Atrazine in the Ohio River Basin

The Ohio River Watershed Pollutant Reduction Program

Draft

Ohio River Valley Water Sanitation Commission

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EXECUTIVE SUMMARY

Atrazine is a selective herbicide commonly used on corn to control grass and weeds during germination or soon after emergence. Consequences associated with atrazine use are its high potential for ground water and surface water contamination and human health impacts. In the early 1990's, ORSANCO became aware of water pollution concerns regarding atrazine in the lower Ohio River as a result of stream monitoring conducted by the Louisville Water Company and the United States Geological Survey (USGS).

Data on the presence of atrazine is limited within the Ohio River Basin since it is not routinely sampled for in surface water. In 1995, ORSANCO conducted an extensive survey to characterize the presence of atrazine in the lower Ohio River Basin. Results from this survey on 10 mainstem sites indicated an increasing trend in average atrazine concentrations in a downstream direction from Cincinnati, OH to Cairo, IL. In addition, Ohio River concentrations occasionally exceeded the drinking water maximum contaminant level (MCL) of 3 ug/L, established for the protection of human health from long term exposure through water ingestion. On twenty eight of the largest tributaries to the lower Ohio River, approximately 25 percent of the samples had maximum atrazine concentrations above 20 ug/L. Evaluation of mass loading from these tributaries indicated that the major atrazine sources to the lower Ohio River were the Great Miami River, Green River, Wabash River, and the Little Wabash River.

While current control programs for atrazine exist within the Basin it is apparent that contamination continues to be a problem in the lower Ohio River. Recommendations for future work include establishing ambient water quality criteria for atrazine, developing a monitoring program on the large tributary sources of atrazine to further define sources, and to focus control programs in the sub-basins contributing highest loadings to the lower Ohio River Basin.

INTRODUCTION

Atrazine is a selective herbicide that has been used commercially since 1959 to control annual grass and broadleaf weeds during germination or soon after emergence. Herbicides containing atrazine may be pre-plant surface applied, pre-plant incorporated, applied as a pre-emergence treatment in water or liquid fertilizer, impregnated on dry bulk fertilizer or sometimes applied as a post-emergence application. The principle use of atrazine is for corn with minor applications to other field crops such as, sorghum, range grass, sugar cane, pineapple, nursery conifers, macadamia orchards and turf grass sod.

A concern associated with the use of atrazine is the high potential for both ground water and surface water contamination and associated human health impacts. Typically, during the spring and summer large quantities of the herbicide are transported to streams, which ultimately flow into the lower half of the Ohio River. In 1989, out of concern for possible water contamination, manufacturers decreased the recommended application rate of atrazine from 4.0 lbs./acre/year to a range between 1.6-2.5 lbs./acre/year depending on soil characteristics. However, this reduction in the recommended application rate had little effect on atrazine applied within the Ohio River Basin since most corn growers were already applying the herbicide at rates below the recommended value (ORSANCO, 1997).

In the early 1990's, atrazine was frequently being detected in the lower Ohio River through sampling efforts of the United States Geological Survey (USGS) and the Louisville Water Company. At this same time, over 1 million people were consuming tap water supplied by utilities that use the lower Ohio River as a raw water source. Currently, routine water treatment technologies are ineffective in removing atrazine from drinking water. Substantial herbicide removal can be achieved with carbon filtration however, the addition of this equipment to municipal water treatment facilities is expensive. Therefore, most drinking water utilities along the Ohio River do not routinely apply carbon treatment and are unaware of the times at which high levels of atrazine are present in the water. As a result, populations are exposed to some level of atrazine through their drinking water.

Using a magnetic particle, enzyme-linked immunoassay technique, atrazine can be easily analyzed for in surface water. Immunoassays are commonly used in the medical field, and test kits utilizing this technology to measure concentrations of compounds in water are available from a number of suppliers. A major advantage of the immunoassay technique is the low cost, which is at least one-tenth of the expense of having a laboratory perform the analysis. Furthermore, little training or sample preparation is required and test results are available relatively quick. However, the primary disadvantage of this technique is that results are not accurate to less than one part per billion.

This report is a portion of the Ohio River Watershed Pollutant Reduction Program (ORWPRP) being conducted by the Ohio River Valley Water Sanitation Commission (ORSANCO) with funding assistance from the U.S. Environmental Protection Agency (U.S. EPA) and support from the Commission's member states. The goal of the ORWPRP is to generate information to evaluate the need for and achieve meaningful reductions of pollutants inhibiting the beneficial uses of the Ohio River and its tributaries. The purpose of this report is to present the available information on atrazine pertaining to water pollution problems within the Ohio River Basin. Specifically, data is included on the geographic extent and severity of atrazine contamination in various aquatic media along with potential sources of such contamination.

METHODS

Information contained in this report was generated through U.S. EPA documents and articles obtained through literature searches in libraries and on the Internet. Data specific to the Ohio River Basin was obtained through personal communication and information requests with employees at federal, state, and local government agencies. Agencies supplying information included: the Ohio Environmental Protection Agency, Ohio Division of Natural Resources, Kentucky Department of Agriculture, Kentucky Division of Water, Indiana Department of Environmental Management, Purdue University Cooperative Extension Service, Illinois Department of Agriculture, Illinois Environmental Protection Agency, the Conservation Technology Information Center, West Virginia Soil Conservation Service , West Virginia Department of Environmental Protection, and ORSANCO.

PHYSICAL AND CHEMICAL PROPERTIES

Atrazine is a common name for the compound 2-chloro-4-ethylamino-6-isopropylamino-1,3,5-triazine, which belongs to the triazine family of herbicides (USEPA, 1984). Triazine herbicides are manmade compounds which are characterized as having an alternating ring of three nitrogen and three carbon atoms within its chemical structure (see Figure 1). Typically, atrazine is a white, crystalline solid but can be manufactured in liquid, granular or powder forms.

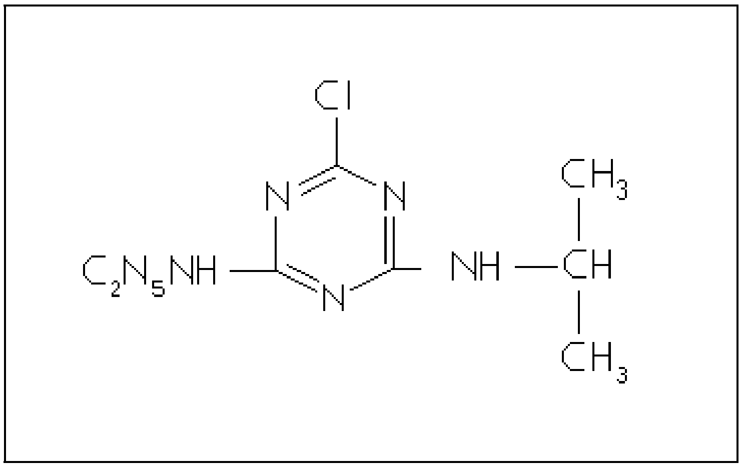


Figure 1. Chemical structure of atrazine with the empirical formula $C_8H_{14}ClN_5$ (Fetter, 1993).

General properties of atrazine include moderate water solubility, an inability to sorb strongly to soil particles, and a somewhat lengthy soil half-life (see Table 1). Under normal temperatures and pressures atrazine is stable, but it may burn if exposed to heat or flame. In addition, excessive heating of atrazine may cause the production of toxic and corrosive fumes of chlorides and toxic fumes of nitrogen.

Water is the primary means by which atrazine is transported from application areas to other parts of the environment. Once applied at the surface, atrazine can be carried with runoff to nearby streams and rivers, leach into ground water systems or volatilize into the atmosphere. In the atmosphere, atrazine can be diluted in water droplets and as a result become highly susceptible to long-range transport until it returns to the surface by wet or dry deposition. During storm events atrazine is more likely to wash off soils and runoff to nearby streams and rivers. However, the likelihood of atrazine loss in surface runoff depends on many factors including atrazine placement, time of application, soil type, soil pH, surface residues, and the amount and intensity of the first rainfall after application (Comfort and Roeth, 1996).

Property	**Value**
Molecular Weight	215.7 AMU
Melting Point	173-175 °C
Specific Gravity	1.187 g/cm^3
Water Solubility	33 mg/L (25 °C)
Vapor Pressure	3.0x10^{-7} mm Hg (20 °C)
Half-life in Soil	60 days
Soil Adsorption Coefficient (K_{oc})	100 g/mL

Table 1. Summary of physical and chemical properties of atrazine (EXTOXNET, 1993).

The fate of atrazine in the environment is controlled by numerous biological, physical and chemical reactions (USEPA, 1984). Typically, in terrestrial environments atrazine lasts about four months at the soil surface and two months in deeper areas. However, in conditions that are not conductive to chemical or biological activity, such as dry or cold climates, atrazine can persist for up to a year. Generally, atrazine is not found below the first foot of soil due to breakdown by chemical hydrolysis and microbial degradation. In hydrolysis, a water molecule reacts with a pesticide to break apart the molecule by substituting a hydroxyl (OH) group into the structure of the pesticide. The extent of breakdown in hydrolysis is pH dependent with degradation occurring more rapidly in acidic or basic environments and slower in neutral environments. In microbial degradation, bacteria and fungi already present in the soil either partially or completely metabolize a pesticide. This process takes place either in the presence or absence of oxygen and produces end products such as carbon dioxide, water, and methane.

In surface water, atrazine is relatively persistent and generally has a half-life of longer than 60 days. Once in surface water, the removal of atrazine from the environment occurs by photodegradation (photolysis) near water surfaces were light can penetrate. Photodegradation involves the breakdown of organic pesticides by direct or indirect energy from sunlight. Pesticides absorb this energy from sunlight, become unstable or reactive, and degrade.

ENVIRONMENTAL AND HUMAN HEALTH CONCERNS

In humans and other animals, atrazine is slightly to moderately toxic and can be absorbed into the bloodstream through ingestion, inhalation or dermal contact. Currently, ingestion is the most significant route of atrazine exposure to the general public since inhalation and dermal contact are associated more with occupational exposure. Typically, humans ingest atrazine through consumption of contaminated drinking water while crops have the ability to absorb and metabolize atrazine, thereby detoxifying the compound.

Most information regarding the toxic effects of atrazine in humans is based upon epidemiological studies in laboratory animals. When given large oral doses of atrazine, rats exhibited slowed breathing, incoordination, muscle spasms, convulsions, hypothermia and hyperactivity. Generally, once atrazine is absorbed into the bloodstream the herbicide appears to target major organs such as the liver, kidneys, and lungs. In addition, following a lifetime administration, atrazine has been found to cause mammary tumors in laboratory animals through interference with normal function of the endocrine system.

