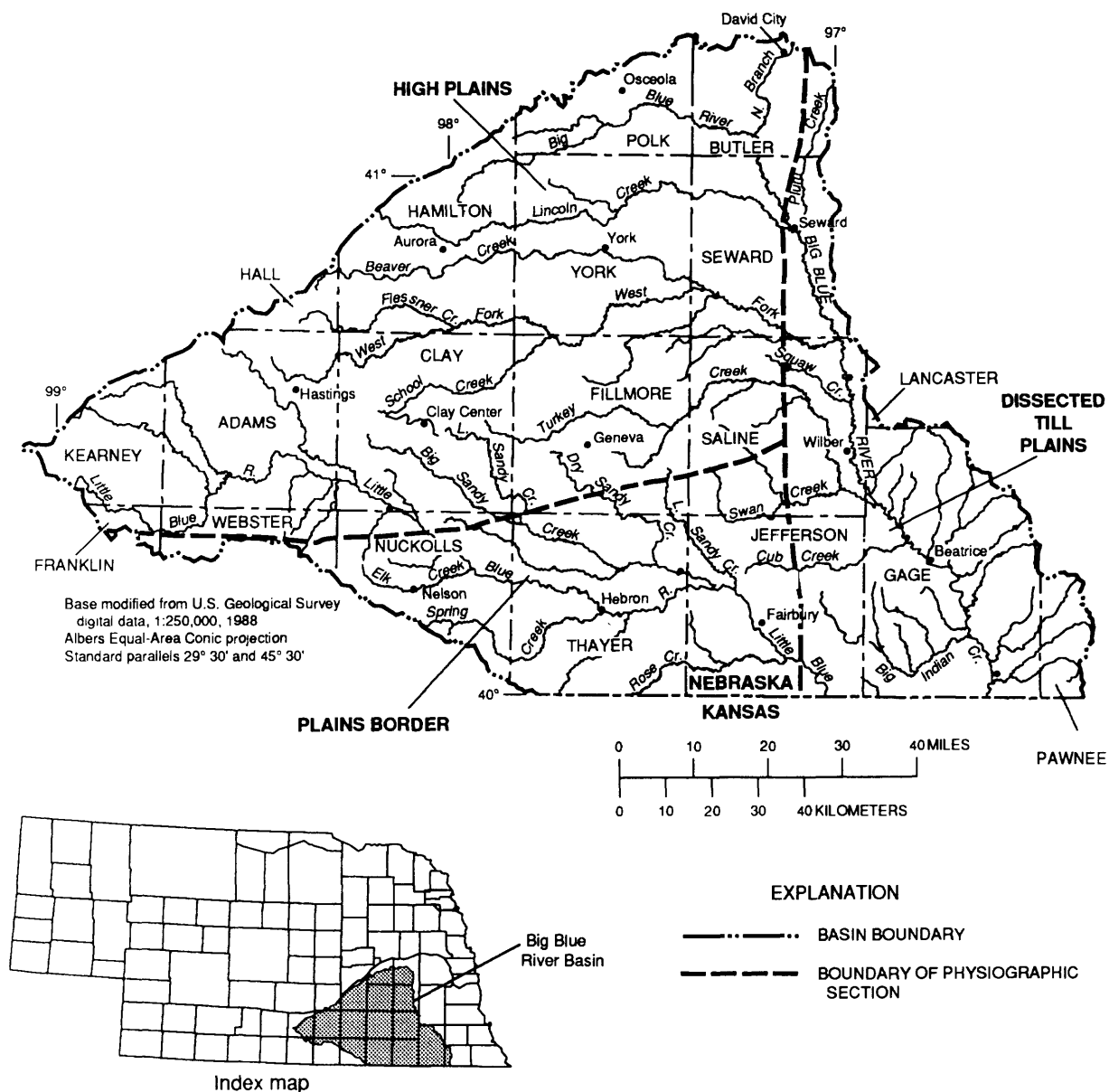


Figure 1. Location of the Big Blue River Basin in Nebraska and physiographic divisions within the basin (physiographic divisions from Fenneman, 1946).

Climate

The Big Blue River Basin has a humid, mid-continental climate. The weather is dominated by hot, humid air masses from the Gulf of Mexico in the summer and by cold, dry air masses from Canada in the winter (Bevans and others, 1993). July is the warmest month, with an average temperature of 25 °C, and January is the coldest month with an average temperature of -4 °C (Stamer and others, 1987).

Precipitation in the basin is the most significant climatic factor for agriculture and surface-water availability (Dugan and others, 1991). The mean annual precipitation from 1951-80 ranged from about 24 inches in the northwest part of the basin to about 32 inches in the southeast (Steele, 1988). About 75 percent of the precipitation in the basin normally occurs during the warm season, April through September, which generally coincides with the growing season (Stamer and others, 1987).

Potential evapotranspiration ranges from about 48 inches per year in the western part of the basin to approximately 44 inches per year in the east (Farnsworth and others, 1982). Evapotranspiration normally exceeds precipitation during the growing season and is much less than precipitation during the nongrowing season (Dugan and others, 1991).

Physiography

The Big Blue River Basin consists of three physiographic divisions (fig. 1). Most of the northern and western parts of the basin are located in the High Plains Section of the Great Plains Province (Fenneman, 1946). The southwestern part of the basin is located in the Plains Border Section of the Great Plains Province (Fenneman, 1946). The Plains Border Section is a dissected zone in which erosion is incomplete, and this section widens progressively westward at the expense of the High Plains (Fenneman, 1931). The southeastern to extreme eastern parts of the Big Blue River Basin lie within the Dissected Till Plains Section of the Central Lowland Province. The eastern boundary of the Dissected Till Plains in Nebraska is generally the Big Blue River (Fenneman, 1938).

The Big Blue River Basin consists of very flat plains in the headwaters and gently rolling hills along the downstream reaches (Engel and Steele, 1986). The High Plains Section of the basin is characterized by loess plains overlying Pleistocene fluvial sand and gravel deposits. Moderate stream gradients contribute to very limited stream dissection and broad, poorly defined stream valleys (Dugan and others, 1991).

The Plains Border Section is underlain by Cretaceous limestone, sandstone, and shale, and localized fluvial and eolian deposits. This section is the dissected eastern margin of the High Plains (Fenneman, 1931) and has greater local relief than the High Plains Section. The drainage pattern in the Plains Border Section is more definite than in the High Plains, and stream channels are characteristically narrow and well established (Dugan and others, 1991).

The Dissected Till Plains Section is characterized by dissected deposits of loess-mantled glacial till and fluvial deposits of clay, gravel, sand, and silt that overlie bedrock of primarily Permian shale

and limestone and some Cretaceous sandstone. The relief of the land surface east of the Big Blue River varies to at least 200 feet (Fenneman, 1938), and drainage channels in the Dissected Till Plains Section are well established (Dugan and others, 1991).

Surface-Water Hydrology

The largest streamflows generally occur in May and June, and the smallest generally occur in December and January. Rapid rates of evapotranspiration decrease streamflows in July and August, and snowmelt in March causes larger streamflows than would be expected if precipitation were the only factor (Bevans and others, 1993). The Big Blue River had a mean flow of 2,350 cubic feet per second at its confluence with the Kansas River from 1965-86 (Dugan and others, 1991).

Runoff characteristics of streams are affected largely by permeability, available water capacity, and the slope of soils in the stream basin (Dugan, 1984). Generally, soils in the Big Blue River Basin are clay to silty-clay loams, with sandy soils occurring only in isolated areas within the Plains Border Section. Dugan (1984) showed that within the Big Blue River Basin, the average permeability of the 60-inch soil profile is generally less than 1 inch per hour. In areas near streams within the basin, the permeability is generally 2 to 5 inches per hour but may be as much as 5 to 10 inches per hour. Water capacity ranges from 0.09 inch per inch of soil for sandy soils to 0.19 inch per inch of soil for silty-clay loams (Dugan, 1984). Soil slopes in the High Plains Section are minimal, typically less than 3 percent, whereas in the remainder of the basin, the extensive dissection causes soil slopes to generally exceed 10 percent (Dugan and others, 1991). As a result of the permeability, water capacity, and soil slope within the basin, average annual runoff ranges from less than 2 inches in the High Plains Section to more than 4 inches in the Dissected Till Plains Section (Dugan, 1984).

DESCRIPTION OF PREVIOUS SURFACE-WATER-QUALITY INVESTIGATIONS

The following studies, in which surface-water samples were analyzed for atrazine and other related herbicides, were conducted in the Big Blue River Basin in Nebraska from 1983 through 1992. The 50 sites where samples were collected and analyzed for atrazine and other herbicides are listed in table 1, and the location of these sites is shown in figure 2.

(1) National Water-Quality Assessment (NAWQA) pilot study: The U.S. Geological Survey began its NAWQA program in 1986 to provide nationally consistent descriptions of the current status of water quality for the Nation's water resources, to define trends in water quality where possible, and to identify, describe, and explain, to the extent possible, the major factors that affect observed water-quality conditions and trends (Hirsch and others, 1988). The lower Kansas River Basin, which includes the Big Blue River Basin in Nebraska, was one of four surface-water pilot-study areas. The lower Kansas River Basin was selected as a pilot-study area because it is typical of the Midwestern grain belt that includes irrigated and nonirrigated cropland and non-irrigated pasture and rangeland (Stamer and others, 1987). During this study, surface-water samples collected at 31 sites throughout the basin (table 1) from May 1987 through June 1990 were analyzed for atrazine and other nitrogen-containing herbicides (Fallon and McChesney, 1993).

(2) Regional herbicide reconnaissance: The U.S. Geological Survey conducted a multistate reconnaissance study of the midwestern United States in 1989 to determine the seasonal and geographic distribution of herbicides in 147 randomly selected streams within 122 river basins (Thurman and others, 1991). Four sites on the Big Blue, West Fork Big Blue, and Little Blue Rivers were selected (table 1). These sites were the Big Blue River at Surprise, Nebraska (map reference number 1, fig. 2), the West Fork Big Blue River near Dorchester, Nebraska (map reference number 32, fig. 2), the Big Blue River at Barneston, Nebraska (map reference number 41, fig. 2), and the Little Blue River near Fairbury, Nebraska (map reference number 49, fig. 2). Water samples were

collected from these 4 sites 3 times during 1989--once before planting (March-April), once after planting during the first major storm runoff (May-June), and once in the fall during a period of low flow (October-November).

(3) Temporal variability study: Nine streams in the Midwest, including the West Fork of the Big Blue River near Dorchester, Nebraska (map reference number 32, fig. 2), were sampled intensively from April through July 1990 by the U.S. Geological Survey. The purpose of this study was to determine temporal distribution in concentrations and loads of herbicides during storm runoff (Goolsby and others, 1991). Samples were collected every few hours during storm runoff and several times per week during periods of base flow using a combination of manual sampling and automatic samplers. The West Fork of the Big Blue River also was among two of the nine streams sampled intensively from April 1991 through March 1992 to provide information on the annual mass transport of herbicides (Goolsby and Battaglin, 1993). Samples also were collected from 20 individual sites in July and October 1991 to attempt to identify herbicides sources in irrigation return flow and in base flow.

(4) Upper Big Blue Natural Resources District (NRD) ground-water recharge study: The York Groundwater Recharge Demonstration Project is one of 21 projects funded by the Federal government under the High Plains States Groundwater Demonstration Program. The York Groundwater Recharge Demonstration Project is a cooperative project between the Upper Big Blue NRD and the U.S. Bureau of Reclamation designed to test the effectiveness and practicality of three methods of recharge on a lake constructed on a tributary of Beaver Creek in York County (P.A. Sadler, Upper Big Blue Natural Resources District, written commun., 1993). Following runoff in May 1992, the Upper Big Blue NRD collected a surface-water sample from a tributary of Beaver Creek, upstream from the lake (map reference number 26, fig. 2).

(5) Little Blue NRD 1983 Edgar Sandpit water-quality sampling study: This study was a 3-year project designed to test the quality of runoff water in Big Sandy Creek near Edgar, Nebraska (map reference number 46, fig. 2) (Little Blue Natural Resources District, 1986). The sampling

Table 1. Map reference number, U.S. Geological Survey identification number, site name, latitude and longitude coordinates, and drainage area for the surface-water sampling sites and the study(ies) for which these samples were collected from the Big Blue River Basin in Nebraska, 1983-92

[--, data not available]

Map reference number (fig. 2)	U.S. Geological Survey identification number	Site name	Latitude and longitude coordinates	Drainage area (square miles)	Water-quality study ¹
1	06879900	Big Blue River at Surprise, Nebr.	41°06'05" 97°18'35"	345	N, R
2	405221097582100	Lincoln Creek near Aurora, Nebr.	40°52'21" 97°58'21"	60	N
3	405438097354800	Lincoln Creek near York, Nebr.	40°54'38" 97°35'48"	179	N
4	06880000	Lincoln Creek near Seward, Nebr.	40°54'57" 97°08'43"	446	N
5	06880500	Big Blue River at Seward, Nebr.	40°54'10" 97°06'40"	1,099	N
6	405220097024000	Bean field near Seward, Nebr.	40°52'20" 97°02'40"	.02	N
7	405128097032000	Milo field near Seward, Nebr.	40°51'28" 97°03'20"	.02	N
8	4036110982000600	West Fork Big Blue River near Hastings, Nebr.	40°36'11" 98°20'06"	--	N,T
9	403704098185800	Flat Creek near Hastings, Nebr.	40°37'04" 98°18'58"	--	T
10	403734098131100	Unnamed creek near Inland, Nebr.	40°37'34" 98°13'11"	--	T
11	404247097580600	West Fork Big Blue River near Stockham, Nebr.	40°42'47" 97°58'06"	316	N,T
12	404246097591200	North Branch West Fork Big Blue River near Stockham, Nebr.	40°42'46" 97°59'12"	--	T
13	404333097573700	Unnamed creek at Stockham, Nebr.	40°43'33" 97°57'37"	--	T
14	404247097523400	Unnamed creek near Stockham, Nebr.	40°42'47" 97°52'34"	--	T
15	404522097493100	Unnamed creek near Henderson, Nebr.	40°45'22" 97°49'31"	--	T
16	404254097445700	West Fork Big Blue River near Lushton, Nebr.	40°42'54" 97°44'57"	--	T
17	403749097503400	School Creek near Sutton, Nebr.	40°37'49" 97°50'34"	--	N
18	404137097434300	School Creek near Lushton, Nebr.	40°41'37" 97°43'43"	--	T
19	404023097401800	Elk Run near Grafton, Nebr.	40°40'23" 97°40'18"	--	T
20	404327097354600	West Fork Big Blue River near McCool Junction, Nebr.	40°43'27" 97°35'46"	640	N,T

Table 1. Map reference number, U.S. Geological Survey identification number, site name, latitude and longitude coordinates, and drainage area for the surface-water sampling sites and the study(ies) for which these samples were collected from the Big Blue River Basin in Nebraska, 1983-92--Continued

Map reference number (fig. 2)	U.S. Geological Survey identification number	Site name	Latitude and longitude coordinates	Drainage area (square miles)	Water-quality study ¹
21	404403097354900	Stone Creek at McCool Junction, Nebr.	40°44'03" 97°35'49"	--	T
22	404413097354900	Galaway Creek at McCool Junction, Nebr.	40°44'13" 97°35'49"	--	T
23	404516097354900	Spring Creek at McCool Junction, Nebr.	40°45'16" 97°35'49"	--	T
24	404616097350400	Unnamed creek near McCool Junction, Nebr.	40°46'16" 97°35'04"	--	T
25	404719097205900	West Fork Big Blue River near Beaver Crossing, Nebr.	40°47'19" 97°20'59"	--	T
26	405100097373000	Tributary of Beaver Creek upstream from the York Recharge Lake	40°51'00" 97°37'30"	--	UB
27	405029097322100	Beaver Creek near York, Nebr.	40°50'29" 97°32'21"	195	N
28	404748097205800	Beaver Creek near Beaver Crossing, Nebr.	40°47'48" 97°20'58"	--	T
29	404617097194200	Indian Creek near Beaver Crossing, Nebr.	40°46'17" 97°19'42"	--	T
30	404528097141700	Walnut Creek near Beaver Crossing, Nebr.	40°45'28" 97°14'17"	--	T
31	404432097111100	Nonirrigated cornfield near Dorchester, Nebr.	40°44'32" 97°11'11"	.06	N
32	06880800	West Fork Big Blue River near Dorchester, Nebr.	40°43'52" 97°10'38"	1,206	N, R, T
33	404247097104000	Irrigated cornfield near Dorchester, Nebr.	40°42'47" 97°10'40"	.04	N
34	06881000	Big Blue River near Crete, Nebr.	40°35'47" 96°57'36"	2,716	N
35	403304097311400	Turkey Creek near Geneva, Nebr.	40°33'04" 97°31'14"	--	N
36	06881200	Turkey Creek near Wilbur, Nebr.	40°28'48" 97°00'43"	460	N
37	402348096591100	Swan Creek near Dewitt, Nebr.	40°23'48" 96°59'11"	240	N
38	401730096500200	Cub Creek near Beatrice, Nebr.	40°17'30" 96°50'02"	140	N
39	06881500	Big Blue River at Beatrice, Nebr.	40°15'00" 96°45'00"	3,901	N
40	400632096401600	Big Indian Creek near Wymore, Nebr.	40°06'32" 96°40'16"	204	N

Table 1. Map reference number, U.S. Geological Survey identification number, site name, latitude and longitude coordinates, and drainage area for the surface-water sampling sites and the study(ies) for which these samples were collected from the Big Blue River Basin in Nebraska, 1983-92--Continued

Map reference number (fig. 2)	U.S. Geological Survey identification number	Site name	Latitude and longitude coordinates	Drainage area (square miles)	Water-quality study ¹
41	06882000	Big Blue River at Barneston, Nebr.	40°03'11" 96°35'16"	4,447	N, R
42	402726098240500	Little Blue River near Hastings, Nebr.	40°27'26" 98°24'05"	659	N
43	06883000	Little Blue River near Deweese, Nebr.	40°19'58" 98°04'20"	979	N
44	401243097433500	Little Blue River near Deshler, Nebr.	40°12'43" 97°43'35"	1,250	N
45	06883570	Little Blue River near Alexandria (Gilead), Nebr.	40°12'27" 97°23'26"	1,557	N
46	402306097564300	Big Sandy Creek near Edgar, Nebr.	40°23'06" 97°56'43"	--	LB
47	401826097451100	Big Sandy Creek near Davenport, Nebr.	40°18'26" 97°45'11"	250	N
48	06883940	Big Sandy Creek at Alexandria, Nebr.	40°14'06" 97°23'20"	600	N
49	06884000	Little Blue River near Fairbury, Nebr.	40°06'54" 97°10'13"	2,350	N, R
50	400359097101400	Rose Creek near Fairbury, Nebr.	40°03'59" 97°10'14"	290	N

¹ Explanation of water-quality study: N, sampled for the National Water-Quality Assessment Program (Jordan and Stamer, 1991; Fallon and McChesney, 1993); R, sampled for the regional herbicide reconnaissance study (Thurman and others, 1991); T, sampled for the temporal variability study (Goolsby and others, 1991); UB, sampled for the Upper Big Blue Natural Resources District ground-water recharge study (Bitner, 1992); and LB, sampled for the Little Blue Natural Resources District 1983 Edgar Sandpit water-quality sampling study (Little Blue Natural Resources District, 1986).