In humans, atrazine has been reported to be a mild skin irritant. Exposure to atrazine through dermal contact or large concentrations of airborne particles may cause rashes and moderate to severe eye irritation. Typical symptoms of atrazine poisoning include abdominal pain, diarrhea and vomiting, eye irritation and skin rashes. Based on the weight of evidence, atrazine is not believed to damage DNA material. However, some epidemiological studies suggest a possible association between atrazine exposure and the occurrence of lymphomas, leukemias, and ovarian cancer in humans. In addition, studies suggest atrazine exposure may cause cardiac, urogenital and limb reduction birth defects.

Due to contamination and human health concerns atrazine is banned in six European countries (Wiles et al., 1994). Nationally, the U.S. Environmental Protection Agency (USEPA) has designated atrazine as a possible human carcinogen based upon limited evidence of carcinogenicity in the absence of human data. With this designation, the U.S. EPA has established a lifetime Health Advisory Level (HAL) of 3 ug/L for atrazine in drinking water (see

Table 2). In addition, both the Maximum Contaminant Level (MCL) and the Maximum Contaminant Level Goal (MCLG) for atrazine in finished drinking water is 3 ug/L. An MCL is an enforceable drinking water standard established under the federal Safe Drinking Water Act. It is the maximum allowable level of a contaminant in finished drinking water based on the average of 4 annual samples. MCLs take into account both human health and the ability of removal technologies to provide effective treatment. An MCLG is a non-enforceable concentration of a drinking water contaminant that is protective of adverse human health effects allowing for an adequate margin of safety. The MCL and MCLG for atrazine are not based on the carcinogenicity of the herbicide, but rather its potential to cause other non-cancer related health problems such as birth defects. A health advisory is a non-enforceable recommended maximum concentration of a pollutant in drinking water for a lifetime of exposure. Water at or below this level is acceptable for drinking every day over the course of an average 70-year human lifespan and is not expected to cause noncarcinogenic health problems. To date, the U.S. EPA has not established any ambient water quality criteria to regulate atrazine in surface water.

Standards and Criteria	**Value**
U.S. EPA Lifetime Health Advisory	3 ug/L
U. S. EPA Drinking Water Standards	3 ug/L (MCL) 3 ug/L (MCLG)

Table 2. Summary of standards and criteria pertaining to atrazine (USGS, 1995).

FORMATION AND SOURCES

Atrazine was registered in the United States in 1958 by Ciba Corporation and since, has been sold under the trade names Alazine®, Atred®, AAtrex®, Atratol®, Atranex®, Simazat®, Giffex 4L® and Primatol® (Extoxnet, 1996). While atrazine is no longer under patent, Ciba Crop Protection is the principle manufacturer and retains over 90 percent of its market share (Wiles et al., 1994).

Studies have shown that the appearance of atrazine in many natural waters throughout the United States and Canada is a result of agricultural application followed by subsequent runoff and/or leaching. Nationally, it is estimated that 66 percent of all grown corn is treated with atrazine. However, within the lower Ohio River Basin, this value is much higher with between 80 to 90 percent of corn being treated with atrazine. To date, atrazine has been detected in ground and surface waters within 32 states across the country (Wiles et al., 1994).

In the lower Ohio River Basin, atrazine usage has remained relatively steady over the last five years, with applications ranging from about 10.7 to 11.8 million pounds per year (see Table 3). Out of this total, atrazine is used most heavily in the central portion of Indiana and southeastern sections of Illinois were applications range from about 140 to 480 lbs./mile^2/year (see Figure 2).

Year	**Pounds of Atrazine**
1990	10,798,000
1991	11,801,000
1992	11,755,705
1993	11,524,194
1994	11,618,391

Table 3. Total Atrazine usage in the Lower Ohio River Basin (ORSANCO, 1997).

PRESENCE IN THE OHIO RIVER BASIN

Data on the presence of atrazine is limited within the Ohio River Basin since it is not routinely sampled for in surface water. In 1995, ORSANCO conducted an extensive survey in order to characterize the presence of atrazine in the lower Ohio River Basin. Results from this 13-week study indicated that atrazine concentrations increased in a downstream direction on the mainstem of the Ohio River. A graph of the longitudinal distribution of atrazine in the lower Ohio River shows that concentrations in water samples fluctuated substantially from a minimum of near 0 ug/L to a maximum of almost 4 ug/L at Cairo, IL during the sampling period (see Figure 3). Overall, there was about a 1.5 ug/L increase in the average atrazine concentration towards the river mouth from approximately 1 ug/L at Cincinnati, OH to about 2.5 ug/L at Cairo,

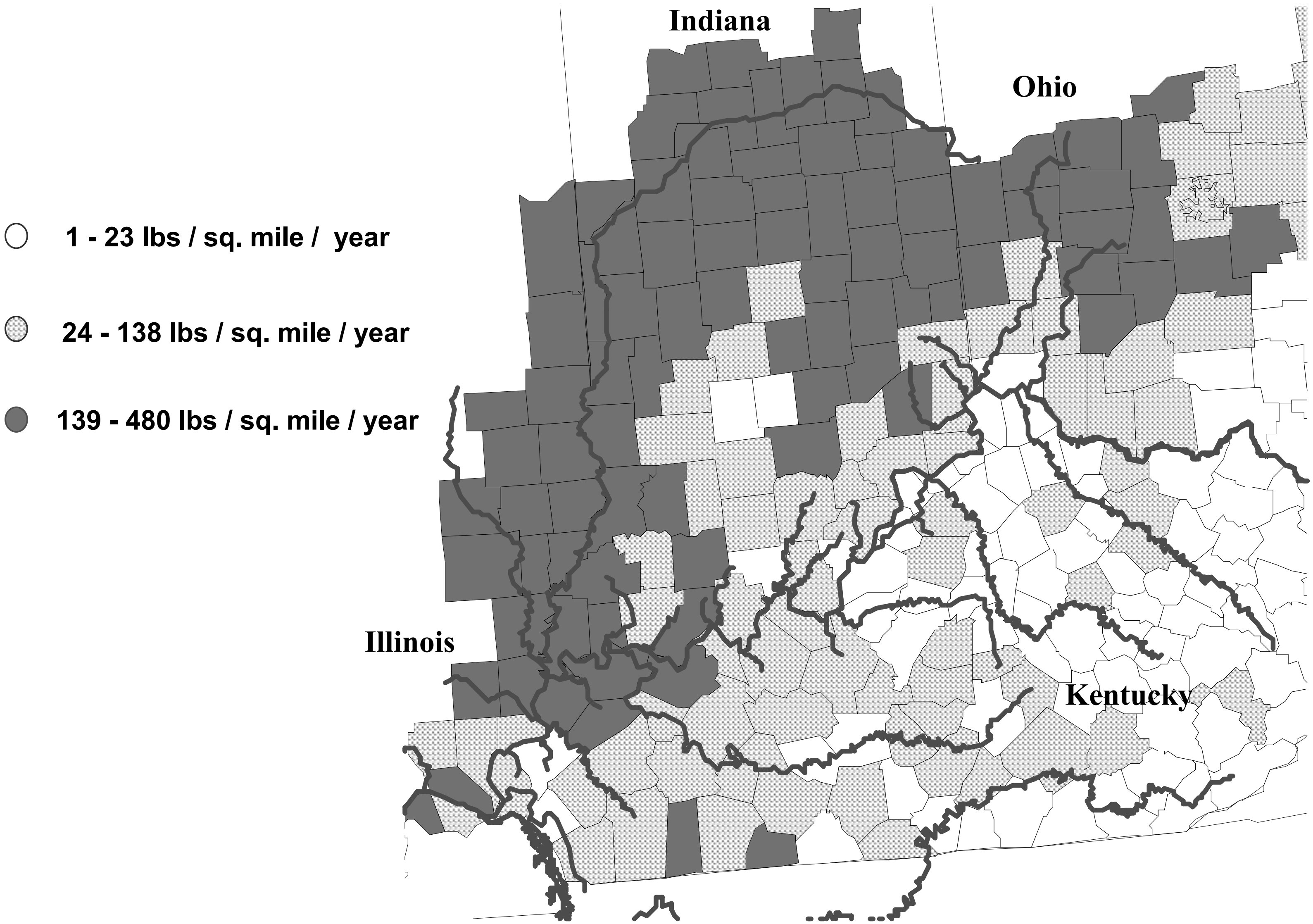


Figure 2. Atrazine usage in the Lower Ohio River Basin (ORSANCO, 1997).

IL. In addition, several water samples were found to exceed the MCL of 3 ug/L for atrazine in drinking water. However, throughout the duration of the survey average atrazine concentrations were below the MCL concentration.

Using monitoring data from long-term, fixed stations in Louisville, KY and Evansville, IL, it becomes apparent that atrazine concentrations in the Ohio River are not constant within a given year or between years (see Figures 4a and 4b). From 1994 to 1998 peak atrazine concentrations occur at different months throughout the spring and summer. However, in all four years low-level atrazine detections begin to occur in mid to late April, and tail off towards December. So, while peak concentrations tend to vary substantially, the beginning and ending points for atrazine detections in the annual cycle tend to be more consistent from year to year. In addition, peak concentrations appear to be increasing at both locations over the 4 year period. From 1994 to 1998, peak atrazine concentrations increased from 1.4 ug/L to 5 ug/L at Louisville, KY, and from about 2.7 ug/L to 4 ug/L at Evansville, IL.

Data from 28 of the largest tributaries to the lower Ohio River revealed a wide range of concentrations present in Ohio Basin surface waters (see Figure 5). More than half of the tributaries sampled had maximum atrazine concentrations below 5 ug/L however, 25 percent were found to have maximum levels above 20 ug/L. The maximum concentration measured was approximately 60 ug/L in Highland Creek in Kentucky, which is 20 times higher than the MCL of 3 ug/L for atrazine in drinking water. In general, tributaries entering the Ohio River on its north shore have noticeably higher atrazine concentrations than those entering from the south.

When tributaries were evaluated in terms of mass loading (i.e., lbs. per day) it was evident that major atrazine sources to the Ohio River included the Great Miami River, Green River, Wabash River and the Little Wabash River (see Figure 6). Mass loading (or mass flux) is important because it considers both concentration and stream flow to determine the amount of atrazine influx per unit of time to the Ohio River from tributaries. The stacked bars in the graph represent the cumulative mass input from tributaries to the Ohio River and the line represents the flowing atrazine load in the Ohio River. The clear portion of the stacked bar represents the cumulative load to the Ohio from all upstream tributaries sampled, while the dark portion bar represents the atrazine mass influx from that tributary, such that the entire bar represents the total loading at that point.

Figure 3: Atrazine Concentrations in the Lower Ohio River (April- July, 1995).
(Sampling locations are referenced by number in Appendix A)

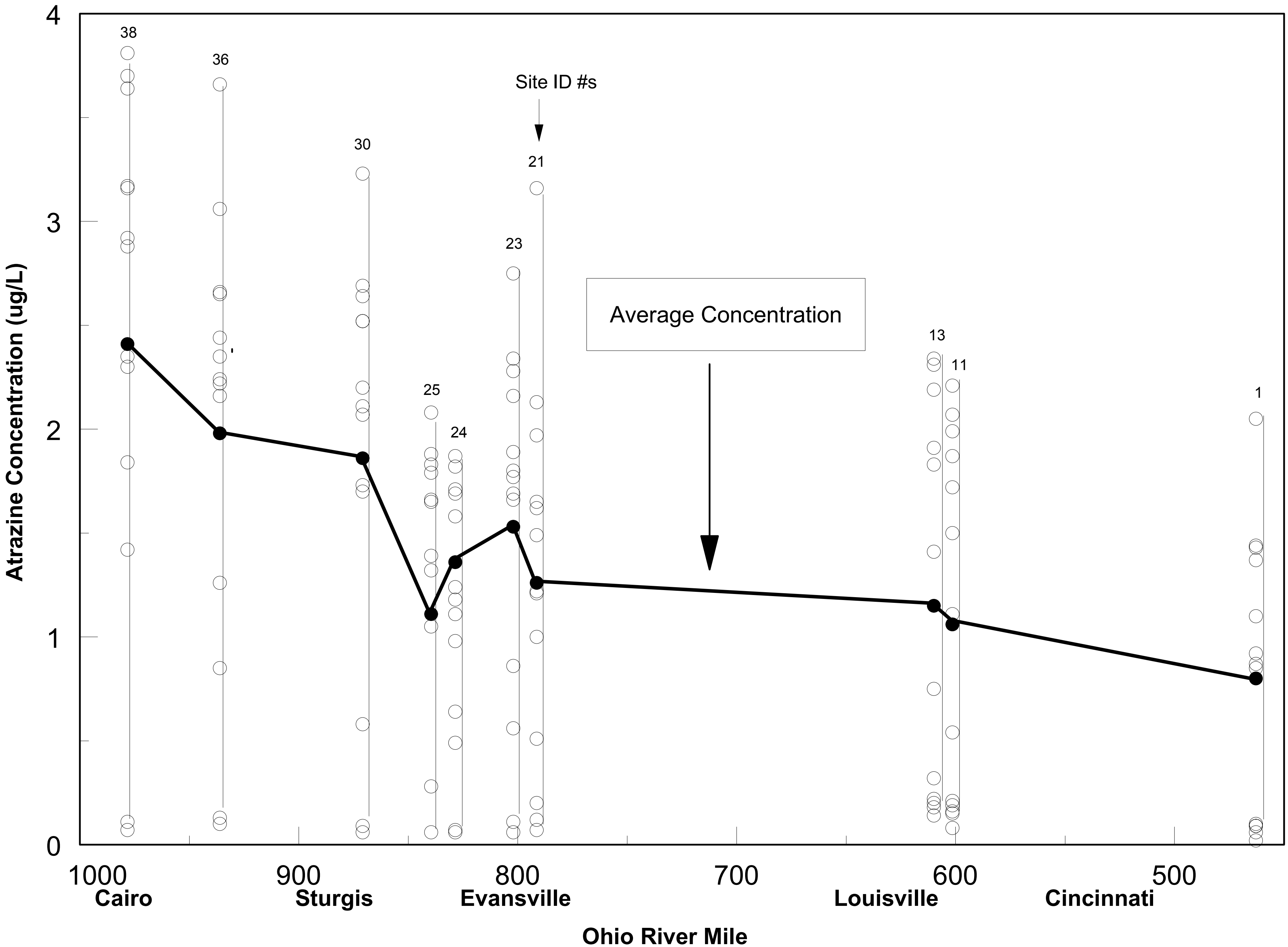


Figure 4a.--Temporal changes in Ohio River Atrazine concentrations at Louisville, 1994 to 1998

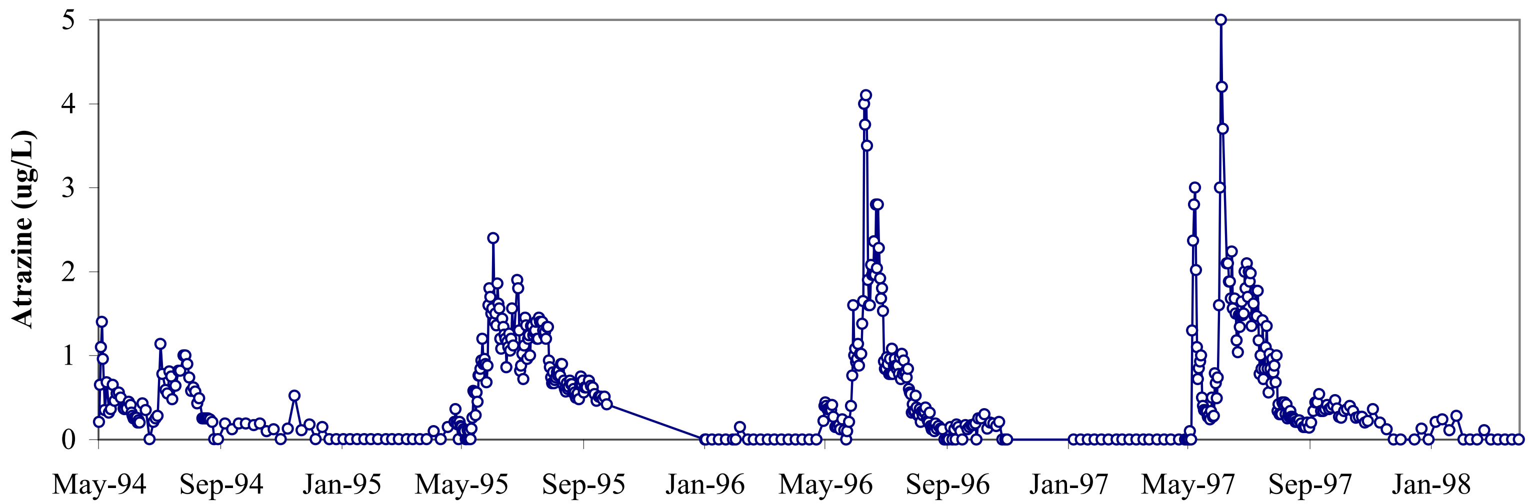
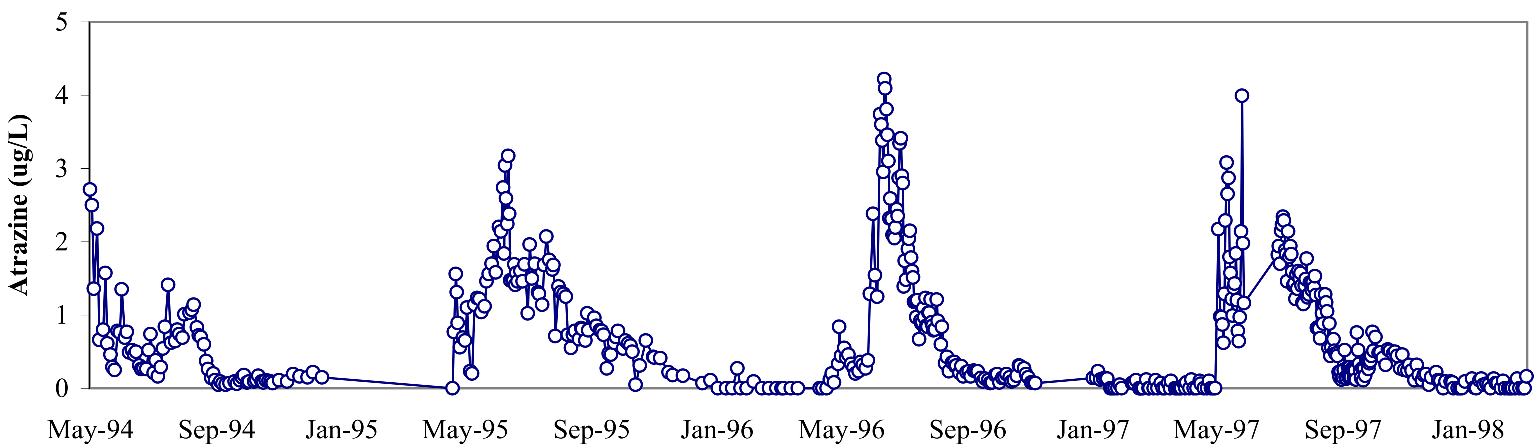


Figure 4b.--Temporal changes in Ohio River Atrazine concentrations at Evansville, 1994 to 1998