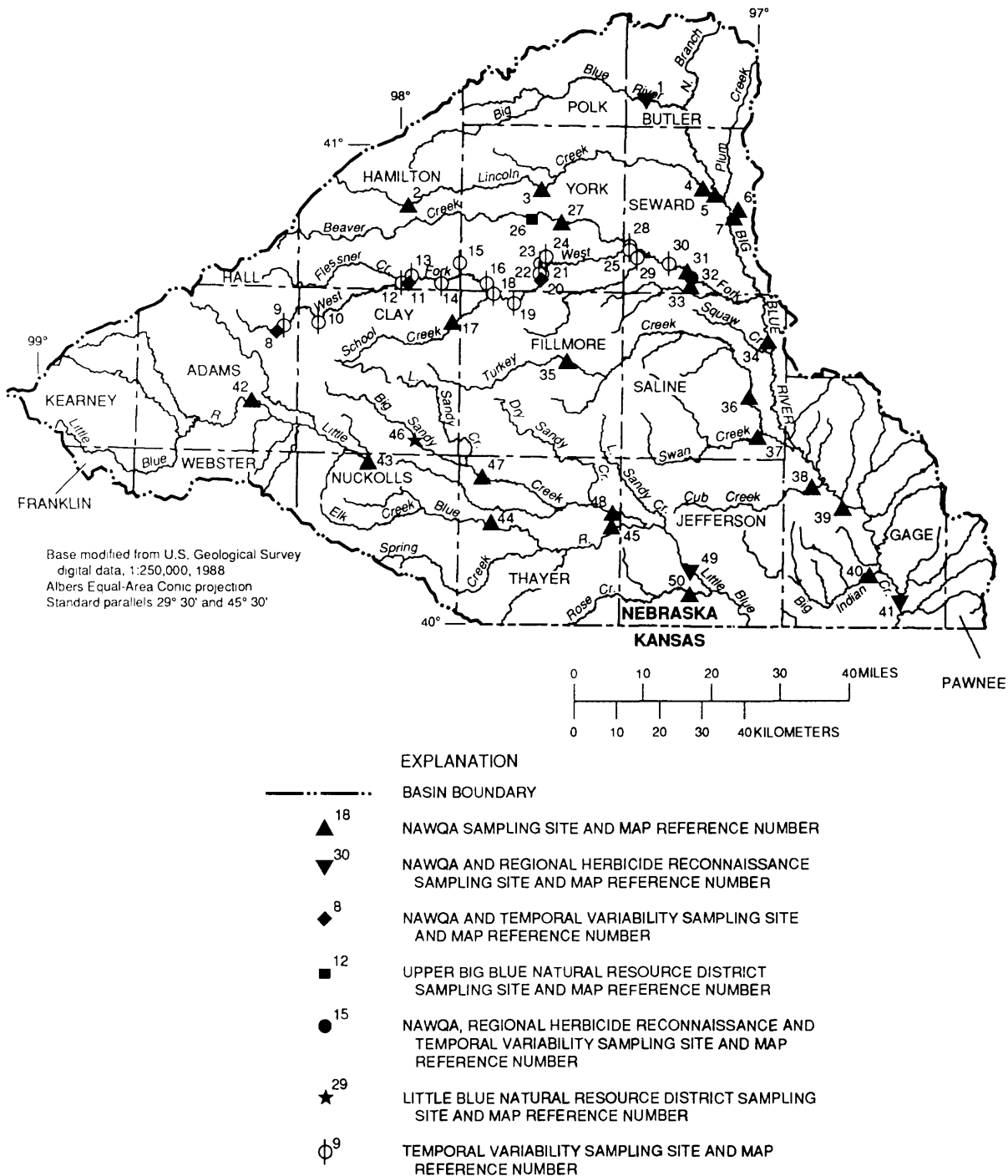


Figure 2. Location of sites where surface-water samples were collected and analyzed for atrazine and other selected herbicides, Big Blue River Basin, Nebraska, 1983-92.

site is located near the Edgar Sandpit, which has been excavated for sand and gravel since the mid-1950's. With the assistance of the NDEQ (formerly the Nebraska Department of Environmental Control) and the University of Nebraska, 21 surface-water samples were collected during runoff from May 1983 to August 1985. Using an autosampler, samples were collected approximately every half hour during each runoff event. The samples from each event were composited, and the composited sample was analyzed by the NDEQ for several pesticides including atrazine, alachlor, and metolachlor (Little Blue Natural Resources District, 1986).

SUMMARY OF RESULTS FROM PREVIOUS SURFACE-WATER-QUALITY INVESTIGATIONS

The following is a brief summary of the results from the five recent studies and individual samples collected within the Big Blue River Basin in Nebraska during 1983-92. All results given in the summary and table 2 are from samples analyzed by gas chromatography/mass spectrometry (GC/MS) methods. Table 2 lists the herbicides that were detected, the number of times the herbicide was detected, the range of concentrations of each herbicide detected, the median concentration of the herbicides detected, and the existing drinking-water regulations (U.S. Environmental Protection Agency, 1992) and water-quality criteria for freshwater-aquatic life (Nebraska Department of Environmental Quality, 1993) for each herbicide. Exceedances of the drinking-water regulations and water-quality criteria for freshwater-aquatic life could not be determined due to insufficient data. Table 3, located at the end of this report, lists the map reference numbers, sample dates, sample times, discharge, and herbicide concentrations detected by immunoassay and GC/MS analysis from these studies. Within table 3, differences in detection levels for specific herbicides may be noted. These differences are due to variations in detection levels established during sample analysis for the various studies.

(1) NAWQA pilot study: As in most studies for which data are compiled in this report, the herbicide most frequently detected was atrazine.

Atrazine was detected in 175 of the 177 samples analyzed during this study, with concentrations that ranged from 0.1 to 51 $\mu\text{g/L}$. Although atrazine was detected in samples during all months of the year, samples with the largest concentrations of the herbicide were detected in samples collected most commonly during May and June. Other frequently detected herbicides during the NAWQA study included alachlor, cyanazine, metolachlor, and simazine, with maximum concentrations of 56, 6.8, 13, and 3.1 $\mu\text{g/L}$, respectively.

(2) Regional herbicide reconnaissance:

Although a total of 12 samples were collected at the four sites, herbicide concentrations in pre-herbicide application samples from the Big Blue River at Surprise, Nebraska (map reference number 1, table 1) and the Little Blue River at Fairbury, Nebraska (map reference number 49, table 1), were not analyzed by GC/MS and are not included in table 2. The compounds most frequently detected were the herbicides atrazine and simazine, and the atrazine metabolites desethylatrazine and deisopropylatrazine.

Atrazine was detected in every sample analyzed by GC/MS, with concentrations ranging from 0.16 to 23 $\mu\text{g/L}$. Simazine was detected in 6 samples at concentrations ranging from 0.28 to 35 $\mu\text{g/L}$. Desethylatrazine was detected in 9 samples, with concentrations ranging from 0.05 to 3.7 $\mu\text{g/L}$. Deisopropylatrazine was detected in 5 samples at concentrations ranging from 0.59 to 2.2 $\mu\text{g/L}$. The herbicides alachlor and cyanazine also were detected. Alachlor was detected in 5 of the 10 samples analyzed by GC/MS at concentrations ranging from 0.11 to 3.1 $\mu\text{g/L}$. Cyanazine was detected in 3 samples collected during the first storm runoff following planting, with a maximum concentration of 5.9 $\mu\text{g/L}$.

(3) Temporal variability study: During 1990, all samples collected from the West Fork of the Big Blue River near Dorchester, Nebraska (map reference number 32, table 1), were analyzed for triazine herbicides using an immunosorbent assay procedure (Goolsby and others, 1991). About 25 percent of these samples also were selected for herbicide analysis by GC/MS. Analytes analyzed by GC/MS included ametryn, alachlor, atrazine, cyanazine, desethylatrazine, deisopropylatrazine, metolachlor, metribuzin, prometon, prometryn, propazine, and terbutryn. The following year

Table 2. Herbicides detected by gas chromatography/mass spectrometry analysis in surface-water samples from the Big Blue River Basin, Nebraska, 1983-92

[Range of detected concentrations, median concentrations, water-quality regulations, and exposure criteria are in micrograms per liter ($\mu\text{g/L}$); --, not applicable; *, under review (U.S. Environmental Protection Agency, 1992)]

Herbicide	Number of detections (number of samples analyzed)	Range of detected concentrations	Median concentrations	Drinking-water regulations ¹	Freshwater-aquatic life	
					Acute exposure criteria ²	Chronic exposure criteria ²
Alachlor	226 (383)	0.05-56	1.1	³ 2.0	⁴ 68	⁵ 21
Ametryn	88 (365)	.05-4.8	.1	⁶ 60	--	--
Atrazine	369 (385)	.05-166	2.7	³ 3.0	⁷ 170	⁸ 1.0
Bromacil	7 (142)	.1-0.6	.3	⁶ 90	--	--
Butylate	2 (142)	.1	.1	⁶ 350	--	--
Cyanazine	210 (365)	.05-8.6	.4	⁶ 1.0	--	--
Desethyl-atrazine	184 (188)	.05-3.7	1.0	--	--	--
Deisopropyl-atrazine	152 (188)	.05-2.6	.6	--	--	--
Metolachlor	243 (383)	.05-26	1.0	⁶ 100	⁷ 390	⁸ 100
Metribuzin	113 (363)	.05-3.4	.3	⁶ 200	--	⁸ 100
Prometon	86 (365)	.05-3.7	.1	⁶ 100*	--	--
Propachlor	11 (143)	.1-0.7	.2	⁶ 90	--	⁸ 8.0
Propazine	143 (365)	.05-1.1	.1	⁶ 10	--	--
Simazine	188 (365)	.05-35	.1	³ 4.0	--	--
Terbacil	2 (141)	.1-3.0	1.5	⁶ 90	--	--
Trifluralin	2 (175)	.1	.1	⁶ 5.0	--	--

¹U.S. Environmental Protection Agency (1992).

²Nebraska Department of Environmental Quality (1993).

³Maximum Contaminant Level (U.S. Environmental Protection Agency, 1992).

⁴Concentration not to be exceeded at any time (Nebraska Department of Environmental Quality, 1993).

⁵Twenty-four-hour average concentration (Nebraska Department of Environmental Quality, 1993).

⁶Lifetime Health Advisory Level (U.S. Environmental Protection Agency, 1992).

⁷One-hour average concentration (Nebraska Department of Environmental Quality, 1993).

⁸Four-day average concentration (Nebraska Department of Environmental Quality, 1993).

(1991) all samples collected were analyzed for the same constituents using GC/MS. Approximately every 10th sample collected was analyzed in duplicate, resulting in two samples with the same date and time in table 3. Twenty additional sites were sampled in July and October of 1991 to identify possible sources of herbicides detected in irrigation return flow and in base flow.

Atrazine, alachlor, cyanazine, and metolachlor were the herbicides most commonly detected by GC/MS analysis in samples collected from the West Fork of the Big Blue River near Dorchester, Nebraska (map reference number 32, table 3). The concentrations of atrazine varied from 0.13 to 120 $\mu\text{g/L}$, with the larger concentrations generally detected in May and June. The maximum concentrations of alachlor, cyanazine, and metolachlor were 43, 8.6, and 26 $\mu\text{g/L}$, respectively.

The herbicides, alachlor, atrazine, and metolachlor, and the atrazine metabolites, desethylatrazine and deisopropylatrazine, were most frequently detected in the samples collected at the 20 additional sites. Alachlor was detected in concentrations ranging from 0.08 to 1.68 $\mu\text{g/L}$ in 17 samples. Atrazine was detected in 30 samples with a range of concentrations from 0.05 to 11.73 $\mu\text{g/L}$, and metolachlor was detected in 21 samples at concentrations ranging from 0.05 to 4.67 $\mu\text{g/L}$. Desethylatrazine and deisopropylatrazine were detected at concentrations ranging from 0.05 to 2.76 $\mu\text{g/L}$ and 0.12 to 1.51 $\mu\text{g/L}$, respectively.

(4) Upper Big Blue NRD ground-water recharge study: A water sample collected immediately upstream from the recharge lake following runoff on May 16, 1992, had an atrazine concentration of 166 $\mu\text{g/L}$ (map reference number 26, fig. 2) (Bitner, 1992). Bitner (1992) also noted that following the storm, the concentration of atrazine in the recharge lake increased from 0.38 to 93 $\mu\text{g/L}$.

(5) Little Blue NRD 1983 Edgar Sandpit water-quality sampling study: Twenty-one samples were collected periodically from Big Sandy Creek (map reference number 46, table 3) during runoff from May 1983 to August 1985. Because the last sample collected was lost during extraction, herbicide-concentration data exist for only 20 samples (table 3). It may be noted in table 3 that 0 $\mu\text{g/L}$ is the detection level used

during the study and indicates that the herbicide was not present at a detection level.

The maximum detected concentrations of atrazine, alachlor, and metolachlor were 17, 5.4, and 0.2 $\mu\text{g/L}$, respectively. Unlike most other studies, the most frequently detected herbicide was alachlor, which was detected at concentrations from 0.1 to 5.4 $\mu\text{g/L}$ in 14 of the 20 samples. Atrazine was detected in six samples, with concentrations ranging from 10 to 17 $\mu\text{g/L}$. Metolachlor was detected in just 2 of the 20 samples, with concentrations of 0.1 and 0.2 $\mu\text{g/L}$.

SUMMARY

In general, the results of the five recent surface-water-quality studies in the Big Blue River Basin in Nebraska indicate that the most frequently detected herbicide was atrazine. Of the 385 samples analyzed for atrazine by GC/MS methods, 369 had detectable concentrations of the herbicide (table 2). The concentrations of atrazine detected in the samples ranged from 0.05 to 166 $\mu\text{g/L}$, with a median concentration of 2.7 $\mu\text{g/L}$.

Other frequently detected herbicides included alachlor, cyanazine, metolachlor, and simazine, and two metabolites of atrazine, desethylatrazine and deisopropylatrazine. In the 226 samples in which alachlor was detected, the concentrations of the herbicide ranged from 0.05 to 56 $\mu\text{g/L}$, and the median concentration was 1.1 $\mu\text{g/L}$ (table 2). Cyanazine was detected in 210 of 365 samples collected, with concentrations that ranged from 0.05 to 8.6 $\mu\text{g/L}$ and a median concentration of 0.4 $\mu\text{g/L}$ (table 2). The maximum concentrations of metolachlor and simazine were 26 and 35 $\mu\text{g/L}$, respectively. The median concentrations of these herbicides were 1.0 and 0.1 $\mu\text{g/L}$, respectively. The atrazine metabolite desethylatrazine was detected in 184 samples within the basin, with a maximum concentration of 3.7 $\mu\text{g/L}$ and a median concentration of 1.0 $\mu\text{g/L}$. Deisopropylatrazine was detected in 152 samples, with maximum and median concentrations of 2.6 and 0.6 $\mu\text{g/L}$, respectively.

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Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay (ELISA) and gas chromatography/mass spectrometry (GC/MS) analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92

[Some samples also were analyzed for the presence of butachlor, carboxin, cycloate, diphenamid, hexazinone, prometryn, simetryne, terbutryn, and vernolate, but none of these herbicides were detected. Concentrations are in micrograms per liter ($\mu\text{g/L}$); <, less than detection level; >, greater than; --, not determined; e, estimated; *, date shown is the median value for dates of samples combined in composite sample; **, time shown is the median value for times of samples combined in composite sample]

Map reference number (fig. 2)	Date	Time (24-hour)	Water quality study ¹	Discharge (cubic feet per second)	Ala-chlor, ELISA ($\mu\text{g/L}$)	Ala-chlor, total recoverable GC/MS ($\mu\text{g/L}$)	Ametryn, total ($\mu\text{g/L}$)	Atrazine, ELISA ($\mu\text{g/L}$)	Atrazine, total GC/MS ($\mu\text{g/L}$)	Bromacil, Butylate, water whole, recoverable ($\mu\text{g/L}$)		Cyanazine, total ($\mu\text{g/L}$)	Desethyl atrazine ($\mu\text{g/L}$)
1	09-28-87	1250	N	7.1	--	<0.1	<0.1	--	0.7	--	--	<0.1	--
	07-26-88	0730	N	6.2	--	.1	<.1	--	2.4	<0.1	<0.1	.5	--
	11-14-88	1200	N	1.4	--	<.1	<.1	--	.3	<.1	<.1	.1	--
	03-08-89	1015	N	415	--	<.1	<.1	--	.6	<.1	<.1	<.1	--
	04-05-89	--	R	3.5	--	--	--	0.2	--	--	--	--	--
2	05-31-89	1445	N	e1.5	--	.2	<.1	--	.4	<.1	<.1	.1	--
	06-26-89	--	R	71	--	3.1	<.05	>5	17	--	--	5.9	1.7
	10-31-89	--	R	3.0	--	.11	.10	1.3	.70	--	--	<.2	.44
	07-26-88	0945	N	.34	--	1.0	.4	--	8.8	--	--	3.3	--
3	11-15-88	0815	N	1.4	--	.1	1.7	--	11	<.1	<.1	1.2	--
	03-07-89	1015	N	e.01	--	<.1	.2	--	2.6	.3	<.1	.2	--
	05-31-89	0930	N	.40	--	1.1	.4	--	32	<.1	<.1	4.1	--
	07-26-88	0900	N	8.2	--	<.1	.1	--	2.1	<.1	<.1	.2	--
	11-14-88	1345	N	--	--	<.1	.2	--	4.7	<.1	<.1	.4	--
	03-07-89	1000	N	.88	--	<.1	.4	--	5.6	.2	<.1	.5	--
	05-31-89	1330	N	.19	--	<.1	.1	--	2.0	.6	<.1	1.4	--

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay and gas chromatography/mass spectrometry analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Metol-achlor, water			Metri-buzin, water		Prometon, total		Prop-achlor, water		Propazine, total		Terbacil, water		Trifluralin, total	
			Deiso-propyl-atrazine ($\mu\text{g/L}$)	achlor, whole, recoverable ($\mu\text{g/L}$)	whole, total ($\mu\text{g/L}$)	Metri-buzin, whole, total ($\mu\text{g/L}$)	Prometon, total ($\mu\text{g/L}$)	Prop-achlor, whole, total ($\mu\text{g/L}$)	Propazine, total ($\mu\text{g/L}$)	Terbacil, whole, recoverable ($\mu\text{g/L}$)	Trifluralin, total recoverable ($\mu\text{g/L}$)						
1	09-28-87	1250	--	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	--	<0.1	--	<0.1	
	07-26-88	0730	--	1.0	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
	11-14-88	1200	--	<0.1	<0.1	.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
	03-08-89	1015	--	.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	.1	<0.1	<0.1	<0.1	<0.1	
	04-05-89	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	05-31-89	1445	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
2	06-26-89	--	1.4	3.8	.41	.64	.25	.31	--	--	--	--	--	--	--	--	
	10-31-89	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	--	--	<0.05	<0.05	--	--	--	
	07-26-88	0945	--	2.5	<0.1	.3	.1	.2	--	--	.1	.2	--	--	--	<0.1	
	11-15-88	0815	--	.1	<0.1	3.7	.1	.1	<0.1	<0.1	.1	.1	<0.1	<0.1	<0.1	<0.1	
3	03-07-89	1015	--	.2	<0.1	.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
	05-31-89	0930	--	1.3	<0.1	1.2	<0.1	.2	<0.1	<0.1	.2	.1	<0.1	<0.1	<0.1	<0.1	
	07-26-88	0900	--	.1	<0.1	.2	<0.1	.1	<0.1	<0.1	<0.1	.1	<0.1	<0.1	<0.1	<0.1	
	11-14-88	1345	--	.2	<0.1	.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
	03-07-89	1000	--	.1	<0.1	1.2	<0.1	.1	<0.1	<0.1	.1	<0.1	<0.1	<0.1	<0.1	<0.1	
05-31-89	1330	--	.1	<0.1	.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay (ELISA) and gas chromatography/mass spectrometry (GC/MS) analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Water-quality study ¹	Dis-charge (cubic feet per second)	Ala-chlor, total		Atrazine, ELISA (µg/L)	Atrazine, ELISA (µg/L)	Atrazine, total GC/MS (µg/L)	Bromacil, Butylate, water whole, recover-able (µg/L)		Desethyl-atrazine (µg/L)
					Ala-chlor, ELISA (µg/L)	recover-able GC/MS (µg/L)				water whole, recover-able (µg/L)	water whole, recover-able (µg/L)	
4	07-26-88	0845	N	30	--	0.1	--	0.1	2.5	<.1	<.1	0.3
	11-14-88	1050	N	19	--	<.1	--	<.1	.1	<.1	<.1	<.1
	03-08-89	1215	N	25	--	<.1	--	<.1	.7	<.1	<.1	<.1
	05-31-89	1600	N	e17	--	<.1	--	<.1	.1	<.1	<.1	.1
5	07-26-88	1000	N	55	--	.1	--	<.1	2.0	<.1	<.1	.2
	11-14-88	0845	N	29	--	<.1	--	<.1	.1	<.1	<.1	<.1
	03-08-89	1130	N	50	--	<.1	--	<.1	.6	<.1	<.1	<.1
6	06-24-89	1200	N	--	--	56	--	<.1	.5	<.1	<.1	<.1
	08-27-89	1255	N	--	--	.6	--	<.1	.4	<.1	<.1	<.1
7	06-24-89	1230	N	--	--	<.1	--	<.1	26	<.1	<.1	<.1
	08-27-89	1310	N	--	--	<.1	--	<.1	2.3	<.1	<.1	<.1
8	07-26-88	0630	N	6.7	--	.1	--	.4	.4	<.1	<.1	<.1
	11-15-88	1015	N	3.0	--	<.1	--	<.1	.1	<.1	<.1	<.1
	03-07-89	1600	N	6.4	--	<.1	--	<.1	.3	<.1	<.1	<.1
	05-30-89	1145	N	4.4	--	<.1	--	<.1	1.6	<.1	<.1	<.1
07-16-91	0930	T	9.9	--	<.05	--	<.05	.49	--	--	<.05	
10-22-91	0940	T	3.3	--	<.05	--	<.05	.06	--	--	<.05	
07-16-91	1000	T	2.0	--	<.05	--	4.83	1.92	--	--	<.05	
07-16-91	1045	T	3.4	--	<.05	--	<.05	3.14	--	--	<.05	