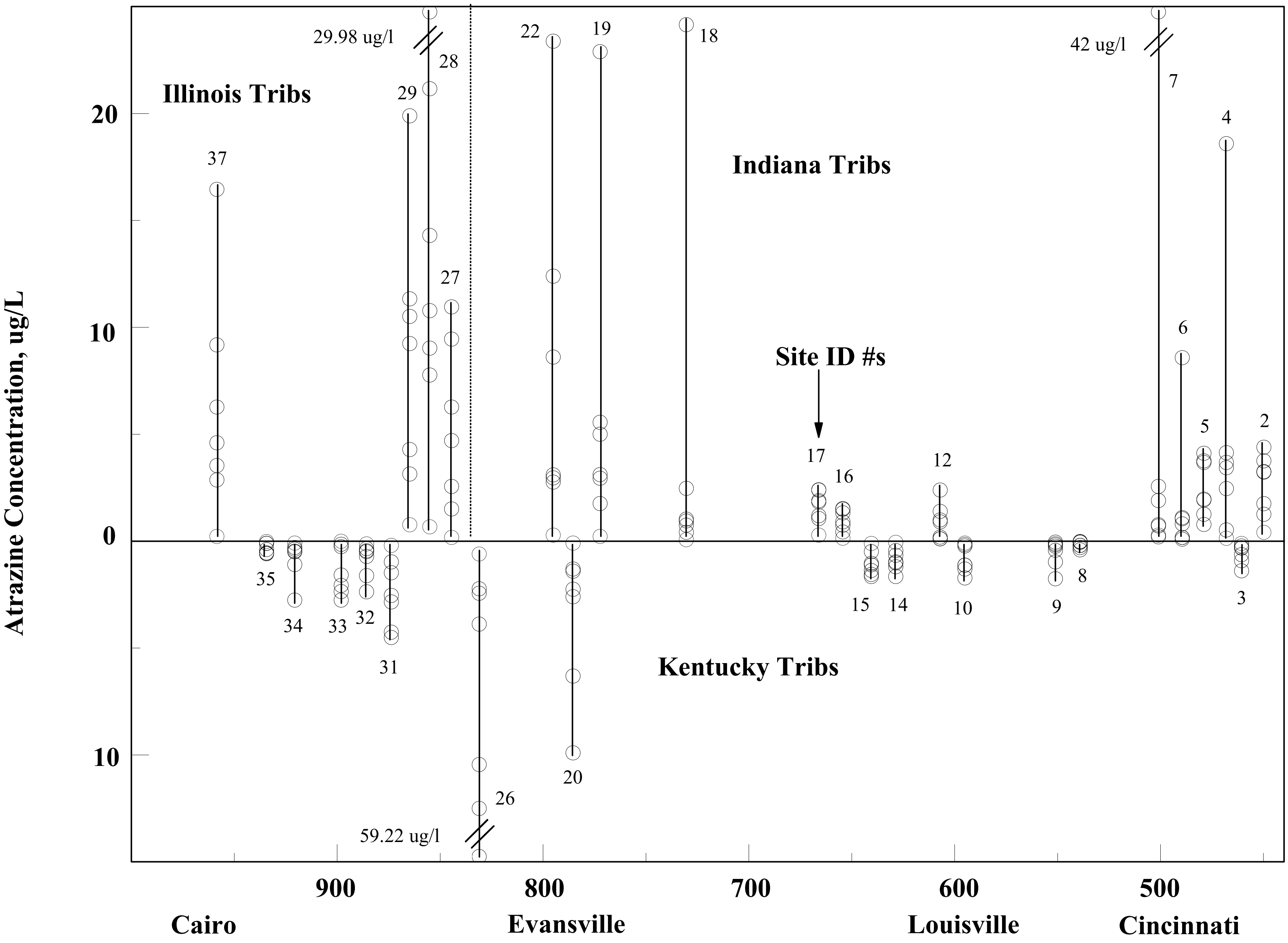


Figure 5: Atrazine Concentrations of Major Ohio River Tributaries (April - July, 1995).
(Sampling locations are referenced by number in Appendix A)

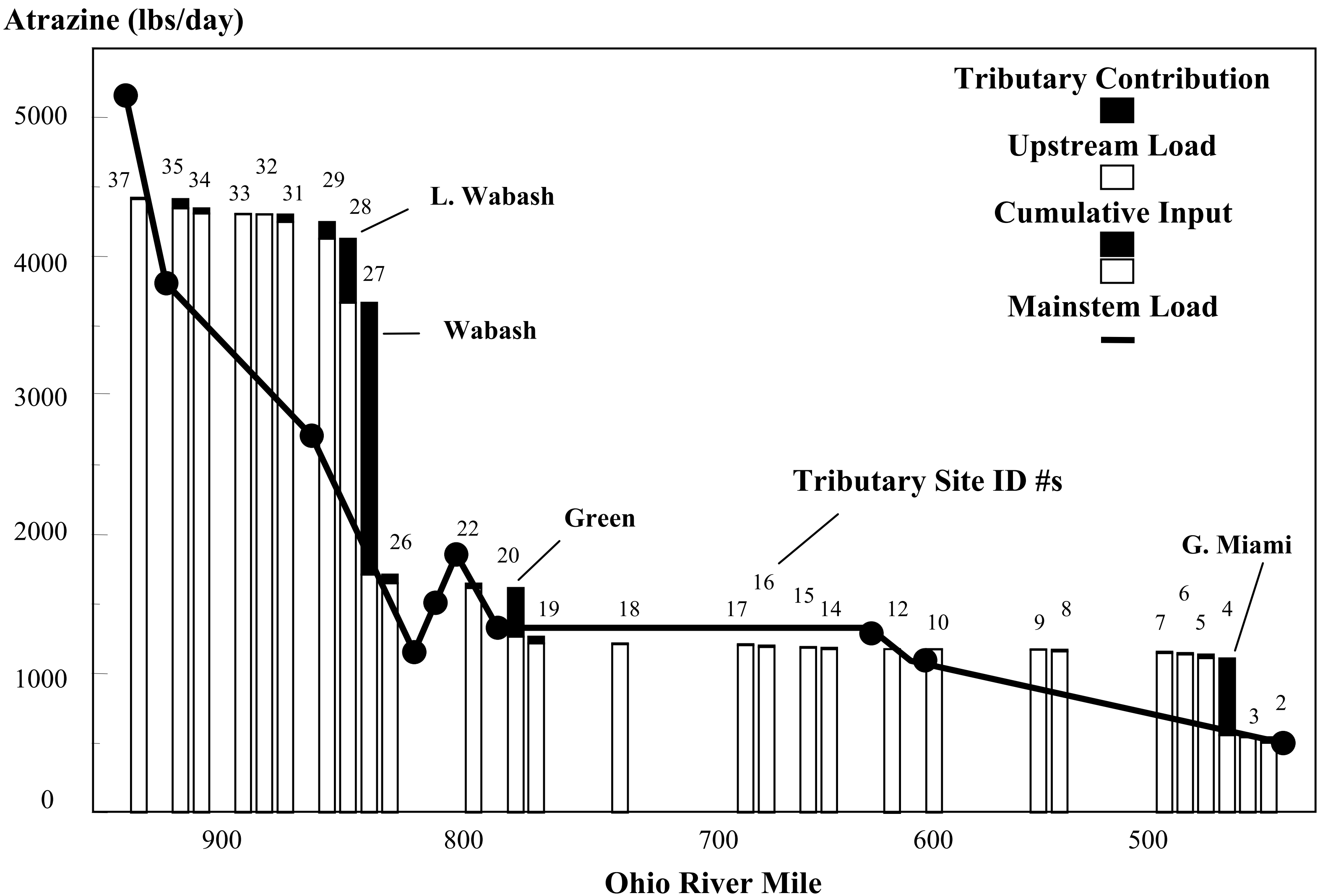


Figure 6. Average cumulative atrazine loadings to the Ohio River, April - July 1995 (Site ID #s are referenced in Appendix A).

Furthermore, the relative contribution of atrazine by major tributary sources was estimated by comparing the average ratio of tributary atrazine loading to Ohio River loading at Cairo, IL (see Figure 7). Eight tributaries were found to contribute one percent or more of the total Ohio River atrazine loading. The Wabash River, being by far the largest single tributary source, contributed approximately 38 percent of atrazine loading with the Great Miami River, Little Wabash River, Green River, Saline River, Tennessee River, Tradewater River, and Highland Creek collectively representing about 32 percent of Ohio River atrazine loading. In addition, the average mass of atrazine not accounted for as tributary inputs was 14 percent and the average contribution from all sources above Cincinnati, the upstream boundary of the study area, accounted for about 10 percent.

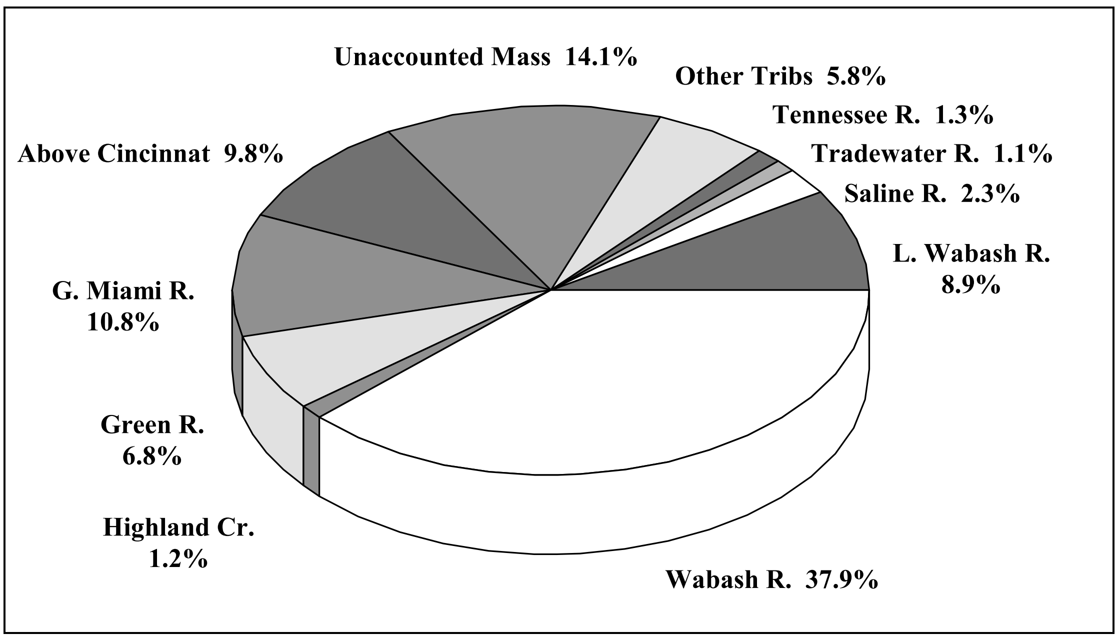


Figure 7. Average tributary contribution of atrazine to the Ohio River (April - July, 1995).

CONTROL PROGRAMS

The U.S. EPA has classified atrazine as a Restricted Use Pesticide (RUP) due to its potential for ground and surface water contamination. With the RUP classification, products containing atrazine must bear the signal word "Caution" on the label, and may only be purchased and used by certified or licensed applicators. In order to become certified, private or commercial applicators elect either to receive training from their local Cooperative Extension Service, or to study on their own for a state pesticide applicator certification exam. In both instances, the written exams and educational programs cover topics such as pesticide laws and regulations, human and environmental safety, label comprehension and safe handling procedures. In addition, the certification process legally requires retail dealers who sell restricted-use pesticides to keep records that document the purchaser's name, applicator license number, and amount of the product sold in order for regulatory agencies to monitor the sale and use of these pesticides.

In 1993, Ciba-Geigy voluntarily revised new label restrictions for atrazine, and products containing atrazine, in order to reduce the overall amount of atrazine used and to protect surface water. Two major provisions of this revision included a reduction in atrazine application rates and identification of setback buffer zones next to water. Under the new restrictions atrazine may not be mixed, loaded, or used within 50 feet of all wells, intermittent streams, rivers, and natural or impounded lakes and reservoirs (Roeth, 1997). Application rates were also decreased to 1.6-2.0 lbs/acre depending on soil characteristics.

Currently, in the Ohio River Basin there are 17 nonpoint source control programs being implemented to reduce atrazine, or pesticides, in surface water (see Appendix B). The majority of these nonpoint source programs are funded through grants issued under Section 319 of the Clean Water Act and are conducted through partnerships among state and local governments, environmental groups, and communities. Generally, these programs are implemented on a small watershed basis and demonstrate cost-effective solutions to nonpoint source problems by promoting the public's knowledge and awareness of nonpoint source pollution. Out of the 17 control programs being implemented, none are focused in sub-basins that are considered the largest loading sources of atrazine to the Ohio River. For specific information on each program and common Best Management Practices (BMPs) see Appendix B.