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay and gas chromatography/mass spectrometry analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Metol-									
			Deiso-propyl-atrazine (µg/L)	achlor, water whole, recover-able (µg/L)	Metri-buzin, water whole, total (µg/L)	Prometon, total (µg/L)	Prop-achlor, water whole, total (µg/L)	Propazine, total (µg/L)	Simazine, total (µg/L)	Terbacil, water whole, recover-able (µg/L)	Trifluralin, total recover-able (µg/L)	
4	07-26-88	0845	--	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1
	11-14-88	1050	--	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
	03-08-89	1215	--	.2	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
	05-31-89	1600	--	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
5	07-26-88	1000	--	.1	<.1	<.1	<.1	<.1	<.1	.1	<.1	<.1
	11-14-88	0845	--	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
	03-08-89	1130	--	.2	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
6	06-24-89	1200	--	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
	08-27-89	1255	--	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
7	06-24-89	1230	--	<.1	<.1	<.1	<.1	.6	.2	.1	<.1	<.1
	08-27-89	1310	--	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
8	07-26-88	0630	--	<.1	<.1	.1	<.1	<.1	<.1	<.1	<.1	<.1
	11-15-88	1015	--	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
	03-07-89	1600	--	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
	05-30-89	1145	--	<.1	<.1	<.1	<.1	<.1	<.1	.1	<.1	<.1
	07-16-91	0930	0.12	.10	<.05	<.05	--	--	<.05	<.05	--	--
	10-22-91	0940	<.05	<.05	<.05	<.05	--	--	<.05	<.05	--	--
9	07-16-91	1000	.14	.28	<.05	<.05	--	--	<.05	<.05	--	--
10	07-16-91	1045	.34	2.93	<.05	<.05	--	--	<.05	<.05	.17	--

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay (ELISA) and gas chromatography/mass spectrometry (GC/MS) analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Water quality study ¹	Discharge (cubic feet per second)	Ala-chlor, ELISA (µg/L)	Ala-chlor, total recoverable GC/MS (µg/L)	Ametryn, total (µg/L)	Atrazine, ELISA (µg/L)	Atrazine, total GC/MS (µg/L)	Bromacil, Butylate, water whole, recoverable (µg/L)		Desethyl-atrazine (µg/L)
										water whole, recoverable (µg/L)	water whole, recoverable (µg/L)	
11	07-25-88	1230	N	14	--	<0.1	0.2	--	1.5	<0.1	<0.1	0.4
	11-15-88	1130	N	3.5	--	<.1	<.1	--	.1	<.1	<.1	.1
	03-07-89	1300	N	2.6	--	<.1	<.1	--	.5	<.1	.1	.1
	07-16-91	1230	T	40	--	.17	.63	--	2.93	--	--	.10
	10-22-91	1100	T	3.3	--	<.05	<.05	--	.11	--	--	<.05
12	07-16-91	1140	T	12	--	.39	<.05	--	5.66	--	--	.23
13	07-16-91	1340	T	3.1	--	.21	<.05	--	2.17	--	--	<.05
14	07-16-91	1420	T	3.0	--	.46	.10	--	5.40	--	--	<.05
15	07-16-91	1500	T	.73	--	1.67	.05	--	7.42	--	--	.23
	07-16-91	1500	T	--	--	1.68	.05	--	7.44	--	--	.23
16	07-16-91	1030	T	48	--	.18	.26	--	3.12	--	--	<.05
	10-22-91	0950	T	6.2	--	<.05	<.05	--	.17	--	--	<.05
17	07-25-88	1130	N	3.8	--	.1	.1	--	4.4	<.1	<.1	.7
	11-15-88	1230	N	262	--	<.1	<.1	--	.3	<.1	<.1	<.1
	03-07-89	1445	N	.55	--	4.1	.1	--	22	.5	<.1	.1
	05-30-89	1445	N	.26	--	.5	.1	--	3.3	.3	<.1	.2
18	07-16-91	1055	T	14	--	.30	.08	--	2.94	--	--	<.05
												.70

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay and gas chromatography/mass spectrometry analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Metol-achlor, water whole, recover-able (µg/L)			Metri-buzin, water whole, total (µg/L)	Prop-achlor, water whole, total (µg/L)	Propazine, total (µg/L)	Simazine, total (µg/L)	Terbacil, water whole, recover-able (µg/L)	Trifluralin, total recover-able (µg/L)
			Deiso-propyl-atrazine (µg/L)	achlor, water whole, recover-able (µg/L)	water whole, total (µg/L)						
11	07-25-88	1230	--	0.3	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1
	11-15-88	1130	--	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
	03-07-89	1300	--	.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
	07-16-91	1230	0.43	<.05	<.05	--	<.05	.12	--	--	--
	10-22-91	1100	<.05	<.05	<.05	--	<.05	<.05	--	--	--
12	07-16-91	1140	.71	4.67	<.05	--	<.05	.06	--	--	--
13	07-16-91	1340	.46	<.05	<.05	--	<.05	<.05	--	--	--
14	07-16-91	1420	.58	.41	<.05	--	<.05	.05	--	--	--
15	07-16-91	1500	1.42	.33	<.05	--	<.05	.38	--	--	--
	07-16-91	1500	1.51	.31	<.05	--	<.05	.38	--	--	--
16	07-16-91	1030	.38	1.48	<.05	--	<.05	.10	--	--	--
	10-22-91	0950	<.05	<.05	<.05	--	<.05	<.05	--	--	--
17	07-25-88	1130	--	.8	<.1	<.1	<.1	2.1	<.1	<.1	<.1
	11-15-88	1230	--	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
	03-07-89	1445	--	.2	.1	<.1	.3	.1	<.1	<.1	<.1
	05-30-89	1445	--	.3	<.1	<.1	<.1	<.1	<.1	<.1	<.1
18	07-16-91	1055	.35	.40	<.05	--	<.05	<.05	--	--	--

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay (ELISA) and gas chromatography/mass spectrometry (GC/MS) analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Water-quality study ¹	Dis-charge (cubic feet per second)	Ala-chlor, ELISA (µg/L)	Ala-chlor, total recover-able GC/MS (µg/L)	Ametryn, total (µg/L)	Atrazine, ELISA (µg/L)	Atrazine, total GC/MS (µg/L)	Bromacil, Butylate, water whole, recover-able (µg/L)		Cyana-zine, total (µg/L)	Desethyl-atrazine (µg/L)
										water whole, recover-able (µg/L)	water whole, recover-able (µg/L)		
19	07-16-91	1125	T	0.68	--	0.34	0.12	--	6.19	--	--	<0.05	1.57
20	07-25-88	1200	N	27	--	.1	.3	--	2.2	<0.1	<0.1	.5	--
	11-15-88	1300	N	14	--	<.1	<.1	--	.1	<.1	<.1	<.1	--
	03-07-89	1245	N	15	--	<.1	<.1	--	.4	<.1	<.1	.1	--
	05-31-89	1100	N	15	--	2.6	<.1	--	11	<.1	<.1	2.5	--
	07-16-91	1240	T	73	--	.25	.12	--	4.02	--	--	.05	.86
21	10-22-91	1105	T	7.8	--	<.05	<.05	--	.24	--	--	<.05	.10
	07-16-91	1315	T	1.1	--	<.05	<.05	--	3.17	--	--	<.05	.45
22	07-16-91	1330	T	15	--	.38	.12	--	4.32	--	--	<.05	1.09
	10-22-91	1135	T	--	--	<.05	<.05	--	.33	--	--	<.05	.40
23	07-16-91	1345	T	2.9	--	<.05	.44	--	2.48	--	--	<.05	.59
	07-16-91	1405	T	2.4	--	1.46	.85	--	11.73	--	--	.18	2.41
24	07-16-91	1405	T	--	--	1.53	.88	--	11.72	--	--	.22	2.59
	07-16-91	1405	T	--	--	.62	.12	--	5.95	--	--	.05	1.06
25	07-16-91	0925	T	111	--	<.05	<.05	--	.37	--	--	<.05	.12
	10-22-91	0920	T	21	--	<.05	<.05	--	166	--	--	<.05	--
26	05-16-92	--	UB	--	--	--	--	--	--	--	--	--	--

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay and gas chromatography/mass spectrometry analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Metol-						Terbacil,		
			achlor, water whole, recoverable (µg/L)	Deiso-propyl-atrazine (µg/L)	Metri-buzin, water whole, total (µg/L)	Prometon, total (µg/L)	Prop-achlor, water whole, total (µg/L)	Propazine, total (µg/L)	Simazine, total (µg/L)	water whole, recoverable (µg/L)	Trifluralin, total recoverable (µg/L)
19	07-16-91	1125	0.77	0.07	<0.05	<0.05	--	0.05	0.14	--	--
20	07-25-88	1200	--	.2	<.1	<.1	<.1	<.1	.5	<.1	<.1
	11-15-88	1300	--	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
	03-07-89	1245	--	.2	<.1	<.1	<.1	<.1	<.1	<.1	<.1
	05-31-89	1100	--	7.9	.8	.1	<.1	<.1	.4	<.1	<.1
	07-16-91	1240	.47	1.35	<.05	<.05	--	<.05	.09	--	--
21	10-22-91	1105	<.05	<.05	<.05	<.05	--	<.05	<.05	--	--
	07-16-91	1305	.24	.06	<.05	<.05	--	<.05	<.05	--	--
	07-16-91	1330	.53	.39	<.05	<.05	--	.05	.05	--	--
	10-22-91	1135	<.05	<.05	<.05	<.05	--	<.05	<.05	--	--
23	07-16-91	1345	.33	.35	<.05	<.05	--	<.05	.06	--	--
	07-16-91	1405	1.32	.44	<.05	<.05	--	<.05	.07	--	--
24	07-16-91	1405	1.42	.47	<.05	<.05	--	.12	.08	--	--
	07-16-91	0925	.55	.96	<.05	<.05	--	<.05	<.05	--	--
25	10-22-91	0920	<.05	<.05	<.05	<.05	--	<.05	<.05	--	--
	05-16-92	--	--	--	--	--	--	--	--	--	--

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay (ELISA) and gas chromatography/mass spectrometry (GC/MS) analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Water quality study ¹	Discharge (cubic feet per second)	Ala-chlor, ELISA (µg/L)	Ala-chlor, total recoverable GC/MS (µg/L)	Ametryn, total (µg/L)	Atrazine, ELISA (µg/L)	Atrazine, total GC/MS (µg/L)	Bromacil, water whole, recoverable (µg/L)		Butylate, water whole, recoverable (µg/L)		Cyanazine, total (µg/L)	Desethyl-atrazine (µg/L)
27	07-26-88	1010	N	6.5	--	<0.1	0.2	--	2.8	<0.1	<0.1	<0.1	0.3	--	--
	11-14-88	1425	N	2.5	--	<.1	<.1	--	.1	<.1	<.1	<.1	<.1	--	--
	03-07-89	1145	N	2.9	--	<.1	<.1	--	.3	<.1	<.1	<.1	<.1	--	--
	05-31-89	1245	N	2.2	--	.2	<.1	--	.9	.1	<.1	<.1	.4	--	--
28	07-16-91	0940	T	28	--	.35	.18	--	3.97	--	--	--	<.05	0.92	
	10-22-91	1040	T	.63	--	<.05	<.05	--	.46	--	--	--	<.05	.20	
29	07-16-91	0815	T	.88	--	.08	<.05	--	3.27	--	--	--	<.05	1.75	
30	07-16-91	1040	T	1.4	--	.21	<.05	--	1.99	--	--	--	.10	.59	
	10-22-91	1145	T	.90	--	<.05	<.05	--	.05	--	--	--	<.05	<.05	
31	06-25-89	0945	N	--	--	1.1	<.1	--	47	<.1	<.1	<.1	.1	--	--
	08-27-89	1330	N	--	--	<.1	<.1	--	3.5	<.1	<.1	<.1	<.1	--	--
32	05-13-87	0930	N	178	--	--	<.1	--	7.3	--	--	--	1.0	--	--
	05-15-87	0855	N	199	--	.9	<.1	--	4.2	--	--	--	.7	--	--
	05-19-87	1330	N	136	--	.2	<.1	--	2.1	--	--	--	.2	--	--
	05-21-87	0915	N	135	--	--	<.1	--	1.7	--	--	--	.2	--	--
	05-27-87	1400	N	276	--	5.0	<.1	--	16	--	--	--	3.7	--	--

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay (ELISA) and gas chromatography/mass spectrometry (GC/MS) analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Water-quality study ¹	Dis-charge (cubic feet per second)	Ala-chlor, total recover-		Atrazine, ELISA (µg/L)	Atrazine, total GC/MS (µg/L)	Bromacil, Butylate, water whole, recover-		Cyanazine, total (µg/L)	Desethyl-atrazine (µg/L)
					Ala-chlor, ELISA (µg/L)	able GC/MS (µg/L)			able (µg/L)	able (µg/L)		
32	05-29-87	1130	N	404	--	2.0	--	17	--	--	1.6	--
	06-05-87	1000	N	288	--	1.0	--	11	--	--	1.2	--
	06-08-87	1045	N	190	--	<.1	--	2.4	--	--	.5	--
	06-10-87	1100	N	1,060	--	3.0	--	18	--	--	1.7	--
	06-11-87	1030	N	866	--	4.0	--	17	--	--	1.5	--
	06-16-87	1030	N	205	--	.6	--	7.2	--	--	.8	--
	07-15-87	1100	N	171	--	.1	--	3.7	--	--	.3	--
	08-11-87	1000	N	163	--	<.1	--	2.2	--	--	.1	--
	09-09-87	1030	N	79	--	<.1	--	.5	--	--	.1	--
	09-29-87	1545	N	81	--	<.1	--	.3	--	--	<.1	--
	11-03-87	1000	N	89	--	<.1	--	.1	--	--	<.1	--
	12-01-87	1000	N	85	--	<.1	--	.1	--	--	<.1	--
	01-26-88	1030	N	100	--	<.1	--	.1	--	--	<.1	--
	02-22-88	1100	N	122	--	.1	--	.3	--	--	<.1	--
	03-21-88	1100	N	105	--	<.1	--	.1	--	--	<.1	--
	04-18-88	1020	N	79	--	<.1	--	.1	<.1	<.1	<.1	--
	05-24-88	1130	N	137	--	3.1	--	13	<.1	.1	3.9	--
	06-20-88	1030	N	54	--	.1	--	1.5	<.1	<.1	.3	--
	07-18-88	1000	N	106	--	.1	--	3.8	<.1	<.1	.4	--
	07-25-88	1245	N	75	--	.2	--	3.6	<.1	<.1	.3	--

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay and gas chromatography/mass spectrometry analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Metol-achlor, water whole, recoverable (µg/L)			Deiso-propyl-atrazine (µg/L)	Metribuzin, water whole, total (µg/L)		Prometon, total (µg/L)		Propachlor, water whole, total (µg/L)		Propazine, Simazine, total (µg/L)		Terbacil, water whole, recoverable (µg/L)		Trifluralin, total recoverable (µg/L)	
			Metol-achlor, water whole, recoverable (µg/L)	Metribuzin, water whole, total (µg/L)	Prometon, total (µg/L)		Propachlor, water whole, total (µg/L)	Propazine, Simazine, total (µg/L)	Terbacil, water whole, recoverable (µg/L)	Trifluralin, total recoverable (µg/L)								
32	05-29-87	1130	2.0	0.3	0.3	--	0.2	0.3	--	0.3	--	0.2	0.3	--	0.1	--	<0.1	<0.1
	06-05-87	1000	2.0	.2	.1	--	.2	.3	--	.3	--	.2	.3	--	<.1	--	<.1	<.1
	06-08-87	1045	.4	<.1	<.1	--	<.1	.1	--	<.1	--	<.1	.1	--	<.1	--	<.1	<.1
	06-10-87	1100	2.0	.3	.1	--	.4	.2	--	.4	--	.4	.2	--	.1	--	.1	.1
	06-11-87	1030	2.0	.4	.2	--	.3	.4	--	.3	--	.3	.4	--	.1	--	.1	.1
	06-16-87	1030	.9	.1	<.1	--	.1	<.1	--	.1	--	.1	.3	--	<.1	--	<.1	<.1
	07-15-87	1100	.5	<.1	<.1	--	<.1	<.1	--	<.1	--	<.1	.5	--	<.1	--	<.1	<.1
	08-11-87	1000	<.1	<.1	.3	--	<.1	.3	--	<.1	--	<.1	.1	--	<.1	--	<.1	<.1
	09-09-87	1030	<.1	<.1	<.1	--	<.1	<.1	--	<.1	--	<.1	<.1	--	<.1	--	<.1	<.1
	09-29-87	1545	<.1	<.1	<.1	--	<.1	<.1	--	<.1	--	<.1	<.1	--	<.1	--	<.1	<.1
	11-03-87	1000	<.1	<.1	<.1	--	<.1	<.1	--	<.1	--	<.1	<.1	--	<.1	--	<.1	<.1
	12-01-87	1000	<.1	<.1	<.1	--	<.1	<.1	--	<.1	--	<.1	<.1	--	<.1	--	<.1	<.1
	01-26-88	1030	<.1	<.1	<.1	--	<.1	<.1	--	<.1	--	<.1	<.1	--	<.1	--	<.1	<.1
	02-22-88	1100	.1	<.1	<.1	--	<.1	<.1	--	<.1	--	<.1	<.1	--	<.1	--	<.1	<.1
	03-21-88	1100	<.1	<.1	<.1	--	<.1	<.1	--	<.1	--	<.1	<.1	--	<.1	--	<.1	<.1
	04-18-88	1020	<.1	<.1	<.1	--	<.1	<.1	--	<.1	--	<.1	<.1	--	<.1	--	<.1	<.1
	05-24-88	1130	2.5	.3	<.1	--	.4	1.0	--	.2	--	.4	3.0	--	<.1	--	<.1	<.1
	06-20-88	1030	.1	<.1	<.1	--	<.1	<.1	--	<.1	--	<.1	<.1	--	<.1	--	<.1	<.1
	07-18-88	1000	.2	<.1	<.1	--	<.1	<.1	--	.1	--	<.1	.5	--	<.1	--	<.1	<.1
	07-25-88	1245	.4	<.1	<.1	--	<.1	<.1	--	<.1	--	<.1	.6	--	<.1	--	<.1	<.1

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay (ELISA) and gas chromatography/mass spectrometry (GC/MS) analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Water-quality study ¹	Dis-charge (cubic feet per second)	Ala-chlor, ELISA (µg/L)	Ala-chlor, total recoverable GC/MS (µg/L)	Ametryn, total (µg/L)	Atrazine, ELISA (µg/L)	Atrazine, total GC/MS (µg/L)	Bromacil, water whole, recoverable (µg/L)		Butylate, water whole, recoverable (µg/L)		Desethyl-atrazine (µg/L)
										water whole, recoverable (µg/L)	water whole, recoverable (µg/L)			
32	08-08-88	1115	N	81	--	<0.1	<0.2	--	1.8	<0.1	<0.1	<0.1	<0.1	--
	08-31-88	1400	N	48	--	<1	<1	--	.6	<1	<1	<1	.1	--
	10-12-88	1230	N	55	--	<1	<1	--	.5	<1	<1	<1	<1	--
	11-07-88	1200	N	57	--	<1	<1	--	.2	<1	<1	<1	<1	--
	11-15-88	1420	N	58	--	<1	<1	--	.2	<1	<1	<1	<1	--
	12-06-88	1000	N	53	--	<1	<1	--	.1	<1	<1	<1	<1	--
	01-03-89	1130	N	59	--	<1	<1	--	.1	<1	<1	<1	<1	--
	02-07-89	1000	N	49	--	<1	<1	--	.2	<1	<1	<1	<1	--
	03-07-89	1400	N	108	--	<1	<1	--	.3	<1	<1	<1	.1	--
	03-08-89	1345	N	55	--	<1	<1	--	.3	<1	<1	<1	.1	--
	04-04-89	0955	N	70	--	<1	<1	--	.1	<1	<1	<1	.1	--
	04-04-89	--	R	70	--	<0.05	<0.05	<0.2	.16	--	--	--	<2	<0.05
	05-02-89	0830	N	50	--	<1	<1	--	.2	<1	<1	<1	<1	--
	05-31-89	1430	N	e54	--	<1	<1	--	1.0	<1	<1	<1	.2	--
	06-21-89	1020	N	50	--	.1	<1	--	3.2	<1	<1	<1	.4	--
	06-27-89	1030	N	1,830	--	3.4	<1	--	29	<1	<1	<1	1.3	--
	06-27-89	--	R	1,830	--	1.7	<0.05	>5	23	--	--	--	<2	2.8
	06-28-89	1200	N	1,470	--	2.5	<1	--	18	<1	<1	<1	1.6	--
	06-29-89	1130	N	1,130	--	2.7	.1	--	25	<1	<1	<1	1.9	--

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay and gas chromatography/mass spectrometry analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Metol-										
			Deiso-propyl-atrazine ($\mu\text{g/L}$)	achlor, water whole, recover-able ($\mu\text{g/L}$)	Metri-buzin, water whole, total ($\mu\text{g/L}$)	Prometon, total ($\mu\text{g/L}$)	Prop-achlor, water whole, total ($\mu\text{g/L}$)	Propazine, total ($\mu\text{g/L}$)	Simazine, total ($\mu\text{g/L}$)	Terbacil, water whole, recover-able ($\mu\text{g/L}$)	Trifluralin, total recover-able ($\mu\text{g/L}$)		
32	08-08-88	1115	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1
	08-31-88	1400	--	<1	<1	<1	<1	<1	<1	<1	.1	<1	<1
	10-12-88	1230	--	.1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	11-07-88	1200	--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	11-15-88	1420	--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	12-06-88	1000	--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	01-03-89	1130	--	<1	<1	0.1	0.1	<1	<1	<1	<1	<1	<1
	02-07-89	1000	--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	03-07-89	1400	--	.1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	03-08-89	1345	--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	04-04-89	0955	--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	04-04-89	--	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05	<0.05	--	--
	05-02-89	0830	--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	05-31-89	1430	--	<1	<1	<1	.1	<1	<1	<1	<1	<1	<1
	06-21-89	1020	--	1.0	<1	<1	.9	<1	<1	<1	.1	<1	<1
	06-27-89	1030	--	2.3	.2	<1	<1	.3	<1	.3	<1	<1	<1
	06-27-89	--	1.9	.83	.24	.12	.12	--	.27	.27	3.0	--	--
	06-28-89	1200	--	2.8	.1	<1	<1	.2	<1	.2	1.0	<1	<1
	06-29-89	1130	--	2.9	.3	<1	<1	.2	<1	.3	.7	<1	<1

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay (ELISA) and gas chromatography/mass spectrometry (GC/MS) analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Water quality study ¹	Discharge (cubic feet per second)	Ala-chlor, ELISA (µg/L)	Ala-chlor, total recoverable GC/MS (µg/L)	Ametryn, total (µg/L)	Atrazine, ELISA (µg/L)	Atrazine, total GC/MS (µg/L)	Bromacil, Butylate, water whole, recoverable (µg/L)		Cyanazine, total (µg/L)	Desethyl-atrazine (µg/L)
										water whole, recoverable (µg/L)	water whole, recoverable (µg/L)		
32	06-30-89	0915	N	e589	--	2.1	0.1	--	27	<0.1	<0.1	2.1	--
	08-22-89	1010	N	123	--	.1	.2	--	1.9	<.1	<.1	.1	--
	09-05-89	1030	N	1,670	--	.2	.2	--	2.3	<.1	<.1	.1	--
	10-31-89	1330	N	64	--	<.1	<.1	--	.4	<.1	<.1	<.1	--
	10-31-89	--	R	56	--	<.05	<.05	0.5	.34	--	--	<.2	0.14
	11-28-89	1000	N	66	--	<.1	<.1	--	.2	--	--	<.1	--
	12-18-89	1135	N	45	--	<.1	<.1	--	.2	--	--	<.1	--
	01-17-90	1130	N	64	--	<.1	<.1	--	.2	--	--	<.1	--
	02-12-90	1400	N	82	--	<.1	<.1	--	.2	--	--	<.1	--
	04-03-90	1225	T	68	0.30	--	--	.20	--	--	--	--	--
	04-06-90	1500	T	66	.20	--	--	.20	--	--	--	--	--
	04-09-90	1345	T	69	.10	--	--	.10	--	--	--	--	--
	04-12-90	1500	T	64	<.10	<.05	<.05	.20	.16	--	--	<.20	.08
	04-17-90	1330	T	64	.10	--	--	.20	--	--	--	--	--
	04-19-90	1330	T	65	.30	--	--	.30	--	--	--	--	--
	04-19-90	1330	T	65	.10	--	--	.10	--	--	--	--	--
	04-19-90	1330	T	65	.20	<.05	<.05	.20	.14	--	--	<.20	.08
	04-19-90	1330	T	65	.10	--	--	.10	--	--	--	--	--
	04-24-90	1200	T	62	--	<.05	<.05	--	.34	--	--	<.20	.06
	04-26-90	1405	T	61	.20	--	--	.80	--	--	--	--	--

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay and gas chromatography/mass spectrometry analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Deiso-propyl-atrazine ($\mu\text{g/L}$)		Metol-achlor, water whole, recover-able ($\mu\text{g/L}$)		Metri-buzin, water whole, total ($\mu\text{g/L}$)		Prometon, total ($\mu\text{g/L}$)		Prop-achlor, water whole, total ($\mu\text{g/L}$)		Propazine, total ($\mu\text{g/L}$)		Simazine, total ($\mu\text{g/L}$)		Terbacil, water whole, recover-able ($\mu\text{g/L}$)		Trifluralin, total recover-able ($\mu\text{g/L}$)	
			($\mu\text{g/L}$)	($\mu\text{g/L}$)	($\mu\text{g/L}$)	($\mu\text{g/L}$)	($\mu\text{g/L}$)	($\mu\text{g/L}$)	($\mu\text{g/L}$)	($\mu\text{g/L}$)	($\mu\text{g/L}$)	($\mu\text{g/L}$)	($\mu\text{g/L}$)	($\mu\text{g/L}$)	($\mu\text{g/L}$)	($\mu\text{g/L}$)	($\mu\text{g/L}$)	($\mu\text{g/L}$)	($\mu\text{g/L}$)	($\mu\text{g/L}$)
32	06-30-89	0915	--	3.1	0.3	0.3	0.3	0.1	0.2	0.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	08-22-89	1010	--	.2	<.1	.1	<.1	<.1	<.1	.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
	09-05-89	1030	--	.1	<.1	<.1	<.1	<.1	<.1	.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
	10-31-89	1330	--	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
	10-31-89	--	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05	--	--	<0.05	<0.05	<0.05	<0.05	--	--	--	--
	11-28-89	1000	--	<.1	<.1	<.1	<.1	--	<.1	<.1	--	--	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
	12-18-89	1135	--	<.1	<.1	<.1	<.1	--	<.1	<.1	--	--	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
	01-17-90	1130	--	<.1	<.1	<.1	<.1	--	<.1	<.1	--	--	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
	02-12-90	1400	--	<.1	<.1	<.1	<.1	--	<.1	<.1	--	--	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
	04-03-90	1225	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	04-06-90	1500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	04-09-90	1345	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	04-12-90	1500	<.05	<.05	<.05	<.05	<.05	--	<.05	<.05	--	--	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05
	04-17-90	1330	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	04-19-90	1330	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	04-19-90	1330	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	04-19-90	1330	<.05	<.05	<.05	<.05	<.05	--	<.05	<.05	--	--	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05
	04-19-90	1330	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	04-24-90	1200	<.05	<.05	<.05	<.05	<.05	--	<.05	<.05	--	--	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05
	04-26-90	1405	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay (ELISA) and gas chromatography/mass spectrometry (GC/MS) analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Water-quality study ¹	Dis-charge (cubic feet per second)	Ala-chlor, total recover-able		Atrazine, ELISA (µg/L)	Atrazine, GC/MS (µg/L)	Atrazine, total GC/MS (µg/L)	Bromacil, Butylate, water recover-able		Cyana-zine, total (µg/L)	Desethyl-atrazine (µg/L)
					Ala-chlor, ELISA (µg/L)	Ala-chlor, GC/MS (µg/L)				water recover-able (µg/L)	water recover-able (µg/L)		
32	04-30-90	1055	T	57	<0.10	--	0.90	--	--	--	--	--	--
	05-03-90	1325	T	60	.20	0.05	1.0	0.33	--	--	<0.20	0.06	
	05-07-90	1000	T	62	.30	--	.80	--	--	--	--	--	--
	05-09-90	0930	T	153	1.8	1.8	6.9	7.0	--	--	6.3	.42	
	05-09-90	1330	T	179	4.7	--	3.9	--	--	--	--	--	--
	05-09-90	1730	T	166	3.5	4.4	5.0	6.8	--	--	2.0	.45	
	05-09-90	2130	T	138	--	13	--	34	--	--	3.4	1.5	
	05-10-90	0130	T	130	26	9.3	--	27	--	--	2.1	1.1	
	05-10-90	0530	T	125	17	6.8	8.1	14	--	--	2.0	.84	
	05-10-90	0930	T	124	3.3	3.7	6.2	9.2	--	--	1.9	.47	
	05-10-90	1300	T	116	3.8	--	13	--	--	--	--	--	--
	05-10-90	1700	T	154	3.2	2.4	12	8.5	--	--	1.3	.44	
	05-10-90	2100	T	168	3.7	--	15	--	--	--	--	--	--
	05-11-90	0100	T	160	4.3	--	13	--	--	--	--	--	--
	05-11-90	0900	T	130	4.3	--	14	--	--	--	--	--	--
	05-11-90	1300	T	138	3.6	2.4	12	8.6	--	--	1.4	.44	
	05-11-90	1700	T	159	2.8	--	14	--	--	--	--	--	--
	05-11-90	2100	T	170	3.7	--	14	--	--	--	--	--	--
	05-12-90	0100	T	174	4.1	--	11	--	--	--	--	--	--
	05-12-90	0500	T	171	3.9	--	12	--	--	--	--	--	--

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay and gas chromatography/mass spectrometry analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Metol-																		
			Deiso-propyl-atrazine (µg/L)	achlor, water whole, recover-able (µg/L)	Metri-buzin, water whole, total (µg/L)	Prometon, total (µg/L)	Prop-achlor, water whole, total (µg/L)	Propazine, total (µg/L)	Simazine, total (µg/L)	Terbacil, water whole, recover-able (µg/L)	Trifluralin, total recover-able (µg/L)										
32	04-30-90	1055	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	05-03-90	1325	<0.05	<0.05	0.11	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	05-07-90	1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	05-09-90	0930	.32	2.4	.10	<0.05	<0.05	<0.05	<0.05	.10	.05	.05	.10	.05	.05	.05	.05	.05	.05	.05	.05
	05-09-90	1330	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	05-09-90	1730	.23	.54	<.05	<.05	<.05	<.05	<.05	.10	.13	.13	.10	.13	.13	.13	.13	.13	.13	.13	.13
	05-09-90	2130	.68	17	.21	<.05	<.05	<.05	<.05	.42	.09	.09	.42	.09	.09	.09	.09	.09	.09	.09	.09
	05-10-90	0130	.70	14	.47	<.05	<.05	<.05	<.05	.32	<.05	<.05	.32	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05
	05-10-90	0530	.53	5.6	.44	.07	.07	.07	.07	.18	<.05	<.05	.18	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05
	05-10-90	0930	.24	3.6	.13	<.05	<.05	<.05	<.05	.11	.10	.10	.11	.10	.10	.10	.10	.10	.10	.10	.10
	05-10-90	1300	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	05-10-90	1700	.20	2.6	.09	<.05	<.05	<.05	<.05	.09	.11	.11	.09	.11	.11	.11	.11	.11	.11	.11	.11
	05-10-90	2100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	05-11-90	0100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	05-11-90	0900	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	05-11-90	1300	.20	2.6	.08	<.05	<.05	<.05	<.05	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11
	05-11-90	1700	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	05-11-90	2100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	05-12-90	0100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	05-12-90	0500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay (ELISA) and gas chromatography/mass spectrometry (GC/MS) analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Water-quality study ¹	Dis-charge (cubic feet per second)	Ala-chlor, ELISA (µg/L)	Ala-chlor, total recoverable GC/MS (µg/L)	Ametryn, total (µg/L)	Atrazine, ELISA (µg/L)	Atrazine, total GC/MS (µg/L)	Bromacil, water recoverable (µg/L)	Butylate, water recoverable (µg/L)	Cyanazine, total (µg/L)	Desethyl-atrazine (µg/L)
	05-12-90	0900	T	164	4.0	2.4	<0.05	13	8.8	--	--	1.4	0.45
	05-12-90	1300	T	159	3.3	--	--	13	--	--	--	--	--
	05-12-90	1700	T	157	2.9	--	--	13	--	--	--	--	--
	05-12-90	2100	T	156	1.6	--	--	14	--	--	--	--	--
	05-13-90	0100	T	151	4.2	--	--	14	--	--	--	--	--
	05-13-90	0500	T	144	4.0	2.4	.21	14	9.0	--	--	1.4	.45
	05-13-90	0900	T	138	3.9	--	--	14	--	--	--	--	--
	05-13-90	1300	T	136	3.4	--	--	12	--	--	--	--	--
	05-13-90	1700	T	136	3.2	--	--	11	--	--	--	--	--
	05-13-90	2100	T	136	3.1	--	--	10	--	--	--	--	--
	05-14-90	0100	T	136	5.2	3.2	<.05	12	5.9	--	--	.61	.32
	05-14-90	0500	T	131	5.2	3.2	<.05	--	13	--	--	<.20	.40
	05-14-90	0900	T	125	7.3	6.6	<.05	14	16	--	--	<.20	.54
	05-15-90	1430	T	94	44	11	<.05	41	19	--	--	2.2	.99
	05-17-90	0945	T	64	20	4.4	<.05	27	11	--	--	1.1	.69
	05-19-90	0245	T	147	5.4	--	--	19	--	--	--	--	--
	05-19-90	0645	T	254	6.2	--	--	21	--	--	--	--	--
	05-19-90	1045	T	315	7.8	--	--	19	--	--	--	--	--
	05-19-90	1445	T	356	9.5	5.1	<.05	24	13	--	--	1.6	1.1
	05-19-90	1845	T	267	14	--	--	31	--	--	--	--	--

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay and gas chromatography/mass spectrometry analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Metol-									
			Deiso-propyl-atrazine ($\mu\text{g/L}$)	achlor, water whole, recover-able ($\mu\text{g/L}$)	Metri-buzin, water whole, total ($\mu\text{g/L}$)	Prometon, total ($\mu\text{g/L}$)	Prop-achlor, water whole, total ($\mu\text{g/L}$)	Propazine, total ($\mu\text{g/L}$)	Simazine, total ($\mu\text{g/L}$)	Terbacil, water whole, recover-able ($\mu\text{g/L}$)	Trifluralin, total recover-able ($\mu\text{g/L}$)	
32	05-12-90	0900	0.20	2.6	0.09	<0.05	--	0.10	0.11	--	--	
	05-12-90	1300	--	--	--	--	--	--	--	--	--	
	05-12-90	1700	--	--	--	--	--	--	--	--	--	
	05-12-90	2100	--	--	--	--	--	--	--	--	--	
	05-13-90	0100	--	--	--	--	--	--	--	--	--	
	05-13-90	0500	.20	2.7	.08	<0.05	--	.11	.12	--	--	
	05-13-90	0900	--	--	--	--	--	--	--	--	--	
	05-13-90	1300	--	--	--	--	--	--	--	--	--	
	05-13-90	1700	--	--	--	--	--	--	--	--	--	
	05-13-90	2100	--	--	--	--	--	--	--	--	--	
	05-14-90	0100	.14	1.4	.05	<0.05	--	.06	.08	--	--	
	05-14-90	0500	.20	.97	<0.05	<0.05	--	.05	<0.05	--	--	
	05-14-90	0900	<.05	.83	<.05	<.05	--	.08	1.0	--	--	
	05-15-90	1430	.53	4.2	.21	<.05	--	.24	1.4	--	--	
	05-17-90	0945	.43	1.4	.23	<.05	--	.14	1.0	--	--	
	05-19-90	0245	--	--	--	--	--	--	--	--	--	
	05-19-90	0645	--	--	--	--	--	--	--	--	--	
	05-19-90	1045	--	--	--	--	--	--	--	--	--	
	05-19-90	1445	.65	4.9	.14	.10	--	.16	.45	--	--	
	05-19-90	1845	--	--	--	--	--	--	--	--	--	

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay (ELISA) and gas chromatography/mass spectrometry (GC/MS) analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Water-quality study ¹	Dis-charge (cubic feet per second)	Ala-chlor, ELISA (µg/L)	Ala-chlor, recover-able GC/MS (µg/L)	Ametryn, total (µg/L)	Atrazine, ELISA (µg/L)	Atrazine, total GC/MS (µg/L)	Bromacil, Butylate, water whole, recover-able (µg/L)		Cyana-zine, total (µg/L)	Desethyl-atrazine (µg/L)
										Ala-chlor, total (µg/L)	recover-able GC/MS (µg/L)		
32	05-19-90	2245	T	216	15	--	--	26	--	--	--	--	--
	05-20-90	0245	T	199	10	--	--	19	--	--	--	--	--
	05-20-90	0645	T	189	13	--	--	21	--	--	--	--	--
	05-20-90	1045	T	208	16	--	--	26	--	--	--	--	--
	05-20-90	1445	T	247	13	--	--	24	--	--	--	--	--
	05-20-90	1845	T	260	15	--	--	32	--	--	--	--	--
	05-20-90	2245	T	266	14	16	<0.05	34	20	--	3.7	2.3	--
	05-21-90	0245	T	296	19	--	--	34	--	--	--	--	--
	05-21-90	0645	T	330	14	--	--	34	--	--	--	--	--
	05-21-90	1045	T	337	8.5	--	--	34	--	--	--	--	--
	05-22-90	1420	T	229	13	--	--	38	--	--	--	--	--
	05-24-90	1010	T	135	24	--	--	34	--	--	--	--	--
	05-29-90	1100	T	83	6.3	--	--	6.6	--	--	--	--	--
	05-31-90	0945	T	78	3.8	--	--	7.4	--	--	--	--	--
	06-05-90	1105	T	73	2.2	--	--	4.6	--	--	--	--	--
	06-07-90	1420	T	82	1.6	--	--	4.3	--	--	--	--	--
	06-12-90	1310	T	76	3.9	--	--	14	--	--	--	--	--
	06-14-90	1210	T	66	2.9	.71	.05	11	6.9	--	.45	.63	--
	06-15-90	0900	T	340	7.1	--	--	12	--	--	--	--	--
	06-15-90	1300	T	823	7.8	--	--	13	--	--	--	--	--