Furthermore, a long-term monitoring station for atrazine was installed at Cairo, IL, based upon data generated from ORSANCO's 1995 Ohio River Basin herbicide study. Begun in January 1997, weekly water samples are taken from the mouth of the Ohio River to monitor changes in atrazine concentrations. In addition, ORSANCO provides notification to water utilities when levels of atrazine in the Ohio River exceed half the MCL (1.5 ug/L) based upon monitoring from Louisville, Evansville, and Cairo water utilities.

CONCLUSIONS

- Atrazine contamination is predominant in the lower half of the Ohio River with concentrations increasing in a downstream direction from Cincinnati, Ohio to Cairo, Illinois.
- Atrazine is persistent in water and does not degrade quickly.
- Concentrations of atrazine in the Ohio River on occasion exceed the MCL (for protection of humans in drinking water).
- Humans can be exposed to unsafe levels of atrazine where carbon treatment is not used. Water utilities however, routinely meet Federal Safe Drinking Water Act requirements pertaining to atrazine.
- A water quality standard does not exist for atrazine in surface water.
- Major tributary sources of atrazine to the Ohio River include the Wabash River, Great Miami River, Little Wabash River, and the Green River.
- Water utilities do not routinely monitor source water to facilitate optimum treatment for atrazine.
- Control programs are not targeting water quality problems in sub-watersheds.

RECOMMENDATIONS

1) Establish Ambient Water Quality Criteria for Atrazine

Currently, the U.S. EPA has not established any water quality criteria to regulate atrazine concentrations in surface water. Unsafe atrazine levels are based solely upon the MCL created under the Safe Drinking Water Act and do not take into account stream conditions.

2) Further Define Sources of Atrazine

Develop a monitoring program for atrazine on the Wabash River in order to more narrowly define sources on the tributary.

3) Establish Base-line Conditions of Atrazine on the Ohio River

Conduct long-term sampling on the Ohio River in order to define baseline conditions of atrazine and to evaluate human health threats from Ohio River source water.

4) Focus Control Programs in the Sub-Basins Contributing the Highest Loadings

Control programs first need to focus on major Ohio River Sub-basins that are contributing the highest atrazine loading. Currently, programs have not been identified to control pesticides at these locations.

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Appendix A
(ORSANCO Monitoring Locations)

Site ID	Sampling Location	Ohio River Mile (Confluence if tributary)	State	Station Type	Sampling Frequency
1	Cincinnati WTP	462.8	OH	Ohio River	Weekly
2	Little Miami River	463.5	OH	Tributary	Biweekly
3	Licking River	470.3	KY	Tributary	Biweekly
4	Great Miami River	491.0	OH	Tributary	Biweekly
5	Whitewater River	491.0	IN	Tributary	Biweekly
6	Tanners Creek	494.8	IN	Tributary	Biweekly
7	Laughery Creek	498.7	IN	Tributary	Biweekly
8	Kentucky River	545.8	KY	Tributary	Biweekly
9	Little Kentucky River	546.6	KY	Tributary	Biweekly
10	Harrods Creek	595.9	KY	Tributary	Biweekly
11	Louisville CH WTP	600.6	KY	Ohio River	Weekly
12	Silver Creek	606.5	IN	Tributary	Biweekly
13	New Albany WTP	609.0	IN	Ohio River	Weekly
14	Salt River	629.9	KY	Tributary	Biweekly
15	Otter Creek	636.5	KY	Tributary	Biweekly
16	Indian Creek	657.0	IN	Tributary	Biweekly
17	Blue River	663.0	IN	Tributary	Biweekly
18	Anderson River	731.4	IN	Tributary	Biweekly
19	Little Pigeon Creek	772.9	IN	Tributary	Biweekly
20	Green River	784.2	KY	Tributary	Biweekly
21	Evansville WTP	791.7	IN	Ohio River	Weekly
22	Pigeon Creek	792.9	IN	Tributary	Biweekly
23	Henderson WTP	803.2	KY	Ohio River	Weekly
24	Mt. Vernon WTP	829.2	IN	Ohio River	Weekly
25	Morganfield WTP	839.9	KY	Ohio River	Weekly
26	Highland Creek	841.8	KY	Tributary	Biweekly
27	Wabash River	848.0	IL/IN	Tributary	Biweekly
28	Little Wabash River	848.0	IL	Tributary	Biweekly
29	Saline River	867.4	IL	Tributary	Biweekly
30	Sturgis WTP	871.3	KY	Ohio River	Weekly
31	Tradewater River	873.4	KY	Tributary	Biweekly
32	Crooked Creek	877.7	KY	Tributary	Biweekly
33	Deer Creek	893.0	KY	Tributary	Biweekly
34	Cumberland River	920.4	KY	Tributary	Biweekly
35	Tennessee River	934.5	KY	Tributary	Biweekly
36	Paducah WTP	935.5	KY	Ohio River	Weekly
37	Post Creek Cutoff	957.7	IL	Tributary	Biweekly
38	Cairo WTP	977.8	IL	Ohio River	Weekly

ORSANCO Sampling Sites on the Ohio River and Major Tributaries for April-July, 1995.

Appendix B
(Best Management Practices and Programs)

Common Best Management Practices (BMPs) for Reduction of Pesticides (USDA, 1993)

Filter strip - A strip of grass, trees, or shrubs placed along streams to filter runoff and remove contaminants before they reach water bodies.

Critical Area Planting – Planting grass or other vegetation to protect a badly eroding area from soil erosion.

Diversion – A earthen embankment that directs runoff water from a specific area.

Grassed Waterway – Shaping and establishing grass in a natural drainage way to prevent gullies from forming.

Well Protection – Changing farming practices which occur on or near wells in order to reduce the risk of contamination of water resources.

Stream Protection – Protecting a stream by excluding livestock and by establishing buffer zones of vegetation to filter runoff.

Crop Residue Management – Leaving last year's crop residue on the soil surface by limiting tillage to provide cover for the soil at a critical time of the year.

Pest Management – Evaluating and using a tailored pest management system to reduce crop and environmental damages.

Contour Farming – Planting rows of crops around a hill rather than up and down the hill to slow water runoff.

Cover Crop – Crops such as ryegrass or wheat are planted after harvest to provide protection of the soil from wind and rain.

State	County	Program	Waterbody
OH	Champaign	Pollution Prevention and Riparian Restoration	Mad River
OH	Richland, Ashland	Watershed Project	Black Fork River
KY	All	Draft State Management Plan for Atrazine	All
KY	Jefferson	Joint Partnership	Beargrass Creek
KY	Fleming	Joint Partnership	Fleming Creek
KY	42 Counties	Joint Partnership	Kentucky River
KY	Daviess, Hancock, Ohio	Joint Partnership	North Fork of Panther Creek
KY	Bourbon, Clark	Joint Partnership	Strodes Creek
KY	Henry, Oldham, Jefferson	Community Education Project	Harrods Creek
KY	Anderson, Boyle, Mercer, Nelson, Shelby, Spencer	Demonstration Chemical Mixing Center	Upper Salt River/ Taylorsville Lake
WV	Preston	Nutrient and Pesticide Erosion Control and Abatement Assistance	Big Sandy Creek
WV	Mason	Nutrient and Pesticide Demonstration Project	Kanawha River
WV	Marshall, Hancock, Ohio	Watershed Demonstration Project	Wheeling Creek and Tomlinson Run
IN	All	Pesticide/Fertilizer Storage Program	All Surface Water
IN	Madison, Henry	Fall Creek Watershed Project	Fall Creek

State	County	Program	Waterbody
IN	All	Yard Maintenance Practices Impact on Water Quality	All Surface Water
IN	Tippecanoe	Joint Partnership	Indiana Pine Watersheds

WEST VIRGINIA

- *Big Sandy Creek* — Big Sandy Creek originates in Pennsylvania and flows southwest into West Virginia before joining the Cheat River. A group was established in 1991 in an effort to reduce nutrients, pesticides and sediments in Big Sandy Creek primarily through public awareness and education and the adoption of best management practices. Annual reports are available. (Contact: Teresa Byler, West Virginia Soil Conservation Service, phone: 304-558-2204)

- *Wheeling Creek and Tomlinson Run* — The headwaters of the Wheeling Creek watershed are located in southwestern Pennsylvania. The creek itself begins just across the border in the West Virginia panhandle and flows northwest through the City of Wheeling before emptying into the Ohio River. A demonstration project is currently being funded to reduce instream concentrations of nutrients, pesticides and sediment through public education and the adoption of best management practices. (Contact: Teresa Byler, West Virginia Soil Conservation Service, phone: 304-558-2204)

- *Kanawha River Basin and Oldtown Creek* — The goal of this demonstration project is to reduce the amounts of nutrients, pesticides and sediment that flow into the Kanawha River through public education and the implementation of best management practices. (Contact: Teresa Byler, West Virginia Soil Conservation Service, phone: 304-558-2204)

OHIO

- *Black Fork River* — The Black Fork River, a tributary of the Mohican River, flows in a southerly direction, primarily through Ashland County in north-central Ohio. The Mohican River is located within the larger Muskingum River watershed. In 1994, a project was funded to improve the water quality of the Black Fork River through improved management of crop residue, wetlands, riparian buffers and filter strips, livestock waste, and septic systems. Specific pollutants targeted for reduction in the river include nutrients, pesticides, and sediments. (Contact: Richard Forbes, Richland County SWCD, phone: 419-589-2712).

- *Upper Wolf Creek* — Wolf Creek flows along the south side of the Muskingum River, before joining the river in Washington County. This project is designed to address the water quality impacts of sediment and nutrients that result from agricultural activities in the Upper Wolf Creek Watershed. Specifically, the project will implement best management practices, such as animal waste storage and utilization systems and livestock exclusion fences along riparian areas, and an educational program will be offered to landowners in the watershed. (Contact: Doris Taylor, Soil and Water Conservation District - Morgan County, phone: 614-962-4234)

- *Mad River Watershed* — The Mad River originates in eastern Ohio and flows south past Springfield and through the City of Dayton before emptying into the Great Miami River, just downstream of the confluence with the Stillwater River. A project was initiated in 1993 to protect the coldwater habitat aquatic life use designation of the Mad River by implementing an Integrated Crop Management (ICM) program on 10 farms, establishing wooded buffer strips and grass filter strips, stabilizing sections of eroded streambank, and implementing an information and education program for watershed residents. Information from a second 1993 Section 319 grant will be used to identify critical areas for BMP implementation. Specific pollutants that this project will address include pesticides, nutrients, and sediment. (Contact: Barbara Moore, Champaign County SWCD, phone: 513-653-3318)

- *Upper Four Mile Creek* — Four Mile Creek is located in the Southwest portion of the state and is part of the larger Great Miami River Basin. The watershed extends into eastern Indiana. A watershed management plan to reduce the amount of nutrients and sediment entering Acton Lake, a reservoir on Four Mile Creek, was developed in a cooperative effort between Ohio and Indiana. Goals of the management plan include reducing soil erosion by 17 percent, and improving nutrient management through the implementation of best management practices.