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay and gas chromatography/mass spectrometry analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Metol-achlor, water whole, recover-able (µg/L)			Deiso-propyl-atrazine (µg/L)	Metri-buzin, water whole, total (µg/L)	Prometon, total (µg/L)	Prop-achlor, water whole, total (µg/L)	Propazine, total (µg/L)	Simazine, total (µg/L)	Terbacil, water whole, recover-able (µg/L)	Trifluralin, total recover-able (µg/L)
			Metol-achlor, water whole, recover-able (µg/L)	Deiso-propyl-atrazine (µg/L)	Metri-buzin, water whole, total (µg/L)								
32	05-19-90	2245	--	--	--	--	--	--	--	--	--	--	--
	05-20-90	0245	--	--	--	--	--	--	--	--	--	--	--
	05-20-90	0645	--	--	--	--	--	--	--	--	--	--	--
	05-20-90	1045	--	--	--	--	--	--	--	--	--	--	--
	05-20-90	1445	--	--	--	--	--	--	--	--	--	--	--
	05-20-90	1845	--	--	--	--	--	--	--	--	--	--	--
	05-20-90	2245	0.86	2.3	<0.05	0.71	0.41	<0.05					
	05-21-90	0245	--	--	--	--	--	--	--	--	--	--	--
	05-21-90	0645	--	--	--	--	--	--	--	--	--	--	--
	05-21-90	1045	--	--	--	--	--	--	--	--	--	--	--
	05-22-90	1420	--	--	--	--	--	--	--	--	--	--	--
	05-24-90	1010	--	--	--	--	--	--	--	--	--	--	--
	05-29-90	1100	--	--	--	--	--	--	--	--	--	--	--
	05-31-90	0945	--	--	--	--	--	--	--	--	--	--	--
	06-05-90	1105	--	--	--	--	--	--	--	--	--	--	--
	06-07-90	1420	--	--	--	--	--	--	--	--	--	--	--
	06-12-90	1310	--	--	--	--	--	--	--	--	--	--	--
	06-14-90	1210	.30	.73	<.05	.39	.08	.16					
	06-15-90	0900	--	--	--	--	--	--	--	--	--	--	--
	06-15-90	1300	--	--	--	--	--	--	--	--	--	--	--

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay (ELISA) and gas chromatography/mass spectrometry (GC/MS) analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Water-quality study ¹	Discharge (cubic feet per second)	Ala-chlor, ELISA (µg/L)	Ala-chlor, total recoverable GC/MS (µg/L)	Ametryn, total (µg/L)	Atrazine, ELISA (µg/L)	Atrazine, total GC/MS (µg/L)	Bromacil, Butylate, water whole, recoverable (µg/L)		Cyanazine, total (µg/L)	Desethyl-atrazine (µg/L)
										water whole, recoverable (µg/L)	water whole, recoverable (µg/L)		
32	06-15-90	1700	T	926	--	11	<0.05	--	40	--	--	5.7	3.3
	06-15-90	2100	T	1,230	7.0	--	--	14	--	--	--	--	--
	06-16-90	0100	T	1,210	6.5	--	--	14	--	--	--	--	--
	06-16-90	0500	T	1,200	6.3	--	--	14	--	--	--	--	--
	06-16-90	0900	T	1,210	7.1	--	--	14	--	--	--	--	--
	06-16-90	1030	T	1,270	7.5	--	--	14	--	--	--	--	--
	06-16-90	1035	T	1,270	8.2	--	--	14	--	--	--	--	--
	06-16-90	1040	T	1,270	8.4	--	--	14	--	--	--	--	--
	06-16-90	1045	T	1,270	7.4	--	--	14	--	--	--	--	--
	06-16-90	1300	T	1,340	7.6	--	--	13	--	--	--	--	--
	06-16-90	1700	T	1,430	7.2	--	--	13	--	--	--	--	--
	06-16-90	2100	T	1,480	6.1	--	--	29	--	--	--	--	--
	06-17-90	0100	T	1,530	5.8	--	--	26	--	--	--	--	--
	06-17-90	0500	T	1,580	5.4	--	--	27	--	--	--	--	--
	06-17-90	0900	T	1,630	5.2	5.7	<.05	28	28	--	--	2.3	3.3
	06-17-90	1300	T	1,730	6.0	--	--	26	--	--	--	--	--
	06-17-90	1700	T	1,820	5.8	--	--	24	--	--	--	--	--
	06-17-90	2100	T	1,910	5.0	--	--	26	--	--	--	--	--
	06-18-90	0100	T	1,970	6.0	--	--	29	--	--	--	--	--
	06-18-90	0500	T	2,040	5.6	--	--	31	--	--	--	--	--

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay and gas chromatography/mass spectrometry analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Deiso-propyl-atrazine ($\mu\text{g/L}$)	Metol-achlor, water whole, recover-able ($\mu\text{g/L}$)		Metri-buzin, water whole, total ($\mu\text{g/L}$)	Prometon, total ($\mu\text{g/L}$)	Prop-achlor, water whole, total ($\mu\text{g/L}$)	Propazine, total ($\mu\text{g/L}$)	Simazine, total ($\mu\text{g/L}$)	Terbacil, water whole, recover-able ($\mu\text{g/L}$)	Trifluralin, total recover-able ($\mu\text{g/L}$)
				8.7	1.3							
32	06-15-90	1700	1.5	8.7	1.3	<0.05	0.47	0.13	--	--	--	--
	06-15-90	2100	--	--	--	--	--	--	--	--	--	--
	06-16-90	0100	--	--	--	--	--	--	--	--	--	--
	06-16-90	0500	--	--	--	--	--	--	--	--	--	--
	06-16-90	0900	--	--	--	--	--	--	--	--	--	--
	06-16-90	1030	--	--	--	--	--	--	--	--	--	--
	06-16-90	1035	--	--	--	--	--	--	--	--	--	--
	06-16-90	1040	--	--	--	--	--	--	--	--	--	--
	06-16-90	1045	--	--	--	--	--	--	--	--	--	--
	06-16-90	1300	--	--	--	--	--	--	--	--	--	--
	06-16-90	1700	--	--	--	--	--	--	--	--	--	--
	06-16-90	2100	--	--	--	--	--	--	--	--	--	--
	06-17-90	0100	--	--	--	--	--	--	--	--	--	--
	06-17-90	0500	--	--	--	--	--	--	--	--	--	--
	06-17-90	0900	1.3	2.9	<.05	.48	.47	.62	--	--	--	--
	06-17-90	1300	--	--	--	--	--	--	--	--	--	--
	06-17-90	1700	--	--	--	--	--	--	--	--	--	--
	06-17-90	2100	--	--	--	--	--	--	--	--	--	--
	06-18-90	0100	--	--	--	--	--	--	--	--	--	--
	06-18-90	0500	--	--	--	--	--	--	--	--	--	--

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay (ELISA) and gas chromatography/mass spectrometry (GC/MS) analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour) study ¹	Water-quality study ¹	Dis-charge (cubic feet per second)	Ala-chlor, ELISA (µg/L)	Ala-chlor, total recover-able GC/MS (µg/L)	Ametryn, total (µg/L)	Atrazine, ELISA (µg/L)	Atrazine, total GC/MS (µg/L)	Bromacil, Butylate, water whole, recover-able (µg/L)		Cyana-zine, total (µg/L)	Desethyl-atrazine (µg/L)
										Ala-chlor, ELISA (µg/L)	Ala-chlor, total recover-able GC/MS (µg/L)		
32	06-18-90	0900	T	2,070	4.9	3.2	0.23	32	20	--	--	1.1	2.1
	06-18-90	1300	T	2,080	6.0	--	--	31	--	--	--	--	--
	06-18-90	1700	T	2,060	6.0	--	--	34	--	--	--	--	--
	06-18-90	2100	T	2,000	5.4	--	--	28	--	--	--	--	--
	06-19-90	0100	T	1,890	6.0	--	--	32	--	--	--	--	--
	06-19-90	0500	T	1,650	5.9	--	--	27	--	--	--	--	--
	06-19-90	0900	T	1,180	7.0	--	--	9.2	--	--	--	--	--
	06-19-90	1300	T	828	6.7	--	--	8.6	--	--	--	--	--
	06-19-90	1700	T	651	7.5	1.5	<.05	9.4	12	--	--	1.3	1.5
	06-19-90	2100	T	562	6.6	--	--	8.8	--	--	--	--	--
	06-22-90	1000	T	471	6.0	--	--	23	--	--	--	--	--
	06-22-90	1415	T	453	6.5	--	--	21	--	--	--	--	--
	06-22-90	1815	T	423	7.0	--	--	20	--	--	--	--	--
	06-22-90	2215	T	413	6.5	--	--	28	--	--	--	--	--
	06-23-90	0215	T	416	6.3	--	--	22	--	--	--	--	--
	06-23-90	0615	T	425	6.0	--	--	20	--	--	--	--	--
	06-23-90	1015	T	421	5.9	--	--	18	--	--	--	--	--
	06-23-90	1415	T	415	6.9	--	--	24	--	--	--	--	--
	06-23-90	1815	T	413	6.8	2.6	<.05	23	18	--	--	2.4	2.8
	06-23-90	2215	T	413	4.8	--	--	23	--	--	--	--	--

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay and gas chromatography/mass spectrometry analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Metol-									
			Deiso-propyl-atrazine ($\mu\text{g/L}$)	achlor, water whole, recover-able ($\mu\text{g/L}$)	Metri-buzin, water whole, total ($\mu\text{g/L}$)	Prometon, total ($\mu\text{g/L}$)	Prop-achlor, water whole, total ($\mu\text{g/L}$)	Propazine, total ($\mu\text{g/L}$)	Simazine, total ($\mu\text{g/L}$)	Terbacil, water whole, recover-able ($\mu\text{g/L}$)	Trifluralin, total recover-able ($\mu\text{g/L}$)	
32	06-18-90	0900	0.96	2.7	0.92	0.18	--	0.23	0.38	--	--	
	06-18-90	1300	--	--	--	--	--	--	--	--	--	
	06-18-90	1700	--	--	--	--	--	--	--	--	--	
	06-18-90	2100	--	--	--	--	--	--	--	--	--	
	06-19-90	0100	--	--	--	--	--	--	--	--	--	
	06-19-90	0500	--	--	--	--	--	--	--	--	--	
	06-19-90	0900	--	--	--	--	--	--	--	--	--	
	06-19-90	1300	--	--	--	--	--	--	--	--	--	
	06-19-90	1700	.80	1.4	.57	<.05	.14	.19	--	--	--	
	06-19-90	2100	--	--	--	--	--	--	--	--	--	
	06-22-90	1000	--	--	--	--	--	--	--	--	--	
	06-22-90	1415	--	--	--	--	--	--	--	--	--	
	06-22-90	1815	--	--	--	--	--	--	--	--	--	
	06-22-90	2215	--	--	--	--	--	--	--	--	--	
	06-23-90	0215	--	--	--	--	--	--	--	--	--	
	06-23-90	0615	--	--	--	--	--	--	--	--	--	
	06-23-90	1015	--	--	--	--	--	--	--	--	--	
	06-23-90	1415	--	--	--	--	--	--	--	--	--	
	06-23-90	1815	1.5	2.0	<.05	1.3	.40	.45	--	--	--	
	06-23-90	2215	--	--	--	--	--	--	--	--	--	

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay (ELISA) and gas chromatography/mass spectrometry (GC/MS) analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Water-quality study ¹	Dis-charge (cubic feet per second)	Ala-chlor, ELISA (µg/L)	Ala-chlor, total recover-able GC/MS (µg/L)	Ametryn, total (µg/L)	Atrazine, ELISA (µg/L)	Atrazine, total GC/MS (µg/L)	Bromacil, Butylate, water whole, recover-able (µg/L)		Cyana-zine, total (µg/L)	Desethyl-atrazine (µg/L)
										water whole, recover-able (µg/L)	water whole, recover-able (µg/L)		
32	06-24-90	0215	T	413	5.4	--	--	21	--	--	--	--	--
	06-24-90	0615	T	411	5.3	--	--	20	--	--	--	--	--
	06-24-90	1015	T	404	4.7	--	--	15	--	--	--	--	--
	06-24-90	1415	T	394	6.2	--	--	17	--	--	--	--	--
	06-24-90	1815	T	374	6.0	--	--	12	--	--	--	--	--
	06-24-90	2215	T	354	4.5	--	--	16	--	--	--	--	--
	06-25-90	0215	T	334	4.2	1.2	<0.05	13	8.0	--	--	2.3	1.9
	06-25-90	1430	T	300	4.7	--	--	8.3	--	--	--	--	--
	06-27-90	1930	T	304	3.9	--	--	19	--	--	--	--	--
	06-27-90	2330	T	458	5.2	--	--	24	--	--	--	--	--
	06-28-90	0330	T	621	5.4	--	--	18	--	--	--	--	--
	06-28-90	0730	T	733	4.9	--	--	11	--	--	--	--	--
	06-28-90	1130	T	810	4.4	--	--	16	--	--	--	--	--
	06-28-90	1530	T	859	11	--	--	9.1	--	--	--	--	--
	06-28-90	1930	T	881	14	--	--	13	--	--	--	--	--
	06-28-90	2330	T	885	17	--	--	13	--	--	--	--	--
	06-29-90	0330	T	894	14	--	--	15	--	--	--	--	--
	06-29-90	0730	T	863	8.7	2.4	<.05	9.0	3.8	--	--	1.1	2.6
	06-29-90	1130	T	776	13	--	--	8.7	--	--	--	--	--
	06-29-90	1930	T	556	9.2	--	--	14	--	--	--	--	--

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay and gas chromatography/mass spectrometry analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Metol-achlor,					Propachlor,			Terbacil,		Trifluralin,		
			Deiso-propyl-atrazine ($\mu\text{g/L}$)	water whole, recoverable ($\mu\text{g/L}$)	water whole, total ($\mu\text{g/L}$)	Prometon, total ($\mu\text{g/L}$)	water whole, total ($\mu\text{g/L}$)	Propazine, total ($\mu\text{g/L}$)	Simazine, total ($\mu\text{g/L}$)	water whole, recoverable ($\mu\text{g/L}$)	water whole, recoverable ($\mu\text{g/L}$)	total recoverable ($\mu\text{g/L}$)	total recoverable ($\mu\text{g/L}$)		
32	06-24-90	0215	--	--	--	--	--	--	--	--	--	--	--	--	--
	06-24-90	0615	--	--	--	--	--	--	--	--	--	--	--	--	--
	06-24-90	1015	--	--	--	--	--	--	--	--	--	--	--	--	--
	06-24-90	1415	--	--	--	--	--	--	--	--	--	--	--	--	--
	06-24-90	1815	--	--	--	--	--	--	--	--	--	--	--	--	--
	06-24-90	2215	--	--	--	--	--	--	--	--	--	--	--	--	--
	06-25-90	0215	1.0	1.2	<0.05	0.33	--	0.30	0.24	--	--	--	--	--	--
	06-25-90	1430	--	--	--	--	--	--	--	--	--	--	--	--	--
	06-27-90	1930	--	--	--	--	--	--	--	--	--	--	--	--	--
	06-27-90	2330	--	--	--	--	--	--	--	--	--	--	--	--	--
	06-28-90	0330	--	--	--	--	--	--	--	--	--	--	--	--	--
	06-28-90	0730	--	--	--	--	--	--	--	--	--	--	--	--	--
	06-28-90	1130	--	--	--	--	--	--	--	--	--	--	--	--	--
	06-28-90	1530	--	--	--	--	--	--	--	--	--	--	--	--	--
	06-28-90	1930	--	--	--	--	--	--	--	--	--	--	--	--	--
	06-28-90	2330	--	--	--	--	--	--	--	--	--	--	--	--	--
	06-29-90	0330	--	--	--	--	--	--	--	--	--	--	--	--	--
	06-29-90	0730	1.4	1.6	.60	.05	--	.22	.05	--	--	--	--	--	--
	06-29-90	1130	--	--	--	--	--	--	--	--	--	--	--	--	--
	06-29-90	1930	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay (ELISA) and gas chromatography/mass spectrometry (GC/MS) analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Water-quality study ¹	Discharge (cubic feet per second)	Ala-chlor, ELISA (µg/L)	Ala-chlor, total recoverable GC/MS (µg/L)	Ametryn, total (µg/L)	Atrazine, ELISA (µg/L)	Atrazine, total GC/MS (µg/L)	Bromacil, Butylate, water whole, recoverable (µg/L)		Cyana-zine, total (µg/L)		Desethyl-atrazine (µg/L)
										water whole, recoverable (µg/L)	water whole, recoverable (µg/L)	Cyana-zine, total (µg/L)	Desethyl-atrazine (µg/L)	
32	06-30-90	0930	T	403	8.6	--	--	14	--	--	--	--	--	--
	07-01-90	0130	T	332	8.6	--	--	10	--	--	--	--	--	--
	07-02-90	1245	T	152	6.3	--	--	17	--	--	--	--	--	--
	07-05-90	1205	T	108	1.8	--	--	11	--	--	--	--	--	--
	07-10-90	1410	T	121	3.2	--	--	15	--	--	--	--	--	--
	07-13-90	1420	T	131	3.1	--	--	11	--	--	--	--	--	--
	07-17-90	1000	T	145	3.0	--	--	7.6	--	--	--	--	--	--
	07-20-90	0840	T	292	3.2	--	--	6.5	--	--	--	--	--	--
	07-20-90	1125	T	351	2.7	0.38	<0.05	5.1	4.3	--	--	0.29	--	1.0
	07-20-90	1525	T	434	3.0	--	--	19	--	--	--	--	--	--
	07-20-90	1925	T	482	2.7	--	--	11	--	--	--	--	--	--
	07-20-90	2325	T	534	3.9	--	--	9.2	--	--	--	--	--	--
	07-21-90	0325	T	641	5.0	--	--	14	--	--	--	--	--	--
	07-21-90	0725	T	791	2.8	--	--	17	--	--	--	--	--	--
	07-21-90	1125	T	949	2.2	--	--	12	--	--	--	--	--	--
	07-21-90	1525	T	1,120	2.3	--	--	9.2	--	--	--	--	--	--
	07-21-90	1925	T	1,290	3.0	--	--	8.9	--	--	--	--	--	--
	07-21-90	2325	T	1,540	2.9	--	--	6.8	--	--	--	--	--	--
	07-22-90	0325	T	2,240	2.8	--	--	7.5	--	--	--	--	--	--
	07-22-90	0725	T	3,650	2.9	--	--	7.3	--	--	--	--	--	--

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay (ELISA) and gas chromatography/mass spectrometry (GC/MS) analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Water quality study ¹	Discharge (cubic feet per second)	Alachlor, total recoverable		Atrazine, ELISA (µg/L)	Atrazine, GC/MS (µg/L)	Bromacil, Butylate, water recoverable		Atrazine, total GC/MS (µg/L)	Cyanazine, total (µg/L)	Desethyl-atrazine (µg/L)
					Alachlor, ELISA (µg/L)	GC/MS (µg/L)			water recoverable (µg/L)	water recoverable (µg/L)			
32	07-22-90	1125	T	6,740	3.4	0.49	13	3.6	--	--	<0.20	0.92	--
	07-22-90	1525	T	7,170	3.1	--	7.7	--	--	--	--	--	--
	07-22-90	1925	T	7,840	3.1	--	--	--	--	--	--	--	--
	07-22-90	2325	T	8,000	3.2	--	9.0	--	--	--	--	--	--
	07-23-90	0325	T	7,780	3.5	--	--	--	--	--	--	--	--
	07-23-90	0725	T	7,360	3.2	--	12	--	--	--	--	--	--
	07-23-90	1125	T	6,790	2.7	--	7.5	--	--	--	--	--	--
	07-23-90	1525	T	6,290	2.6	--	9.0	--	--	--	--	--	--
	07-23-90	1925	T	5,670	2.5	.63	<.05	7.1	--	--	.47	1.3	--
	07-23-90	2325	T	5,140	2.6	--	11	--	--	--	--	--	--
	07-24-90	0325	T	4,720	2.5	--	7.4	--	--	--	--	--	--
	07-24-90	0725	T	4,350	3.1	.66	<.05	8.7	--	--	.59	1.6	--
	07-24-90	1125	T	4,050	2.6	--	9.5	--	--	--	--	--	--
	07-24-90	1525	T	3,770	2.9	.71	<.05	9.6	--	--	.66	1.8	--
	07-24-90	1925	T	3,500	2.4	--	4.0	--	--	--	--	--	--
	07-24-90	2325	T	3,280	2.7	--	7.9	--	--	--	--	--	--
	07-25-90	0325	T	3,050	3.5	--	6.8	--	--	--	--	--	--
	07-25-90	0725	T	2,790	3.3	.50	<.05	7.5	--	--	.45	1.5	--
	07-25-90	0945	T	2,630	2.6	--	40	--	--	--	--	--	--
	07-25-90	1125	T	2,510	3.0	--	10	--	--	--	--	--	--

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay and gas chromatography/mass spectrometry analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Metol-									
			Deiso-propyl-atrazine ($\mu\text{g/L}$)	achlor, water whole, recoverable ($\mu\text{g/L}$)	Metri-buzin, water whole, total ($\mu\text{g/L}$)	Prometon, total ($\mu\text{g/L}$)	Prop-achlor, water whole, total ($\mu\text{g/L}$)	Propazine, total ($\mu\text{g/L}$)	Simazine, total ($\mu\text{g/L}$)	Terbacil, water whole, recoverable ($\mu\text{g/L}$)	Trifluralin, total recoverable ($\mu\text{g/L}$)	
32	07-22-90	1125	0.45	0.35	0.05	<0.05	--	0.06	0.10	--	--	
	07-22-90	1525	--	--	--	--	--	--	--	--	--	
	07-22-90	1925	--	--	--	--	--	--	--	--	--	
	07-22-90	2325	--	--	--	--	--	--	--	--	--	
	07-23-90	0325	--	--	--	--	--	--	--	--	--	
	07-23-90	0725	--	--	--	--	--	--	--	--	--	
	07-23-90	1125	--	--	--	--	--	--	--	--	--	
	07-23-90	1525	--	--	--	--	--	--	--	--	--	
	07-23-90	1925	.62	1.4	.08	.06	--	.09	.10	--	--	
	07-23-90	2325	--	--	--	--	--	--	--	--	--	
	07-24-90	0325	--	--	--	--	--	--	--	--	--	
	07-24-90	0725	.73	.21	.09	.06	--	.11	.12	--	--	
	07-24-90	1125	--	--	--	--	--	--	--	--	--	
	07-24-90	1525	.86	2.1	.10	.06	--	.11	.14	--	--	
	07-24-90	1925	--	--	--	--	--	--	--	--	--	
	07-24-90	2325	--	--	--	--	--	--	--	--	--	
	07-25-90	0325	--	--	--	--	--	--	--	--	--	
	07-25-90	0725	.72	1.7	.09	.06	--	.08	.17	--	--	
	07-25-90	0945	--	--	--	--	--	--	--	--	--	
	07-25-90	1125	--	--	--	--	--	--	--	--	--	

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay (ELISA) and gas chromatography/mass spectrometry (GC/MS) analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Water-quality study ¹	Dis-charge (cubic feet per second)	Ala-chlor, ELISA (µg/L)	Ala-chlor, total recover-able GC/MS (µg/L)	Ametryn, total (µg/L)	Atrazine, ELISA (µg/L)	Atrazine, total GC/MS (µg/L)	Bromacil, water whole, recover-able (µg/L)	Butylate, water whole, recover-able (µg/L)	Cyana-zine, total (µg/L)	Desethyl-atrazine (µg/L)
32	07-25-90	1525	T	2,080	2.9	0.51	0.14	11	7.5	--	--	0.23	1.8
	07-25-90	1925	T	1,800	2.4	--	--	7.2	--	--	--	--	--
	07-25-90	2325	T	1,960	3.2	--	--	8.2	--	--	--	--	--
	07-26-90	0325	T	2,160	2.0	--	--	9.0	--	--	--	--	--
	07-26-90	0725	T	2,290	3.1	--	--	6.8	--	--	--	--	--
	07-26-90	1125	T	2,300	1.9	--	--	7.4	--	--	--	--	--
	07-26-90	1525	T	2,140	1.9	--	--	7.5	--	--	--	--	--
	07-26-90	1925	T	2,000	1.8	--	--	7.7	--	--	--	--	--
	07-26-90	2325	T	1,970	2.7	--	--	7.4	--	--	--	--	--
	07-27-90	0325	T	2,080	3.8	--	--	9.2	--	--	--	--	--
	07-27-90	0725	T	2,230	3.1	.53	.23	6.8	5.3	--	--	.23	1.4
	03-26-91	1400	T	70	--	<.05	<.05	--	.16	--	--	<.05	<.05
	03-26-91	1400	T	70	--	<.05	<.05	--	.17	--	--	<.05	.06
	04-09-91	1000	T	50	--	<.05	<.05	--	.36	--	--	<.05	.08
	04-15-91	1100	T	346	--	.24	<.05	--	1.5	--	--	<.05	.10
	04-15-91	1700	T	441	--	.14	<.05	--	.84	--	--	<.05	.10
	04-16-91	1100	T	738	--	.13	<.05	--	.97	--	--	<.05	.16
	04-16-91	1105	T	738	--	.13	<.05	--	1.1	--	--	.09	.18
	04-16-91	1700	T	763	--	.14	<.05	--	1.1	--	--	.07	.20
	04-16-91	2300	T	692	--	.17	<.05	--	1.0	--	--	.17	.18

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay and gas chromatography/mass spectrometry analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Metol-										
			Deiso-propyl-atrazine ($\mu\text{g/L}$)	achlor, water whole, recover-able ($\mu\text{g/L}$)	Metri-buzin, water whole, total ($\mu\text{g/L}$)	Prometon, total ($\mu\text{g/L}$)	Prop-achlor, water whole, total ($\mu\text{g/L}$)	Propazine, total ($\mu\text{g/L}$)	Simazine, total ($\mu\text{g/L}$)	Terbacil, water whole, recover-able ($\mu\text{g/L}$)	Trifluralin, total recover-able ($\mu\text{g/L}$)		
32	07-25-90	1525	0.83	1.8	0.11	<0.05	--	0.09	0.17	--	--	--	--
	07-25-90	1925	--	--	--	--	--	--	--	--	--	--	--
	07-25-90	2325	--	--	--	--	--	--	--	--	--	--	--
	07-26-90	0325	--	--	--	--	--	--	--	--	--	--	--
	07-26-90	0725	--	--	--	--	--	--	--	--	--	--	--
	07-26-90	1125	--	--	--	--	--	--	--	--	--	--	--
	07-26-90	1525	--	--	--	--	--	--	--	--	--	--	--
	07-26-90	1925	--	--	--	--	--	--	--	--	--	--	--
	07-26-90	2325	--	--	--	--	--	--	--	--	--	--	--
	07-27-90	0325	--	--	--	--	--	--	--	--	--	--	--
	07-27-90	0725	.71	.61	.08	.23	--	.07	.14	--	--	--	--
	03-26-91	1400	<.05	<.05	<.05	<.05	--	<.05	<.05	--	--	--	--
	03-26-91	1400	<.05	<.05	<.05	<.05	--	<.05	<.05	--	--	--	--
	04-09-91	1000	<.05	.05	<.05	<.05	--	<.05	<.05	--	--	--	--
	04-15-91	1100	.05	.12	<.05	.06	--	<.05	.06	--	--	--	--
	04-15-91	1700	.05	.12	<.05	.07	--	<.05	.06	--	--	--	--
	04-16-91	1100	.10	.20	<.05	.06	--	<.05	.06	--	--	--	--
	04-16-91	1105	.12	.23	<.05	.06	--	<.05	.07	--	--	--	--
	04-16-91	1700	.14	.23	.06	<.05	--	<.05	.06	--	--	--	--
	04-16-91	2300	.12	.24	.10	.06	--	<.05	.06	--	--	--	--

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay (ELISA) and gas chromatography/mass spectrometry (GC/MS) analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Water quality study ¹	Discharge (cubic feet per second)	Ala-chlor, total recoverable		Atrazine, ELISA (µg/L)	Atrazine, total GC/MS (µg/L)	Bromacil, Butylate, water whole, recoverable (µg/L)		Atrazine, total GC/MS (µg/L)	Cyanazine, total (µg/L)	Desethyl-atrazine (µg/L)
					Ala-chlor, ELISA (µg/L)	GC/MS (µg/L)			water whole, recoverable (µg/L)	water whole, recoverable (µg/L)			
32	04-16-91	2300	T	692	--	0.14	--	1.1	--	--	0.09	0.19	
	04-17-91	0500	T	563	--	.13	--	.92	--	--	.10	.14	
	04-17-91	1100	T	437	--	.16	--	1.1	--	--	.10	.19	
	04-17-91	1700	T	345	--	.15	--	1.1	--	--	.10	.18	
	04-23-91	1435	T	91	--	.11	--	1.3	--	--	.07	.14	
	04-30-91	0930	T	76	--	<.05	--	.62	--	--	<.05	.10	
	05-06-91	0840	T	107	--	1.8	--	5.7	--	--	<.05	.19	
	05-09-91	1110	T	150	--	5.4	--	20	--	--	.34	.48	
	05-13-91	0940	T	84	--	4.7	--	25	--	--	.55	.57	
	05-16-91	0900	T	71	--	2.3	--	--	--	--	.24	.50	
	05-16-91	2000	T	302	--	9.1	--	19	--	--	.22	1.0	
	05-16-91	2300	T	1,290	--	15	--	33	--	--	.54	1.2	
	05-17-91	0200	T	1,630	--	34	--	66	--	--	4.5	1.3	
	05-17-91	0500	T	1,580	--	32	--	39	--	--	8.6	.74	
	05-17-91	0800	T	1,130	--	31	--	35	--	--	3.0	1.1	
	05-17-91	1100	T	671	--	33	--	31	--	--	.72	1.0	
	05-17-91	1200	T	537	--	27	--	40	--	--	4.1	1.4	
	05-18-91	1312	T	268	--	21	--	29	--	--	2.9	1.1	
	05-20-91	1515	T	310	--	43	--	120	--	--	.40	2.8	
	05-23-91	0745	T	98	--	17	--	68	--	--	1.0	2.0	

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay and gas chromatography/mass spectrometry analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Metol-				Proprometon, total (µg/L)	Propachlor, water, total (µg/L)	Propazine, total (µg/L)	Simazine, total (µg/L)	Terbacil, water, whole, recoverable (µg/L)	Trifluralin, total recoverable (µg/L)
			Deisopropyl-atrazine (µg/L)	Metolachlor, water, whole, recoverable (µg/L)	Metribuzin, water, whole, total (µg/L)	Metolachlor, water, whole, total (µg/L)						
32	04-16-91	2300	0.13	0.24	<0.05	0.06	--	<0.05	0.06	--	--	
	04-17-91	0500	.11	.20	<0.05	<0.05	--	<0.05	.05	--	--	
	04-17-91	1100	.15	.25	<0.05	.05	--	<0.05	.06	--	--	
	04-17-91	1700	.15	.23	<0.05	.05	--	<0.05	.06	--	--	
	04-23-91	1435	.08	.17	<0.05	<0.05	--	<0.05	.06	--	--	
	04-30-91	0930	.05	.10	<0.05	<0.05	--	<0.05	<0.05	--	--	
	05-06-91	0840	.06	.72	<0.05	.09	--	<0.05	<0.05	--	--	
	05-09-91	1110	<0.05	1.7	<0.05	.11	--	.13	<0.05	--	--	
	05-13-91	0940	.05	3.4	<0.05	<0.05	--	.17	.12	--	--	
	05-16-91	0900	.23	1.1	<0.05	<0.05	--	<0.05	<0.05	--	--	
	05-16-91	2000	.48	18	.54	<0.05	--	<0.05	<0.05	--	--	
	05-16-91	2300	.63	12	.66	<0.05	--	<0.05	<0.05	--	--	
	05-17-91	0200	.68	6.4	1.3	<0.05	--	<0.05	<0.05	--	--	
	05-17-91	0500	.40	6.3	1.7	<0.05	--	<0.05	<0.05	--	--	
	05-17-91	0800	.53	19	1.2	<0.05	--	<0.05	<0.05	--	--	
	05-17-91	1100	.41	26	1.9	<0.05	--	<0.05	<0.05	--	--	
	05-17-91	1200	.65	18	.85	<0.05	--	<0.05	<0.05	--	--	
	05-18-91	1312	.51	17	.94	<0.05	--	<0.05	<0.05	--	--	
	05-20-91	1515	1.2	18	.40	<0.05	--	.81	.42	--	--	
	05-23-91	0745	.76	12	.43	<0.05	--	.50	<0.05	--	--	

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay (ELISA) and gas chromatography/mass spectrometry (GC/MS) analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Water-quality study ¹	Dis-charge (cubic feet per second)	Ala-chlor, total recover-able GC/MS (µg/L)	Ala-chlor, ELISA (µg/L)	Atrazine, total ELISA (µg/L)	Atrazine, total GC/MS (µg/L)	Bromacil, Butylate, water whole, recover-able (µg/L)		Desethyl-atrazine (µg/L)	
									Ametryn, total (µg/L)	Cyana-zine, total (µg/L)		
32	05-25-91	2000	T	671	9.8	--	--	110	--	--	0.58	2.4
	05-26-91	0100	T	1,260	8.9	--	--	86	--	--	.39	2.1
	05-26-91	0600	T	1,380	8.5	--	--	67	--	--	.36	1.8
	05-26-91	1100	T	1,180	8.8	--	--	67	--	--	.33	1.7
	05-26-91	1600	T	1,110	8.7	--	--	60	--	--	.36	1.7
	05-26-91	2100	T	1,200	8.5	--	--	55	--	--	<.05	1.6
	05-26-91	2100	T	1,200	8.2	--	--	34	--	--	.34	1.6
	05-27-91	0200	T	1,330	8.7	--	--	52	--	--	.36	1.5
	05-27-91	0700	T	1,450	8.6	--	--	48	--	--	.29	1.5
	05-27-91	1200	T	1,550	9.1	--	--	43	--	--	<.05	1.2
	05-27-91	1200	T	1,550	9.5	--	--	29	--	--	.44	1.7
	05-27-91	1700	T	1,600	13	--	--	41	--	--	<.05	1.3
	05-27-91	1700	T	1,600	13	--	--	41	--	--	.40	1.3
	05-27-91	2200	T	1,580	28	--	--	40	--	--	.47	1.3
	05-28-91	0300	T	1,480	14	--	--	65	--	--	1.6	2.7
	05-28-91	0300	T	1,480	14	--	--	67	--	--	1.6	2.9
	05-28-91	0730	T	1,380	11	--	--	56	--	--	.75	2.9
	05-28-91	1750	T	1,190	12	--	--	58	--	--	7.1	3.4
	05-30-91	0735	T	515	8.8	--	--	50	--	--	2.3	2.4
	06-01-91	1615	T	651	6.3	--	--	34	--	--	1.4	3.0

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay and gas chromatography/mass spectrometry analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Metol-										
			Deiso-propyl-atrazine ($\mu\text{g/L}$)	achlor, water whole, recover-able ($\mu\text{g/L}$)	Metri-buzin, water whole, total ($\mu\text{g/L}$)	Prometon, total ($\mu\text{g/L}$)	Prop-achlor, water whole, total ($\mu\text{g/L}$)	Propazine, total ($\mu\text{g/L}$)	Simazine, total ($\mu\text{g/L}$)	Terbacil, water whole, recover-able ($\mu\text{g/L}$)	Trifluralin, total recover-able ($\mu\text{g/L}$)		
32	05-25-91	2000	0.98	9.6	0.38	<0.05	--	0.82	0.27	--	--	--	--
	05-26-91	0100	.76	9.3	.40	<.05	--	.66	.20	--	--	--	--
	05-26-91	0600	.89	9.0	.50	<.05	--	.54	.21	--	--	--	--
	05-26-91	1100	.67	9.5	.51	<.05	--	.53	.19	--	--	--	--
	05-26-91	1600	.77	9.5	.47	<.05	--	.46	.17	--	--	--	--
	05-26-91	2100	.66	9.2	.49	<.05	--	.43	.16	--	--	--	--
	05-26-91	2100	.63	7.5	.56	<.05	--	.44	.16	--	--	--	--
	05-27-91	0200	.65	9.3	.46	<.05	--	.40	.15	--	--	--	--
	05-27-91	0700	.66	8.9	.46	<.05	--	.36	.14	--	--	--	--
	05-27-91	1200	.48	7.9	.41	<.05	--	.32	<.05	--	--	--	--
	05-27-91	1200	.86	7.2	.40	<.05	--	.39	.10	--	--	--	--
	05-27-91	1700	.54	7.6	.43	<.05	--	.29	<.05	--	--	--	--
	05-27-91	1700	.54	7.6	.43	<.05	--	.29	.08	--	--	--	--
	05-27-91	2200	.57	6.8	.41	<.05	--	.28	.14	--	--	--	--
	05-28-91	0300	1.1	9.1	.69	<.05	--	.45	.37	--	--	--	--
	05-28-91	0300	1.4	9.6	.69	<.05	--	.48	.39	--	--	--	--
	05-28-91	0730	1.3	8.8	.33	.08	--	.40	.36	--	--	--	--
	05-28-91	1750	1.7	14	.53	<.05	--	<.05	.14	--	--	--	--
	05-30-91	0735	1.5	11	.51	<.05	--	.07	.13	--	--	--	--
	06-01-91	1615	1.9	6.4	.07	.11	--	<.05	<.05	--	--	--	--

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay (ELISA) and gas chromatography/mass spectrometry (GC/MS) analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Water-quality study ¹	Dis-charge (cubic feet per second)	Ala-chlor,			Atrazine, total GC/MS (µg/L)	Bromacil, Butylate,		Desethyl-atrazine (µg/L)	
					Ala-chlor, ELISA (µg/L)	total recover-able GC/MS (µg/L)	total recover-able (µg/L)		water whole, recover-able (µg/L)	water whole, recover-able (µg/L)		
32	06-01-91	2215	T	1,420	--	5.0	<.05	--	--	--	2.1	2.9
	06-01-91	2215	T	1,420	--	6.8	<.05	--	--	--	2.6	2.6
	06-02-91	0415	T	1,870	--	5.9	<.05	--	--	--	1.8	2.8
	06-02-91	1015	T	1,850	--	5.7	<.05	--	--	--	1.2	2.4
	06-02-91	1615	T	1,730	--	7.4	<.05	--	--	--	2.2	3.5
	06-02-91	2215	T	1,720	--	9.4	<.05	--	--	--	4.6	3.4
	06-03-91	0415	T	1,760	--	7.5	<.05	--	--	--	2.4	3.5
	06-03-91	1615	T	2,140	--	5.7	<.05	--	--	--	2.3	3.5
	06-04-91	0415	T	4,640	--	4.5	<.05	--	--	--	1.0	2.9
	06-04-91	1015	T	6,220	--	4.1	<.05	--	--	--	.82	3.0
	06-04-91	1615	T	6,210	--	5.1	<.05	--	--	--	.96	3.7
	06-04-91	2215	T	5,790	--	4.4	<.05	--	--	--	.73	3.0
	06-04-91	2215	T	5,790	--	4.7	1.0	--	--	--	1.9	3.6
	06-05-91	1355	T	5,120	--	4.4	<.05	--	--	--	1.6	3.3
	06-06-91	1335	T	3,510	--	3.1	<.05	--	--	--	.96	2.8
	06-06-91	1335	T	3,510	--	3.2	<.05	--	--	--	.89	2.6
	06-07-91	0730	T	2,480	--	2.7	.05	--	--	--	.66	2.3
	06-10-91	0940	T	312	--	1.8	<.05	--	--	--	.65	2.1
	06-12-91	1300	T	216	--	1.2	<.05	--	--	--	.43	1.4
	06-17-91	1010	T	1,130	--	.47	<.05	--	--	--	.26	.97
								8.4				