KENTUCKY

- *Fleming Creek — Fleming Creek, a tributary of the Licking River, is contained almost entirely in Fleming County in northeastern Kentucky. Animal waste from feedlot operations* *is the primary concern in the watershed. In 1992, a best management practice (BMP) cost-share project was funded. The implementation of best management practices is being carried out by USDA, while Kentucky Division of Water has the responsibility of monitoring the effectiveness of the controls. Pre-BMP monitoring indicate elevated levels of bacteria, phosphorus and nitrogen. Based upon algal data, eutrophic to hyper-eutrophic conditions occur at certain locations within the watershed. Five long-term monitoring stations have been selected to track the effectiveness of the controls. It is also anticipated that a second bacteria and nitrogen survey will be conducted following BMP implementation. (Contact: Carolyn Ritchie, U.S. Dept. of Agriculture, phone: 606-845-4841)*

- *Harrods Creek* — Harrods Creek is a 31 mile tributary of the Ohio River, with a confluence just upstream of the City of Louisville. An educational program has been designed to increase community awareness in Harrods Creek and its watershed in order to maintain water quality during residential and commercial urbanization. Specific pollutants of concern include herbicides, pesticides, fertilizers, and sediment. The project seeks to develop and make available materials which will enable watershed stakeholders to become more environmentally literate in regard to their role of watershed management. Guidance and informational brochures are being developed, artificial wetlands have been developed at two school sites, and a watershed management field day was held where various best management practices were demonstrated. (Contact: Kurt Mason, Jefferson County Conservation District, phone: 502-499-1900)

- *Beargrass Creek* — Beargrass Creek is a small tributary of the Ohio River which drains much of the City of Louisville. A task force has been established to preserve, protect and enhance the Beargrass Creek Watershed through the reduction of sediment, pesticides, nutrients, and heavy metals. Task force members include the City of Louisville, Louisville and Jefferson County Metropolitan Sewer District, Jefferson County Conservation District, University of Louisville, U.S. Geological Survey, U.S. Department of Agriculture and others. To date, no federal or state funding has been received. Specific projects include restoration of the stream corridor, water quality monitoring and assessment, and development of a public education program. (Contact: Kurt Mason, Task Force Chair, phone: 502-499-1900)

- *North Fork of Panther Creek* — Panther Creek is a direct tributary of the Ohio River, entering the main stem near the west end of the City of Owensboro. A partnership made up of several federal and state agencies, has been developed to address water quality concerns in the North Fork watershed. Land use in this watershed is primarily agricultural, and pollutants of concern include nutrients, pesticides, sediment and bacteria. The group seeks to improve water quality through implementation of best management practices and educational programs. Water quality monitoring is also conducted. Section 319 funding has been approved to study the impacts of best management practices (installation of filter strips and riparian areas) on triazine concentrations and turbidity in the creek. As of August 1996, contracts to conduct the study were still being completed (Contact: Billy Stratton, USDA Natural Resources Conservation Service, phone: 502-685-1707)

- *Upper Salt River/Taylorsville Lake* — A demonstration project has been designed to provide farmers with an awareness of alternative systems for mixing agricultural chemicals and fertilizers within a controlled area to contain spillage without runoff contamination. Specifically, a Chemical Mixing Facility will be constructed within the Upper Salt River watershed and demonstrations will focus on the use of the facility as well as pesticide handling without a facility, field application and pesticide safety. Additionally, more than $1 million has already been spent to treat wastewater from dairy farms with concentrated animal management areas. The Corps of Engineers is currently modeling the response of Taylorsville Lake to various control alternatives. The results of the model will be used to select the appropriate BMPs. Post-BMP monitoring will be conducted to determine the effectiveness of the implemented controls. (Contact: John Overing, USDA Natural Resources Conservation Service, phone: 606-734-6889 or Corrine Wells, KY Division of Water, 502-564-3410)

INDIANA

- *Laughery Creek* — Laughery Creek is a 39 mile long stream which flows through southeastern Ohio and joins the Ohio River at mile point 498.7. Pollutants of concern in the watershed include sediment, bacteria and phosphorus. A watershed group dedicated to improving the water quality in Versailles Lake and throughout the watershed was established in 1993. Since this time, 107 erosion control structures have been built, a storm drain stenciling project has been started, and workshops have been held for local farmers. (Contact: Debbie Mack, Project CLEAR, phone: 812-689-6456)

- *Fall Creek* — The headwaters of Fall Creek are located in Henry County. From here, the creek flows southwest to the Geist Reservoir and then through the City of Indianapolis, where it joins the White River. The Soil and Water Conservation Districts in Madison and Henry counties began working together in 1993 to reduce sediment, nutrient and pesticide inputs into Fall Creek by implementing best management practices in critical areas of the watershed. (Contact: Dean Forney, Madison County SWCD, phone: 317-644-8530)

Appendix C
(Atrazine Monitoring Data)

ORSANCO Monitoring Data		
	Ohio	**Concentration**
Date	**River Mile**	**(ug/L)**
4/10/1995	978.2	0.07
4/17/1995	978.2	0.11
4/24/1995	978.2	3.81
5/1/1995	978.2	1.84
5/8/1995	978.2	1.42
5/17/1995	978.2	2.3
5/22/1995	978.2	3.7
5/30/1995	978.2	3.17
6/5/1995	978.2	3.16
6/12/1995	978.2	3.64
6/19/1995	978.2	2.92
6/26/1995	978.2	2.35
7/5/1995	978.2	2.88
4/10/1995	936	0.1
4/17/1995	936	0.13
4/24/1995	936	3.06
5/1/1995	936	2.65
5/8/1995	936	0.85
5/17/1995	936	2.16
5/22/1995	936	2.44
5/30/1995	936	2.35
6/5/1995	936	2.66
6/12/1995	936	3.66
6/19/1995	936	2.22
6/26/1995	936	1.26
7/5/1995	936	2.24
4/10/1995	870.8	0.06
4/17/1995	870.8	0.09
4/24/1995	870.8	2.69
5/1/1995	870.8	2.52
5/8/1995	870.8	0.58
5/17/1995	870.8	3.23
5/22/1995	870.8	2.11
5/30/1995	870.8	2.07
6/5/1995	870.8	2.2
6/12/1995	870.8	2.64
6/19/1995	870.8	1.7
6/26/1995	870.8	1.73
7/5/1995	870.8	2.52
4/10/1995	828.5	0.06
4/17/1995	828.5	0.07
4/24/1995	828.5	0.49
5/1/1995	828.5	0.64
5/8/1995	828.5	1.11
5/17/1995	828.5	1.18
5/22/1995	828.5	0.98
5/30/1995	828.5	1.24

ORSANCO Monitoring Data		
	Ohio	**Concentration**
Date	**River Mile**	**(ug/L)**
6/5/1995	828.5	1.69
6/12/1995	828.5	1.87
6/19/1995	828.5	1.82
6/26/1995	828.5	1.71
7/5/1995	828.5	1.58
4/10/1995	839.5	0.06
4/17/1995	839.5	
4/24/1995	839.5	1.88
5/1/1995	839.5	1.05
5/8/1995	839.5	0.28
5/17/1995	839.5	1.32
5/22/1995	839.5	1.39
5/30/1995	839.5	1.79
6/5/1995	839.5	2.08
6/12/1995	839.5	1.65
6/19/1995	839.5	1.83
6/26/1995	839.5	
7/5/1995	839.5	1.66
4/10/1995	802	0.11
4/17/1995	802	0.06
4/24/1995	802	2.28
5/1/1995	802	0.86
5/8/1995	802	0.56
5/17/1995	802	2.16
5/22/1995	802	1.8
5/30/1995	802	1.89
6/5/1995	802	2.34
6/12/1995	802	2.75
6/19/1995	802	1.69
6/26/1995	802	1.77
7/5/1995	802	1.66
4/10/1995	791.3	0.07
4/17/1995	791.3	0.12
4/24/1995	791.3	1
5/1/1995	791.3	0.51
5/8/1995	791.3	0.2
5/17/1995	791.3	1.21
5/22/1995	791.3	1.22
5/30/1995	791.3	1.65
6/5/1995	791.3	2.13
6/12/1995	791.3	3.16
6/19/1995	791.3	1.62
6/26/1995	791.3	1.49
7/5/1995	791.3	1.97
4/10/1995	609.9	0.14
4/17/1995	609.9	0.18
4/24/1995	609.9	0.22
5/1/1995	609.9	0.32

ORSANCO Monitoring Data		
	Ohio	**Concentration**
Date	**River Mile**	**(ug/L)**
5/8/1995	609.9	0.2
5/17/1995	609.9	0.75
5/22/1995	609.9	1.91
5/30/1995	609.9	2.34
6/5/1995	609.9	2.31
6/12/1995	609.9	
6/19/1995	609.9	1.83
6/26/1995	609.9	1.41
7/5/1995	609.9	2.19
4/10/1995	601.4	0.08
4/17/1995	601.4	0.16
4/24/1995	601.4	0.15
5/1/1995	601.4	0.21
5/8/1995	601.4	0.19
5/17/1995	601.4	0.54
5/22/1995	601.4	1.5
5/30/1995	601.4	2.21
6/5/1995	601.4	1.87
6/12/1995	601.4	1.99
6/19/1995	601.4	1.72
6/26/1995	601.4	1.11
7/5/1995	601.4	2.07
4/10/1995	462.8	0.09
4/17/1995	462.8	0.09
4/24/1995	462.8	0.02
5/1/1995	462.8	0.06
5/8/1995	462.8	0.1
5/17/1995	462.8	0.85
5/22/1995	462.8	0.92
5/30/1995	462.8	2.05
6/5/1995	462.8	1.43
6/12/1995	462.8	1.44
6/19/1995	462.8	1.1
6/26/1995	462.8	0.87
7/5/1995	462.8	1.37

Fixed-Station Monitoring Data			Fixed-Station Monitoring Data		
	Concentration			Concentration	
Date	(ug/L)	Location	Date	(ug/L)	Location
5/21/1993	1.9	Louisville	5/2/1994	2.71	Evansville
5/23/1993	0.88	Louisville	5/4/1994	2.5	Evansville
5/24/1993	2.41	Louisville	5/6/1994	1.36	Evansville
5/25/1993	0.97	Louisville	5/9/1994	2.18	Evansville
5/26/1993	0.68	Louisville	5/11/1994	0.66	Evansville
5/27/1993	0.72	Louisville	5/15/1994	0.8	Evansville
5/28/1993	0.9	Louisville	5/17/1994	1.57	Evansville
5/29/1993	0.39	Louisville	5/19/1994	0.61	Evansville
5/30/1993	0.92	Louisville	5/22/1994	0.46	Evansville
5/31/1993	1.6	Louisville	5/24/1994	0.29	Evansville
6/1/1993	1	Louisville	5/26/1994	0.25	Evansville
6/2/1993	0.6	Louisville	5/29/1994	0.78	Evansville
6/3/1993	0.6	Louisville	5/31/1994	0.76	Evansville
6/4/1993	0.5	Louisville	6/2/1994	1.35	Evansville
6/5/1993	0.4	Louisville	6/5/1994	0.69	Evansville
6/6/1993	0.65	Louisville	6/7/1994	0.77	Evansville
6/7/1993	0.16	Louisville	6/9/1994	0.49	Evansville
6/8/1993	0.44	Louisville	6/12/1994	0.52	Evansville
6/9/1993	0.6	Louisville	6/14/1994	0.46	Evansville
6/10/1993	1.8	Louisville	6/16/1994	0.5	Evansville
6/11/1993	0.75	Louisville	6/19/1994	0.31	Evansville
6/12/1993	1.5	Louisville	6/21/1994	0.26	Evansville
6/13/1993	1	Louisville	6/23/1994	0.27	Evansville
6/14/1993	1.28	Louisville	6/26/1994	0.26	Evansville
6/15/1993	0.65	Louisville	6/28/1994	0.52	Evansville
6/16/1993	0.5	Louisville	6/30/1994	0.74	Evansville
6/17/1993	1.45	Louisville	7/3/1994	0.21	Evansville
6/18/1993	0.32	Louisville	7/5/1994	0.38	Evansville
6/19/1993	0.69	Louisville	7/7/1994	0.16	Evansville
6/20/1993	0.67	Louisville	7/10/1994	0.29	Evansville
6/21/1993	2	Louisville	7/12/1994	0.54	Evansville
6/22/1993	2.58	Louisville	7/14/1994	0.84	Evansville
6/23/1993	2.33	Louisville	7/17/1994	1.41	Evansville
6/24/1993	2	Louisville	7/20/1994	0.62	Evansville
6/25/1993	1.58	Louisville	7/24/1994	0.64	Evansville
6/26/1993	1.12	Louisville	7/26/1994	0.8	Evansville
6/27/1993	1.2	Louisville	7/28/1994	0.74	Evansville
6/28/1993	1.44	Louisville	7/31/1994	0.69	Evansville
6/29/1993	1	Louisville	8/2/1994	1.01	Evansville
6/30/1993	1.4	Louisville	8/7/1994	1.03	Evansville
7/1/1993	1.2	Louisville	8/9/1994	1.07	Evansville
7/2/1993	0.96	Louisville	8/11/1994	1.14	Evansville
7/3/1993	1	Louisville	8/14/1994	0.83	Evansville
7/4/1993	0.85	Louisville	8/16/1994	0.72	Evansville
7/5/1993	1.35	Louisville	8/18/1994	0.7	Evansville
7/6/1993	0.75	Louisville	8/21/1994	0.6	Evansville
7/7/1993	0.88	Louisville	8/23/1994	0.37	Evansville

Fixed-Station Monitoring Data			Fixed-Station Monitoring Data		
	Concentration			Concentration	
Date	(ug/L)	Location	Date	(ug/L)	Location
7/8/1993	0.93	Louisville	8/25/1994	0.26	Evansville
7/9/1993	1.75	Louisville	8/28/1994	0.14	Evansville
7/10/1993	1.88	Louisville	8/30/1994	0.2	Evansville
7/11/1993	1.36	Louisville	9/1/1994	0.11	Evansville
7/12/1993	1.8	Louisville	9/4/1994	0.05	Evansville
7/13/1993	1.34	Louisville	9/6/1994	0.09	Evansville
7/14/1993	1.64	Louisville	9/8/1994	0.06	Evansville
7/15/1993	1.84	Louisville	9/11/1994	0.05	Evansville
7/16/1993	2.2	Louisville	9/15/1994	0.07	Evansville
7/17/1993	2.2	Louisville	9/20/1994	0.09	Evansville
7/18/1993	2.5	Louisville	9/22/1994	0.06	Evansville
7/19/1993	2.7	Louisville	9/25/1994	0.11	Evansville
7/20/1993	1.9	Louisville	9/27/1994	0.15	Evansville
7/21/1993	2.1	Louisville	9/29/1994	0.18	Evansville
7/22/1993	1.78	Louisville	10/2/1994	0.08	Evansville
7/23/1993	1.7	Louisville	10/4/1994	0.09	Evansville
7/24/1993	2	Louisville	10/9/1994	0.09	Evansville
7/25/1993	2.6	Louisville	10/11/1994	0.11	Evansville
7/26/1993	2.5	Louisville	10/13/1994	0.17	Evansville
7/27/1993	2	Louisville	10/16/1994	0.09	Evansville
7/28/1993	2	Louisville	10/18/1994	0.08	Evansville
7/29/1993	3.2	Louisville	10/20/1994	0.11	Evansville
7/30/1993	3.4	Louisville	10/23/1994	0.1	Evansville
7/31/1993	3.4	Louisville	10/25/1994	0.09	Evansville
8/1/1993	2.8	Louisville	10/27/1994	0.07	Evansville
8/2/1993	2	Louisville	11/2/1994	0.11	Evansville
8/3/1993	2.5	Louisville	11/10/1994	0.09	Evansville
8/4/1993	2.5	Louisville	11/16/1994	0.19	Evansville
8/5/1993	2	Louisville	11/22/1994	0.16	Evansville
8/6/1993	1.94	Louisville	11/30/1994	0.15	Evansville
8/7/1993	2.2	Louisville	12/5/1994	0.22	Evansville
8/8/1993	2	Louisville	12/14/1994	0.15	Evansville
8/9/1993	1.5	Louisville	4/20/1995	0	Evansville
8/10/1993	1.4	Louisville	4/21/1995	0.77	Evansville
8/11/1993	1.46	Louisville	4/23/1995	1.56	Evansville
8/12/1993	1.9	Louisville	4/24/1995	1.31	Evansville
8/13/1993	1.5	Louisville	4/25/1995	0.89	Evansville
8/14/1993	1.4	Louisville	4/27/1995	0.56	Evansville
8/15/1993	1.68	Louisville	4/30/1995	0.69	Evansville
8/16/1993	1.32	Louisville	5/2/1995	0.65	Evansville
8/17/1993	0.82	Louisville	5/4/1995	1.1	Evansville
8/18/1993	0.8	Louisville	5/7/1995	0.23	Evansville
8/19/1993	0.95	Louisville	5/9/1995	0.2	Evansville
8/20/1993	0.83	Louisville	5/11/1995	1.14	Evansville
8/21/1993	0.85	Louisville	5/14/1995	1.23	Evansville
8/22/1993	0.85	Louisville	5/16/1995	1.22	Evansville
8/23/1993	0.75	Louisville	5/18/1995	1.04	Evansville
8/24/1993	0.75	Louisville	5/21/1995	1.12	Evansville

Fixed-Station Monitoring Data			Fixed-Station Monitoring Data		
Date	Concentration (ug/L)	Location	Date	Concentration (ug/L)	Location
8/25/1993	0.57	Louisville	5/23/1995	1.46	Evansville
8/26/1993	0.64	Louisville	5/25/1995	1.56	Evansville
8/27/1993	0.54	Louisville	5/28/1995	1.7	Evansville
8/29/1993	0.95	Louisville	5/30/1995	1.94	Evansville
8/30/1993	0.9	Louisville	6/1/1995	1.58	Evansville
8/31/1993	0.72	Louisville	6/4/1995	2.2	Evansville
9/7/1993	0.77	Louisville	6/6/1995	2.14	Evansville
9/14/1993	0.63	Louisville	6/8/1995	2.74	Evansville
9/21/1993	0.55	Louisville	6/9/1995	1.84	Evansville
9/28/1993	0.42	Louisville	6/10/1995	3.04	Evansville
10/12/1993	0.24	Louisville	6/11/1995	2.59	Evansville
10/19/1993	0.19	Louisville	6/12/1995	2.24	Evansville
10/26/1993	0.17	Louisville	6/13/1995	3.17	Evansville
11/2/1993	0.23	Louisville	6/14/1995	2.38	Evansville
11/9/1993	0.19	Louisville	6/15/1995	1.47	Evansville
11/16/1993	0.19	Louisville	6/17/1995	1.48	Evansville
11/22/1993	0.18	Louisville	6/18/1995	1.47	Evansville
12/8/1993	0.12	Louisville	6/19/1995	1.69	Evansville
12/27/1993	0.005	Louisville	6/20/1995	1.41	Evansville
1/4/1994	0.005	Louisville	6/21/1995	1.57	Evansville
1/11/1994	0.005	Louisville	6/22/1995	1.46	Evansville
1/20/1994	0.005	Louisville	6/25/1995	1.6	Evansville
1/25/1994	0.005	Louisville	6/27/1995	1.46	Evansville
2/1/1994	0.005	Louisville	6/29/1995	1.69	Evansville
2/8/1994	0.005	Louisville	7/2/1995	1.02	Evansville
2/15/1994	0.005	Louisville	7/4/1995	1.96	Evansville
2/22/1994	0.005	Louisville	7/6/1995	1.5	Evansville
3/1/1994	0.005	Louisville	7/9/1995	1.7	Evansville
3/10/1994	0.005	Louisville	7/12/1995	1.31	Evansville
3/15/1994	0.005	Louisville	7/13/1995	1.29	Evansville
3/22/1994	0.005	Louisville	7/16/1995	1.14	Evansville
3/29/1994	0.005	Louisville	7/18/1995	1.68	Evansville
4/5/1994	0.005	Louisville	7/20/1995	2.07	Evansville
4/12/1994	0.005	Louisville	7/23/1995	1.75	Evansville
4/19/1994	0.005	Louisville	7/26/1995	1.62	Evansville
4/26/1994	0.12	Louisville	7/27/1995	1.68	Evansville
5/2/1994	0.21	Louisville	7/29/1995	0.71	Evansville
5/3/1994	0.65	Louisville	8/1/1995	1.39	Evansville
5/4/1994	1.1	Louisville	8/3/1995	1.31	Evansville
5/5/1994	1.4	Louisville	8/6/1995	1.29	Evansville
5/6/1994	0.96	Louisville	8/8/1995	1.25	Evansville
5/8/1994	0.35	Louisville	8/10/1995	0.73	Evansville
5/10/1994	0.68	Louisville	8/13/1995	0.55	Evansville
5/12/1994	0.32	Louisville	8/15/1995	0.73	Evansville
5/14/1994	0.36	Louisville	8/17/1995	0.78	Evansville
5/16/1994	0.65	Louisville	8/21/1995	0.67	Evansville
5/18/1994	0.46	Louisville	8/23/1995	0.82	Evansville
5/20/1994	0.55	Louisville	8/24/1995	0.81	Evansville