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay and gas chromatography/mass spectrometry analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Deiso-propyl-atrazine ($\mu\text{g/L}$)		Metol-achlor, water whole, recover-able ($\mu\text{g/L}$)		Metri-buzin, water whole, total ($\mu\text{g/L}$)		Prometon, total ($\mu\text{g/L}$)		Prop-achlor, water whole, total ($\mu\text{g/L}$)		Propazine, total ($\mu\text{g/L}$)		Simazine, total ($\mu\text{g/L}$)		Terbacil, water whole, recover-able ($\mu\text{g/L}$)		Trifluralin, total recover-able ($\mu\text{g/L}$)	
			($\mu\text{g/L}$)	($\mu\text{g/L}$)	($\mu\text{g/L}$)	($\mu\text{g/L}$)	($\mu\text{g/L}$)	($\mu\text{g/L}$)	($\mu\text{g/L}$)	($\mu\text{g/L}$)	($\mu\text{g/L}$)	($\mu\text{g/L}$)	($\mu\text{g/L}$)	($\mu\text{g/L}$)	($\mu\text{g/L}$)	($\mu\text{g/L}$)	($\mu\text{g/L}$)	($\mu\text{g/L}$)	($\mu\text{g/L}$)	($\mu\text{g/L}$)
32	06-01-91	2215	2.1	4.4	0.52	<0.05	--	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	--	--	--	--
	06-01-61	2215	1.7	5.8	.55	<.05	--	.28	.08	.08	.08	.08	.08	.08	.08	.08	--	--	--	--
	06-02-91	0415	1.8	8.3	.28	<.05	--	.10	.08	.08	.08	.08	.08	.08	.08	.08	--	--	--	--
	06-02-91	1015	1.3	5.4	.42	.16	--	<.05	.05	.05	.05	.05	.05	.05	.05	.05	--	--	--	--
	06-02-91	1615	2.1	7.7	.34	<.05	--	.07	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	--	--	--	--
	06-02-91	2215	2.6	10	.84	<.05	--	.07	.08	.08	.08	.08	.08	.08	.08	.08	--	--	--	--
	06-03-91	0415	2.2	8.2	.42	.05	--	.06	.06	.06	.06	.06	.06	.06	.06	.06	--	--	--	--
	06-03-91	1615	2.2	6.7	.38	<.05	--	.09	.11	.11	.11	.11	.11	.11	.11	.11	--	--	--	--
	06-04-91	0415	1.8	4.5	.30	<.05	--	.11	.14	.14	.14	.14	.14	.14	.14	.14	--	--	--	--
	06-04-91	1015	1.4	3.9	.24	.06	--	.21	.25	.25	.25	.25	.25	.25	.25	.25	--	--	--	--
	06-04-91	1615	2.1	4.5	.24	.07	--	.26	.26	.26	.26	.26	.26	.26	.26	.26	--	--	--	--
	06-04-91	2215	1.5	4.5	.22	.06	--	.23	.24	.24	.24	.24	.24	.24	.24	.24	--	--	--	--
	06-04-91	2215	2.5	4.9	1.3	.95	--	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	--	--	--	--
	06-05-91	1355	1.7	6.6	.33	<.05	--	.26	.29	.29	.29	.29	.29	.29	.29	.29	--	--	--	--
	06-06-91	1335	1.7	5.8	.34	.10	--	.23	.40	.40	.40	.40	.40	.40	.40	.40	--	--	--	--
	06-06-91	1335	1.6	5.5	.24	.11	--	.22	.39	.39	.39	.39	.39	.39	.39	.39	--	--	--	--
	06-07-91	0730	1.3	5.2	.25	.06	--	.20	.34	.34	.34	.34	.34	.34	.34	.34	--	--	--	--
	06-10-91	0940	1.2	3.2	.16	.09	--	.15	.19	.19	.19	.19	.19	.19	.19	.19	--	--	--	--
	06-12-91	1300	.67	2.8	.13	.06	--	.12	.15	.15	.15	.15	.15	.15	.15	.15	--	--	--	--
	06-17-91	1010	.53	1.4	.10	<.05	--	.06	.08	.08	.08	.08	.08	.08	.08	.08	--	--	--	--

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay (ELISA) and gas chromatography/mass spectrometry (GC/MS) analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Water-quality study ¹	Dis-charge (cubic feet per second)	Ala-chlor, ELISA (µg/L)	Ala-chlor, total recoverable		Atrazine, ELISA (µg/L)	Atrazine, total GC/MS (µg/L)	Bromacil, water recoverable		Butylate, water recoverable (µg/L)	Cyanazine, total (µg/L)	Desethyl-atrazine (µg/L)
						GC/MS (µg/L)	Ametryn, total (µg/L)			water recoverable (µg/L)	water recoverable (µg/L)			
32	06-20-91	1140	T	102	--	0.73	0.08	--	18	--	--	0.35	1.9	
	06-21-91	1600	T	631	--	.73	<.05	--	1.4	--	--	.10	1.0	
	06-21-91	2200	T	681	--	5.0	<.05	--	11	--	--	.58	.88	
	06-22-91	0400	T	868	--	6.2	<.05	--	31	--	--	.61	2.8	
	06-22-91	1000	T	955	--	2.1	.06	--	34	--	--	.28	1.7	
	06-22-91	1600	T	1,070	--	3.7	.07	--	32	--	--	.58	3.0	
	06-24-91	1325	T	484	--	3.1	<.05	--	19	--	--	.55	1.7	
	06-27-91	1230	T	142	--	5.8	<.05	--	31	--	--	.52	2.4	
	07-01-91	1250	T	120	--	.90	<.05	--	9.6	--	--	.21	1.4	
	07-02-91	1255	T	120	--	.53	<.05	--	9.9	--	--	.10	1.4	
	07-03-91	0825	T	134	--	.98	.05	--	12	--	--	.34	1.7	
	07-08-91	0920	T	143	--	1.6	<.05	--	7.2	--	--	.20	1.4	
	07-11-91	1230	T	147	--	.36	.06	--	4.1	--	--	.05	.65	
	07-15-91	1155	T	118	--	.47	.22	--	9.4	--	--	.05	.84	
	07-18-91	1145	T	104	--	.22	.09	--	3.5	--	--	.07	.69	
	07-22-91	0820	T	120	--	.26	.30	--	2.7	--	--	<.05	.81	
	07-25-91	1300	T	117	--	.13	.20	--	1.8	--	--	<.05	.53	
	07-29-91	1230	T	109	--	.23	.20	--	2.6	--	--	<.05	.58	
	07-29-91	1230	T	109	--	.15	.15	--	1.7	--	--	<.05	1.0	
	08-12-91	1350	T	69	--	.17	.28	--	1.6	--	--	<.05	.79	

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay and gas chromatography/mass spectrometry analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Metol-										
			Deiso-propyl-atrazine ($\mu\text{g/L}$)	achlor, water whole, recoverable ($\mu\text{g/L}$)	Metri-buzin, water whole, total ($\mu\text{g/L}$)	Prometon, total ($\mu\text{g/L}$)	Prop-achlor, water whole, total ($\mu\text{g/L}$)	Propazine, total ($\mu\text{g/L}$)	Simazine, total ($\mu\text{g/L}$)	Terbacil, water whole, recoverable ($\mu\text{g/L}$)	Trifluralin, total recoverable ($\mu\text{g/L}$)		
32	06-20-91	1140	1.1	3.0	0.10	0.09	--	0.16	0.18	--	--	--	--
	06-21-91	1600	.55	1.4	<.05	<.05	--	.09	.05	--	--	--	--
	06-21-91	2200	.53	4.5	.92	<.05	--	.08	<.05	--	--	--	--
	06-22-91	0400	1.5	6.6	1.0	<.05	--	.34	.10	--	--	--	--
	06-22-91	1000	.99	3.8	.45	<.05	--	.20	<.05	--	--	--	--
	06-22-91	1600	1.6	5.2	.28	<.05	--	.34	<.05	--	--	--	--
	06-24-91	1325	1.2	2.0	.33	<.05	--	.20	.34	--	--	--	--
	06-27-91	1230	1.7	5.2	.34	<.05	--	.25	.06	--	--	--	--
	07-01-91	1250	.68	1.8	.07	.05	--	.08	.11	--	--	--	--
	07-02-91	1255	.72	1.2	.05	.05	--	.09	.11	--	--	--	--
	07-03-91	0825	.98	1.9	.08	.06	--	.11	.11	--	--	--	--
	07-08-91	0920	.71	1.2	.05	.05	--	.07	.13	--	--	--	--
	07-11-91	1230	.54	.46	<.05	<.05	--	<.05	.12	--	--	--	--
	07-15-91	1155	.69	.69	<.05	.09	--	.06	.14	--	--	--	--
	07-18-91	1145	.35	.87	<.05	<.05	--	<.05	.06	--	--	--	--
	07-22-91	0820	.46	.75	<.05	<.05	--	<.05	.05	--	--	--	--
	07-25-91	1300	.11	.40	<.05	<.05	--	<.05	<.05	--	--	--	--
	07-29-91	1230	.62	.53	<.05	<.05	--	<.05	<.05	--	--	--	--
	07-29-91	1230	.46	.31	<.05	<.05	--	<.05	<.05	--	--	--	--
	08-12-91	1350	.27	.29	<.05	.06	--	<.05	<.05	--	--	--	--

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay (ELISA) and gas chromatography/mass spectrometry (GC/MS) analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Water quality study ¹	Discharge (cubic feet per second)	Ala-chlor, ELISA (µg/L)	Ala-chlor, total recoverable GC/MS (µg/L)	Ametryn, total (µg/L)	Atrazine, ELISA (µg/L)	Atrazine, total GC/MS (µg/L)	Bromacil, Butylate, water whole, recoverable (µg/L)		Cyanazine, total (µg/L)	Desethyl-atrazine (µg/L)
										water whole, recoverable (µg/L)	water whole, recoverable (µg/L)		
32	08-19-91	1000	T	59	--	0.14	0.27	--	1.1	--	--	<0.05	0.67
	08-27-91	1245	T	84	--	.10	.09	--	.69	--	--	<0.05	.39
	08-27-91	1245	T	84	--	<0.05	<0.05	--	.35	--	--	<0.05	.14
	09-03-91	1235	T	40	--	.07	.12	--	.53	--	--	<0.05	.29
	09-10-91	1245	T	24	--	.05	.08	--	.54	--	--	<0.05	.17
	09-17-91	1330	T	24	--	.12	.18	--	.49	--	--	<0.05	.24
	09-24-91	0920	T	21	--	.05	<0.05	--	.42	--	--	<0.05	.18
	10-01-91	1330	T	21	--	<0.05	<0.05	--	.35	--	--	<0.05	.14
	10-15-91	0945	T	22	--	<0.05	<0.05	--	.26	--	--	<0.05	.09
	10-22-91	1225	T	26	--	.05	<0.05	--	.28	--	--	<0.05	.08
	11-06-91	0920	T	25	--	<0.05	<0.05	--	.20	--	--	<0.05	.07
	11-19-91	0945	T	36	--	<0.05	<0.05	--	.25	--	--	<0.05	.09
	12-19-91	0930	T	25	--	.13	<0.05	--	.35	--	--	<0.05	.10
	12-30-91	1300	T	51	--	<0.05	<0.05	--	.19	--	--	<0.05	.09
	01-14-92	1230	T	55	--	<0.05	<0.05	--	.14	--	--	<0.05	<0.05
	01-14-92	1230	T	55	--	<0.05	<0.05	--	.17	--	--	<0.05	.06
	01-28-92	1200	T	56	--	<0.05	<0.05	--	.16	--	--	<0.05	.06
	02-11-92	1300	T	56	--	<0.05	<0.05	--	.13	--	--	<0.05	.05
	02-27-92	1220	T	65	--	<0.05	<0.05	--	.46	--	--	<0.05	.12
	03-09-92	1140	T	50	--	<0.05	<0.05	--	.15	--	--	<0.05	.06

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay and gas chromatography/mass spectrometry analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Metol-achlor, water				Prometon, total (µg/L)	Prop-achlor, water, total (µg/L)	Propazine, total (µg/L)	Simazine, total (µg/L)	Terbacil, water, whole, recoverable (µg/L)	Trifluralin, total recoverable (µg/L)
			Deiso-propyl-atrazine (µg/L)	recovery-able (µg/L)	whole, total (µg/L)	Metri-buzin, water, total (µg/L)						
32	08-19-91	1000	0.21	0.28	<0.05	<0.05	--	<0.05	<0.05	--	--	
	08-27-91	1245	.20	.12	<0.05	<0.05	--	<0.05	<0.05	--	--	
	08-27-91	1245	.05	.05	<0.05	<0.05	--	<0.05	<0.05	--	--	
	09-03-91	1235	.14	.08	<0.05	<0.05	--	<0.05	<0.05	--	--	
	09-10-91	1245	.08	.07	<0.05	<0.05	--	<0.05	<0.05	--	--	
	09-17-91	1330	.19	.18	<0.05	<0.05	--	<0.05	<0.05	--	--	
	09-24-91	0920	.06	.06	<0.05	<0.05	--	<0.05	<0.05	--	--	
	10-01-91	1330	.05	.05	<0.05	<0.05	--	<0.05	<0.05	--	--	
	10-15-91	0945	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05	--	--	
	10-22-91	1225	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05	--	--	
	11-06-91	0920	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05	--	--	
	11-19-91	0945	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05	--	--	
	12-19-91	0930	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05	--	--	
	12-30-91	1300	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05	--	--	
	01-14-92	1230	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05	--	--	
	01-14-92	1230	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05	--	--	
	01-28-92	1200	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05	--	--	
	02-11-92	1300	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05	--	--	
	02-27-92	1220	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05	--	--	
	03-09-92	1140	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05	--	--	

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay (ELISA) and gas chromatography/mass spectrometry (GC/MS) analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Water quality study ¹	Discharge (cubic feet per second)	Ala-chlor, total		Atrazine, total ELISA (µg/L)	Atrazine, total GC/MS (µg/L)	Bromacil, Butylate, water		Desethyl-atrazine (µg/L)
					Ala-chlor, ELISA (µg/L)	recovery GC/MS (µg/L)			whole, recoverable (µg/L)	whole, recoverable (µg/L)	
32	03-23-92	1115	T	69	<.05	<.05	--	0.22	--	<.05	0.06
	04-01-92	1100	T	--	<.05	<.05	--	.13	--	<.05	.08
33	06-25-89	0845	N	--	<.1	<.1	--	51	<.1	6.8	--
	08-28-89	1345	N	--	<.1	<.1	--	2.5	<.1	.1	--
34	09-29-87	1430	N	186	<.1	<.1	--	.4	--	<.1	--
	07-25-88	1030	N	184	.2	.1	--	3.3	<.1	.3	--
	11-14-88	1530	N	112	<.1	<.1	--	.1	<.1	<.1	--
34	03-08-89	1500	N	192	<.1	<.1	--	.5	<.1	<.1	--
	05-31-89	1300	N	e164	.1	<.1	--	2.2	<.1	.2	--
35	07-25-88	1325	N	2.1	.2	.1	--	12	<.1	.8	--
	11-15-88	1110	N	.29	<.1	<.1	--	3.5	<.1	.1	--
	03-07-89	1345	N	1.5	.1	<.1	--	1.0	<.1	<.1	--
	05-30-89	1445	N	e.50	.1	.1	--	3.8	<.1	.5	--
36	09-29-87	1320	N	51	<.1	<.1	--	.3	--	<.1	--
	07-25-88	0600	N	15	.5	.1	--	5.4	<.1	<.1	--
	11-14-88	1445	N	7.2	<.1	<.1	--	.4	<.1	<.1	--
	03-07-89	0855	N	31	.1	<.1	--	.5	<.1	<.1	--
	05-31-89	1215	N	e5.4	<.1	<.1	--	.3	<.1	.1	--
37	07-25-88	0630	N	13	<.1	<.1	--	1.0	<.1	.1	--
	11-14-88	1200	N	11	<.1	<.1	--	.1	<.1	<.1	--

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay and gas chromatography/mass spectrometry analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Metol-										
			Deiso-propyl-atrazine ($\mu\text{g/L}$)	Metri-buzin, water whole, total ($\mu\text{g/L}$)	Prometon, total ($\mu\text{g/L}$)	Prop-achlor, water whole, total ($\mu\text{g/L}$)	Propazine, total ($\mu\text{g/L}$)	Simazine, total ($\mu\text{g/L}$)	Terbacil, water whole, recover-able ($\mu\text{g/L}$)	Trifluralin, total recover-able ($\mu\text{g/L}$)			
32	03-23-92	1115	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	--
	04-01-92	1100	<0.05	<0.05	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	--	--
33	06-25-89	0845	--	13	<1	<1	<0.1	<1	.5	.1	<0.1	<0.1	<0.1
	08-27-89	1345	--	.3	<1	<1	<1	<1	<1	<1	<1	<1	<1
34	09-29-87	1430	--	<1	<1	<1	--	<1	<1	<1	<1	--	<1
	07-25-88	1030	--	.3	<1	<1	<1	<1	.1	.3	<1	<1	<1
	11-14-88	1530	--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	03-08-89	1500	--	.1	<1	.1	<1	<1	<1	<1	<1	<1	<1
	05-31-89	1300	--	.1	<1	.1	<1	<1	<1	<1	<1	<1	<1
35	07-25-88	1325	--	1.2	.1	.1	<1	<1	.1	.1	<1	<1	<1
	11-15-88	1110	--	.2	<1	.1	<1	<1	<1	<1	<1	<1	<1
	03-07-89	1345	--	.3	<1	<1	<1	<1	<1	<1	<1	<1	<1
	05-30-89	1445	--	.2	<1	.4	<1	<1	<1	<1	<1	<1	<1
36	09-29-87	1320	--	<1	<1	<1	--	<1	<1	<1	<1	--	<1
	07-25-88	0600	--	1.2	<1	.2	<1	.2	.1	.1	<1	<1	<1
	11-14-88	1445	--	.1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	03-07-89	0855	--	.1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	05-31-89	1215	--	.2	<1	<1	<1	<1	<1	<1	<1	<1	<1
37	07-25-88	0630	--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	11-14-88	1200	--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay (ELISA) and gas chromatography/mass spectrometry (GC/MS) analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Water-quality study ¹	Dis-charge (cubic feet per second)	Ala-chlor, ELISA (µg/L)	Ala-chlor, total recover-able GC/MS (µg/L)	Ametryn, total (µg/L)	Atrazine, ELISA (µg/L)	Atrazine, total GC/MS (µg/L)	Bromacil, Butylate, water whole, recover-able (µg/L)		Cyana-zine, total (µg/L)	Desethyl-atrazine (µg/L)
										water whole, recover-able (µg/L)	water whole, recover-able (µg/L)		
37	03-07-89	1240	N	30	--	<0.1	<0.1	--	0.3	<0.1	<0.1	<0.1	--
	05-31-89	1100	N	8.0	--	<0.1	<0.1	--	.3	<0.1	<0.1	<0.1	--
38	07-26-88	0510	N	3.6	--	.1	<0.1	--	9.8	<0.1	<0.1	.6	--
	11-14-88	1045	N	.75	--	<0.1	<0.1	--	.3	<0.1	<0.1	<0.1	--
	03-08-89	0900	N	2.9	--	<0.1	<0.1	--	.3	<0.1	<0.1	.1	--
	05-30-89	1630	N	.51	--	<0.1	<0.1	--	.2	<0.1	<0.1	.2	--
39	07-25-88	1330	N	235	--	.4	.2	--	4.4	<0.1	<0.1	.5	--
	07-25-88	1700	N	231	--	.5	.1	--	5.8	<0.1	<0.1	.4	--
	07-25-88	2100	N	215	--	.4	.1	--	5.8	<0.1	<0.1	.5	--
	07-26-88	0115	N	211	--	.3	.1	--	4.5	<0.1	<0.1	.4	--
	07-26-88	0950	N	192	--	.2	.1	--	3.8	<0.1	<0.1	.3	--
	07-27-88	0510	N	163	--	.1	.1	--	4.2	<0.1	<0.1	.2	--
40	11-14-88	0900	N	192	--	<0.1	<0.1	--	.2	<0.1	<0.1	<0.1	--
	03-07-89	1000	N	237	--	<0.1	<0.1	--	.6	<0.1	<0.1	<0.1	--
	05-30-89	1000	N	163	--	.3	<0.1	--	3.2	<0.1	<0.1	.4	--
	07-25-88	0650	N	12	--	.5	<0.1	--	8.9	<0.1	<0.1	.9	--
	11-14-88	1020	N	5.2	--	<0.1	<0.1	--	.7	<0.1	<0.1	.1	--
	03-07-89	1520	N	4.5	--	<0.1	<0.1	--	.5	<0.1	<0.1	<0.1	--

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay and gas chromatography/mass spectrometry analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Deiso-propyl-atrazine ($\mu\text{g/L}$)	Metol-achlor, water whole, recover-able ($\mu\text{g/L}$)		Prometon, total ($\mu\text{g/L}$)	Prop-achlor, water whole, total ($\mu\text{g/L}$)	Propazine, total ($\mu\text{g/L}$)	Simazine, total ($\mu\text{g/L}$)	Terbacil, water whole, recover-able ($\mu\text{g/L}$)	Trifluralin, total recover-able ($\mu\text{g/L}$)
				Metri-buzin, water whole, total ($\mu\text{g/L}$)	achlor, water whole, recover-able ($\mu\text{g/L}$)						
37	03-07-89	1240	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	05-31-89	1100	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
38	07-26-88	0510	--	1.1	<0.1	<0.1	<0.1	.1	.1	<0.1	<0.1
	11-14-88	1045	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	03-08-89	0900	--	.1	3.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	05-30-89	1630	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
39	07-25-88	1330	--	.7	<0.1	<0.1	<0.1	.1	.3	<0.1	<0.1
	07-25-88	1700	--	.6	<0.1	<0.1	<0.1	.1	.2	<0.1	<0.1
	07-25-88	2100	--	.7	<0.1	<0.1	<0.1	.1	.2	<0.1	<0.1
	07-26-88	0115	--	.3	<0.1	<0.1	<0.1	.1	.3	<0.1	<0.1
	07-26-88	0950	--	.3	<0.1	<0.1	<0.1	.1	.3	<0.1	<0.1
	07-27-88	0510	--	.4	<0.1	<0.1	<0.1	.1	.3	<0.1	<0.1
40	11-14-88	0900	--	<0.1	<0.1	<0.1	<0.1	<0.1	.1	<0.1	<0.1
	03-07-89	1000	--	.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	05-30-89	1000	--	.3	<0.1	<0.1	<0.1	<0.1	.1	<0.1	<0.1
	07-25-88	0650	--	1.3	.1	<0.1	<0.1	.1	.1	<0.1	<0.1
	11-14-88	1020	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	03-07-89	1520	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay (ELISA) and gas chromatography/mass spectrometry (GC/MS) analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Water quality study ¹	Discharge (cubic feet per second)	Ala-chlor,		Atrazine, ELISA (µg/L)	Atrazine, total GC/MS (µg/L)	Bromacil, Butylate, water whole, recoverable (µg/L)		Desethyl-atrazine (µg/L)
					Ala-chlor, ELISA (µg/L)	total recoverable GC/MS (µg/L)			water whole, recoverable (µg/L)	Cyanazine, total (µg/L)	
41	09-28-87	1050	N	581	<0.1	<0.1	--	0.8	--	<0.1	--
	07-25-88	0540	N	402	.2	.1	--	4.3	<0.1	<0.1	.5
	11-14-88	1145	N	193	<.1	<.1	--	.2	<.1	<.1	--
	03-07-89	1435	N	329	<.1	<.1	--	.4	<.1	<.1	.1
	04-06-89	--	R	226	<.05	<.05	2.1	.91	--	--	<.2
	04-19-89	1130	N	223	<.1	<.1	--	.2	<.1	<.1	--
	05-24-89	0940	N	220	<.1	<.1	--	.5	<.1	<.1	.1
	05-30-89	1245	N	187	<.1	<.1	--	1.0	<.1	<.1	.1
	06-27-89	1245	N	3,380	.6	<.1	--	19	.2	<.1	.3
	06-27-89	--	R	3,380	1.2	<.05	>.5	16	--	--	.83
42	07-11-89	0930	N	591	.4	.1	--	8.9	<.1	<.1	.9
	08-16-89	0825	N	144	<.1	.1	--	2.3	<.1	<.1	.2
	09-06-89	1020	N	6,600	.1	<.1	--	2.4	<.1	<.1	.1
	10-23-89	--	R	579	<.05	<.05	.9	.51	--	--	<.2
	11-29-89	1030	N	203	<.1	<.1	--	.2	--	--	<.1
	12-19-89	0920	N	180	<.1	<.1	--	.2	--	--	<.1
	01-18-90	1000	N	246	<.1	<.1	--	.2	--	--	<.1
	02-13-90	1030	N	226	<.1	<.1	--	.1	--	--	<.1
	07-26-88	0515	N	18	.1	.1	--	4.9	<.1	<.1	.1
	11-15-88	1100	N	8.0	<.1	<.1	--	.3	<.1	<.1	<.1
03-08-89	0800	N	11	<.1	<.1	--	.2	<.1	<.1	<.1	
05-30-89	1200	N	8.3	<.1	<.1	--	.1	<.1	<.1	<.1	

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay and gas chromatography/mass spectrometry analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Metol-				Prop-achlor, water whole, total (µg/L)	Prometon, total (µg/L)	Propazine, total (µg/L)	Simazine, total (µg/L)	Terbacil, water whole, recoverable (µg/L)	Trifluralin, total recoverable (µg/L)
			Deiso-propyl-atrazine (µg/L)	Metol-achlor, water whole, recoverable (µg/L)	Metri-buzin, water whole, total (µg/L)	Prometon, total (µg/L)						
41	09-28-87	1050	--	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	--	<0.1	
	07-25-88	0540	--	.4	<0.1	<0.1	<0.1	.1	1.8	<0.1	<0.1	
	11-14-88	1145	--	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	
	03-07-89	1435	--	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	
	04-06-89	--	0.59	<.05	<.05	<.05	<.05	<.05	35	--	--	
	04-19-89	1130	--	<.1	<.1	<.1	<.1	<.1	.8	--	<.1	
	05-24-89	0940	--	.1	<.1	<.1	<.1	<.1	3.1	<.1	<.1	
	05-30-89	1245	--	.1	<.1	<.1	<.1	<.1	.1	<.1	<.1	
	06-27-89	1245	--	1.4	.1	<.1	<.1	.1	.1	<.1	<.1	
	06-27-89	--	1.5	1.3	.36	.12	--	.22	.28	--	--	
	07-11-89	0930	--	1.8	.1	<.1	<.1	.1	1.6	<.1	<.1	
	08-16-89	0825	--	.2	<.1	<.1	<.1	<.1	1.0	<.1	<.1	
42	09-06-89	1020	--	.3	<.1	<.1	<.1	<.1	<.1	<.1	<.1	
	10-23-89	--	<.05	<.05	<.05	<.05	<.05	<.05	.95	--	--	
	11-29-89	1030	--	<.1	<.1	<.1	<.1	<.1	1.0	--	<.1	
	12-19-89	0920	--	<.1	<.1	<.1	<.1	<.1	<.1	--	<.1	
	01-18-90	1000	--	<.1	<.1	<.1	<.1	<.1	.1	--	<.1	
	02-13-90	1030	--	<.1	<.1	<.1	<.1	<.1	.1	--	<.1	
	07-26-88	0515	--	1.1	<.1	<.1	<.1	.1	.2	<.1	<.1	
	11-15-88	1100	--	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	
	03-08-89	0800	--	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	
	05-30-89	1200	--	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay (ELISA) and gas chromatography/mass spectrometry (GC/MS) analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour study)	Water-quality study ¹	Dis-charge (cubic feet per second)	Ala-chlor, ELISA (µg/L)	Ala-chlor, total recover-able GC/MS (µg/L)	Ametryn, total (µg/L)	Atrazine, ELISA (µg/L)	Atrazine, total GC/MS (µg/L)	Bromacil, Butylate, water whole, recover-able (µg/L)		Cyna-zine, total (µg/L)	Desethyl-atrazine (µg/L)
										water whole, recover-able (µg/L)	water whole, recover-able (µg/L)		
43	09-30-87	0925	N	49	--	<0.1	<0.1	--	0.3	--	--	<0.1	--
	07-26-88	0810	N	31	--	<1	.1	--	4.8	<0.1	<0.1	.1	--
	11-15-88	0940	N	65	--	<1	<1	--	.3	<1	<1	<1	--
	03-08-89	0920	N	67	--	<1	<1	--	.2	<1	<1	<1	--
	05-30-89	1320	N	45	--	<1	<1	--	.3	<1	<1	<1	--
44	07-26-88	0630	N	32	--	<1	.2	--	5.5	<1	<1	.3	--
	11-15-88	0815	N	52	--	<1	<1	--	.3	<1	<1	<1	--
	03-08-89	1100	N	79	--	<1	<1	--	.1	<1	<1	<1	--
	05-31-89	1030	N	45	--	.1	<1	--	.4	<1	<1	<1	--
	07-26-88	0630	N	55	--	<1	.1	--	4.9	<1	<1	.2	--
45	11-14-88	1655	N	40	--	<1	<1	--	.4	<1	<1	<1	--
	03-08-89	1345	N	118	--	<1	<1	--	.2	<1	<1	<1	--
	05-31-89	1200	N	61	--	<1	<1	--	.5	<1	<1	.1	--
	05-03-83*	0230**	LB	--	--	2.6	--	--	0	--	--	--	--
	05-15-83*	1030**	LB	--	--	.6	--	--	0	--	--	--	--
46	05-15-83*	1630**	LB	--	--	.1	--	--	0	--	--	--	--
	05-16-83*	0030**	LB	--	--	.3	--	--	0	--	--	--	--
	05-16-83*	0830**	LB	--	--	.3	--	--	0	--	--	--	--

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay and gas chromatography/mass spectrometry analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Metol-achlor, water whole, recoverable (µg/L)			Deiso-propyl-atrazine (µg/L)	Metribuzin, water whole, total (µg/L)		Prometon, total (µg/L)	Propachlor, water whole, total (µg/L)		Propazine, total (µg/L)	Simazine, total (µg/L)	Terbacil, water whole, recoverable (µg/L)		Trifluralin, total recoverable (µg/L)
			whole, recoverable	whole, total	whole, total		whole, total	whole, recoverable		whole, recoverable						
43	09-30-87	0925	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
	07-26-88	0810	1.0	<0.1	<0.1	<0.1	<0.1	.1	<0.1	<0.1	.2	<0.1	<0.1	<0.1		
	11-15-88	0940	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
	03-08-89	0920	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
	05-30-89	1320	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	.1	<0.1	<0.1	<0.1		
44	07-26-88	0630	1.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	.4	<0.1	<0.1	<0.1		
	11-15-88	0815	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
	03-08-89	1100	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
	05-31-89	1030	.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	.1	<0.1	<0.1	<0.1		
	07-26-88	0630	.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	.5	<0.1	<0.1	<0.1		
45	11-14-88	1655	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
	03-08-89	1345	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
	05-13-89	1200	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	.1	<0.1	<0.1	<0.1		
	05-03-83*	0230**	0	--	--	--	--	--	--	--	--	--	--	--		
	05-15-83*	1030**	0	--	--	--	--	--	--	--	--	--	--	--		
46	05-15-83*	1630**	0	--	--	--	--	--	--	--	--	--	--	--		
	05-16-83*	0030**	0	--	--	--	--	--	--	--	--	--	--	--		
	05-16-83*	0830**	0	--	--	--	--	--	--	--	--	--	--	--		

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay (ELISA) and gas chromatography/mass spectrometry (GC/MS) analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Water quality study ¹	Discharge (cubic feet per second)	Ala-chlor, ELISA (µg/L)	Ala-chlor, total recoverable GC/MS (µg/L)	Ametryn, total (µg/L)	Atrazine, ELISA (µg/L)	Atrazine, total GC/MS (µg/L)	Bromacil, water whole, recoverable (µg/L)		Desethyl-atrazine (µg/L)
										water whole, recoverable (µg/L)	Butylate, water whole, recoverable (µg/L)	
46	06-18-83*	1000**	LB	--	--	1.8	--	--	0	--	--	--
	06-18-83*	1800**	LB	--	--	1.3	--	--	0	--	--	--
	06-19-83*	0500**	LB	--	--	2.0	--	--	0	--	--	--
	08-11-83*	0630**	LB	--	--	0	--	--	0	--	--	--
	06-14-84*	1130**	LB	--	--	5.4	--	--	16	--	--	--
	06-14-84*	1730**	LB	--	--	5.3	--	--	17	--	--	--
	06-15-84*	0130**	LB	--	--	4.6	--	--	16	--	--	--
	06-15-84*	0930**	LB	--	--	4.7	--	--	14	--	--	--
	08-09-84*	2200**	LB	--	--	0	--	--	0	--	--	--
	09-19-84*	1330**	LB	--	--	0	--	--	0	--	--	--
	09-19-84*	1930**	LB	--	--	0	--	--	0	--	--	--
	09-20-84*	0330**	LB	--	--	0	--	--	0	--	--	--
	09-20-84*	1130**	LB	--	--	0	--	--	0	--	--	--
	08-03-85*	1430**	LB	--	--	.6	--	--	11	--	--	--
	08-03-85*	2330**	LB	--	--	.3	--	--	10	--	--	--
47	07-26-88	0600	N	1.5	--	<.1	0.1	--	5.8	<.1	<.1	0.3
48	09-28-87	1530	N	24	--	<.1	<.1	--	.1	--	--	<.1
	07-26-88	0545	N	37	--	<.1	.1	--	3.3	<.1	<.1	.2
	11-14-88	1730	N	20	--	<.1	<.1	--	<.1	<.1	<.1	<.1
	03-08-89	1250	N	26	--	<.1	<.1	--	.1	<.1	<.1	<.1
	05-31-89	1130	N	25	--	<.1	<.1	--	<.1	<.1	<.1	<.1

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay and gas chromatography/mass spectrometry analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Deiso-propyl-atrazine ($\mu\text{g/L}$)	Metol-achlor, water			Metri-buzin, water whole, total ($\mu\text{g/L}$)	Prometon, total ($\mu\text{g/L}$)	Prop-achlor, water whole, total ($\mu\text{g/L}$)	Propazine, total ($\mu\text{g/L}$)	Simazine, total ($\mu\text{g/L}$)	Terbacil, water whole, recover-able ($\mu\text{g/L}$)	Trifluralin, total recover-able ($\mu\text{g/L}$)
				achlor, water recover-able ($\mu\text{g/L}$)	water whole, total ($\mu\text{g/L}$)	water whole, total ($\mu\text{g/L}$)							
46	06-18-83*	1000**	--	0	--	--	--	--	--	--	--	--	--
	06-18-83*	1800**	--	0	--	--	--	--	--	--	--	--	--
	06-19-83*	0500**	--	0	--	--	--	--	--	--	--	--	--
	08-11-83*	0630**	--	0	--	--	--	--	--	--	--	--	--
	06-14-84*	1130**	--	0	--	--	--	--	--	--	--	--	--
	06-14-84*	1730**	--	0	--	--	--	--	--	--	--	--	--
	06-15-84*	0130**	--	0	--	--	--	--	--	--	--	--	--
47	06-15-84*	0930**	--	0	--	--	--	--	--	--	--	--	--
	08-09-84*	2200**	--	0	--	--	--	--	--	--	--	--	--
	09-19-84*	1330**	--	0	--	--	--	--	--	--	--	--	--
	09-19-84*	1930**	--	0	--	--	--	--	--	--	--	--	--
	09-20-84*	0330**	--	0	--	--	--	--	--	--	--	--	--
	09-20-84*	1130**	--	0	--	--	--	--	--	--	--	--	--
	08-03-85*	1430**	--	.2	--	--	--	--	--	--	--	--	--
08-03-85*	2330**	--	.1	--	--	--	--	--	--	--	--	--	
48	07-26-88	0600	--	.3	<.1	<.1	<.1	<.1	0.2	0.6	<.1	<.1	<.1
	09-28-87	1530	--	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
	07-26-88	0545	--	.3	<.1	<.1	<.1	.1	.2	<.1	<.1	<.1	<.1
	11-14-88	1730	--	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
	03-08-89	1250	--	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
05-31-89	1130	--	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay (ELISA) and gas chromatography/mass spectrometry (GC/MS) analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Water quality study ¹	Dis-charge (cubic feet per second)	Ala-chlor, ELISA (µg/L)	Ala-chlor, total recoverable GC/MS (µg/L)	Ametryn, total (µg/L)	Atrazine, ELISA (µg/L)	Atrazine, total GC/MS (µg/L)	Bromacil, Butylate, water whole, recoverable (µg/L)		Cyanazine, total (µg/L)	Desethyl-atrazine (µg/L)
										water whole, recoverable (µg/L)	water whole, recoverable (µg/L)		
49	07-25-88	0845	N	133	--	0.1	0.1	--	3.6	<0.1	<0.1	0.2	--
	11-14-88	1555	N	90	--	<.1	<.1	--	.3	<.1	<.1	<.1	--
	03-08-89	1225	N	133	--	<.1	<.1	--	.1	<.1	<.1	<.1	--
	04-05-89	--	R	116	--	--	--	<0.2	--	--	--	--	--
	05-31-89	1300	N	91	--	.1	<.1	--	.5	<.1	<.1	.1	--
50	06-26-89	--	R	6,590	--	2.3	<.05	>.5	22	--	--	1.9	3.7
	10-30-89	--	R	106	--	<.05	<.05	.4	.31	--	--	<.2	.12
	07-25-88	0615	N	18	--	.2	<.1	--	7.2	<.1	<.1	.4	--
	11-14-88	1515	N	8.0	--	<.1	<.1	--	.1	<.1	<.1	<.1	--
03-08-89	1200	N	13	--	<.1	<.1	--	.1	<.1	<.1	<.1	--	
05-31-89	1330	N	6.8	--	<.1	<.1	--	.3	<.1	<.1	<.1	--	

Table 3. Concentrations of atrazine, two atrazine metabolites, and selected herbicides detected by immunoassay and gas chromatography/mass spectrometry analysis in surface-water samples from the Big Blue River Basin Nebraska, 1983-92--Continued

Map reference number (fig. 2)	Date	Time (24-hour)	Metol-achlor, water whole, recover-able (µg/L)				Deiso-propyl-atrazine (µg/L)	Metri-buzin, water whole, total (µg/L)	Prometon, total (µg/L)	Prop-achlor, water whole, total (µg/L)	Propazine, total (µg/L)	Simazine, total (µg/L)	Terbacil, water whole, recover-able (µg/L)	Trifluralin, total recover-able (µg/L)
			achlor, water whole, recover-able (µg/L)	water whole, recover-able (µg/L)	water whole, recover-able (µg/L)	water whole, recover-able (µg/L)								
49	07-25-88	0845	0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.2	<0.1	<0.1	
	11-14-88	1555	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	
	03-08-89	1225	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	
	04-05-89	--	--	--	--	--	--	--	--	--	--	--	--	
	05-31-89	1300	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	.1	<.1	<.1	
	06-26-89	--	1.6	.30	.06	--	--	.32	2.2	--	--	--	--	
50	07-25-88	0615	.7	<.1	<.1	<.1	<.1	.1	<.1	.5	<.1	<.1	<.1	
	11-14-88	1515	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	
	03-08-89	1200	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	
	05-31-89	1330	<.1	<.1	<.1	<.1	<.1	.2	<.1	<.1	<.1	<.1	<.1	
	06-26-89	--	2.2	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	
	10-30-89	--	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	

¹ Explanation of water-quality study: N, sampled for the National Water-Quality Assessment Program (Jordan and Stamer, 1991; Fallon and McChesney, 1993); R, sampled for the regional herbicide reconnaissance study (Thurman and others, 1991); T, sampled for the temporal variability study (Goolsby and others, 1991); UB, sampled for the Upper Big Blue Natural Resources District ground-water recharge study (Bitner, 1992); LB, sampled for the Little Blue Natural Resources District 1983 Edgarp Sandpit water-quality sampling study (Little Blue Natural Resources District, 1986).