Fixed-Station Monitoring Data			Fixed-Station Monitoring Data		
	Concentration			Concentration	
Date	(ug/L)	Location	Date	(ug/L)	Location
5/22/1994	0.56	Louisville	8/27/1995	0.65	Evansville
5/24/1994	0.5	Louisville	8/29/1995	1.02	Evansville
5/27/1994	0.37	Louisville	8/30/1995	0.79	Evansville
5/28/1994	0.36	Louisville	9/5/1995	0.96	Evansville
5/30/1994	0.37	Louisville	9/7/1995	0.85	Evansville
6/1/1994	0.45	Louisville	9/10/1995	0.79	Evansville
6/3/1994	0.41	Louisville	9/12/1995	0.78	Evansville
6/4/1994	0.32	Louisville	9/14/1995	0.73	Evansville
6/5/1994	0.28	Louisville	9/17/1995	0.27	Evansville
6/6/1994	0.25	Louisville	9/19/1995	0.47	Evansville
6/7/1994	0.26	Louisville	9/21/1995	0.46	Evansville
6/8/1994	0.25	Louisville	9/24/1995	0.62	Evansville
6/9/1994	0.26	Louisville	9/26/1995	0.7	Evansville
6/10/1994	0.2	Louisville	9/28/1995	0.78	Evansville
6/11/1994	0.23	Louisville	10/3/1995	0.54	Evansville
6/12/1994	0.2	Louisville	10/5/1995	0.65	Evansville
6/15/1994	0.43	Louisville	10/8/1995	0.61	Evansville
6/18/1994	0.35	Louisville	10/10/1995	0.58	Evansville
6/22/1994	0.005	Louisville	10/12/1995	0.5	Evansville
6/26/1994	0.21	Louisville	10/15/1995	0.05	Evansville
6/28/1994	0.25	Louisville	10/19/1995	0.31	Evansville
6/30/1994	0.28	Louisville	10/25/1995	0.65	Evansville
7/3/1994	1.14	Louisville	11/1/1995	0.43	Evansville
7/5/1994	0.78	Louisville	11/2/1995	0.42	Evansville
7/8/1994	0.59	Louisville	11/8/1995	0.41	Evansville
7/10/1994	0.55	Louisville	11/16/1995	0.22	Evansville
7/12/1994	0.81	Louisville	11/20/1995	0.18	Evansville
7/14/1994	0.75	Louisville	11/30/1995	0.17	Evansville
7/15/1994	0.48	Louisville	12/19/1995	0.07	Evansville
7/18/1994	0.64	Louisville	12/27/1995	0.11	Evansville
7/21/1994	0.82	Louisville	1/3/1996	0	Evansville
7/23/1994	0.82	Louisville	1/11/1996	0	Evansville
7/26/1994	1	Louisville	1/17/1996	0	Evansville
7/28/1994	1	Louisville	1/22/1996	0.27	Evansville
7/30/1994	0.9	Louisville	1/25/1996	0	Evansville
8/1/1994	0.74	Louisville	1/31/1996	0	Evansville
8/3/1994	0.58	Louisville	2/7/1996	0.09	Evansville
8/5/1994	0.62	Louisville	2/15/1996	0	Evansville
8/7/1994	0.57	Louisville	2/22/1996	0	Evansville
8/9/1994	0.43	Louisville	2/29/1996	0	Evansville
8/11/1994	0.49	Louisville	3/5/1996	0	Evansville
8/14/1994	0.25	Louisville	3/7/1996	0	Evansville
8/16/1994	0.25	Louisville	3/14/1996	0	Evansville
8/18/1994	0.25	Louisville	3/21/1996	0	Evansville
8/20/1994	0.25	Louisville	4/11/1996	0	Evansville
8/22/1994	0.24	Louisville	4/14/1996	0	Evansville
8/24/1994	0.21	Louisville	4/18/1996	0	Evansville
8/26/1994	0.005	Louisville	4/21/1996	0.12	Evansville

Fixed-Station Monitoring Data				Fixed-Station Monitoring Data		
	Concentration				Concentration	
Date	(ug/L)	Location		Date	(ug/L)	Location
8/30/1994	0.005	Louisville		4/23/1996	0.2	Evansville
9/6/1994	0.19	Louisville		4/25/1996	0.08	Evansville
9/13/1994	0.12	Louisville		4/29/1996	0.33	Evansville
9/20/1994	0.19	Louisville		4/30/1996	0.84	Evansville
9/27/1994	0.19	Louisville		5/2/1996	0.44	Evansville
10/5/1994	0.17	Louisville		5/5/1996	0.55	Evansville
10/11/1994	0.19	Louisville		5/7/1996	0.42	Evansville
10/18/1994	0.1	Louisville		5/9/1996	0.46	Evansville
10/25/1994	0.12	Louisville		5/12/1996	0.33	Evansville
11/1/1994	0.005	Louisville		5/14/1996	0.28	Evansville
11/8/1994	0.13	Louisville		5/16/1996	0.2	Evansville
11/15/1994	0.52	Louisville		5/19/1996	0.23	Evansville
11/22/1994	0.11	Louisville		5/21/1996	0.36	Evansville
11/30/1994	0.18	Louisville		5/23/1996	0.32	Evansville
12/6/1994	0.005	Louisville		5/26/1996	0.27	Evansville
12/13/1994	0.15	Louisville		5/28/1996	0.38	Evansville
12/20/1994	0.005	Louisville		5/30/1996	1.29	Evansville
12/27/1994	0.005	Louisville		6/2/1996	2.38	Evansville
1/3/1995	0.005	Louisville		6/4/1996	1.54	Evansville
1/10/1995	0.005	Louisville		6/6/1996	1.25	Evansville
1/17/1995	0.005	Louisville		6/9/1996	3.74	Evansville
1/24/1995	0.005	Louisville		6/10/1996	3.6	Evansville
1/31/1995	0.005	Louisville		6/11/1996	3.38	Evansville
2/7/1995	0.005	Louisville		6/12/1996	2.95	Evansville
2/15/1995	0.005	Louisville		6/13/1996	4.22	Evansville
2/21/1995	0.005	Louisville		6/14/1996	4.09	Evansville
2/28/1995	0.005	Louisville		6/15/1996	3.81	Evansville
3/8/1995	0.005	Louisville		6/16/1996	3.46	Evansville
3/14/1995	0.005	Louisville		6/17/1996	3.1	Evansville
3/21/1995	0.005	Louisville		6/18/1996	2.32	Evansville
3/28/1995	0.005	Louisville		6/19/1996	2.59	Evansville
4/4/1995	0.1	Louisville		6/20/1996	2.31	Evansville
4/11/1995	0.005	Louisville		6/21/1996	2.09	Evansville
4/18/1995	0.15	Louisville		6/22/1996	2.09	Evansville
4/25/1995	0.21	Louisville		6/23/1996	2.05	Evansville
4/26/1995	0.36	Louisville		6/24/1996	2.19	Evansville
4/27/1995	0.21	Louisville		6/25/1996	2.44	Evansville
4/28/1995	0.18	Louisville		6/26/1996	2.35	Evansville
4/29/1995	0.005	Louisville		6/27/1996	2.87	Evansville
4/30/1995	0.21	Louisville		6/28/1996	3.34	Evansville
5/1/1995	0.16	Louisville		6/29/1996	3.41	Evansville
5/2/1995	0.15	Louisville		6/30/1996	2.9	Evansville
5/3/1995	0.1	Louisville		7/1/1996	2.8	Evansville
5/4/1995	0.12	Louisville		7/2/1996	1.39	Evansville
5/5/1995	0.1	Louisville		7/3/1996	1.74	Evansville
5/6/1995	0.005	Louisville		7/4/1996	1.48	Evansville
5/7/1995	0.005	Louisville		7/5/1996	2.07	Evansville
5/8/1995	0.11	Louisville		7/6/1996	1.9	Evansville

Fixed-Station Monitoring Data			Fixed-Station Monitoring Data		
	Concentration			Concentration	
Date	(ug/L)	Location	Date	(ug/L)	Location
5/9/1995	0.005	Louisville	7/7/1996	2.04	Evansville
5/10/1995	0.1	Louisville	7/8/1996	2.15	Evansville
5/11/1995	0.005	Louisville	7/9/1996	1.78	Evansville
5/12/1995	0.13	Louisville	7/10/1996	1.6	Evansville
5/13/1995	0.26	Louisville	7/11/1996	1.51	Evansville
5/14/1995	0.58	Louisville	7/12/1996	1.18	Evansville
5/15/1995	0.56	Louisville	7/13/1996	1.19	Evansville
5/16/1995	0.29	Louisville	7/14/1996	0.97	Evansville
5/17/1995	0.56	Louisville	7/15/1996	1.2	Evansville
5/18/1995	0.45	Louisville	7/17/1996	0.67	Evansville
5/19/1995	0.76	Louisville	7/18/1996	0.92	Evansville
5/20/1995	0.76	Louisville	7/19/1996	0.88	Evansville
5/21/1995	0.84	Louisville	7/20/1996	0.9	Evansville
5/22/1995	0.94	Louisville	7/21/1996	1.09	Evansville
5/23/1995	1.2	Louisville	7/22/1996	0.97	Evansville
5/24/1995	0.9	Louisville	7/23/1996	1.23	Evansville
5/25/1995	0.96	Louisville	7/24/1996	0.85	Evansville
5/26/1995	0.9	Louisville	7/25/1996	0.84	Evansville
5/27/1995	0.68	Louisville	7/26/1996	1.03	Evansville
5/28/1995	0.88	Louisville	7/27/1996	1.03	Evansville
5/29/1995	1.6	Louisville	7/28/1996	1.21	Evansville
5/30/1995	1.8	Louisville	7/29/1996	0.9	Evansville
5/31/1995	1.7	Louisville	7/30/1996	0.85	Evansville
6/1/1995	1.5	Louisville	7/31/1996	0.79	Evansville
6/2/1995	1.56	Louisville	8/1/1996	0.8	Evansville
6/3/1995	2.4	Louisville	8/3/1996	1.21	Evansville
6/4/1995	1.4	Louisville	8/4/1996	0.92	Evansville
6/5/1995	1.5	Louisville	8/7/1996	0.6	Evansville
6/6/1995	1.36	Louisville	8/8/1996	0.84	Evansville
6/7/1995	1.86	Louisville	8/11/1996	0.34	Evansville
6/8/1995	1.62	Louisville	8/13/1996	0.43	Evansville
6/9/1995	1.56	Louisville	8/15/1996	0.23	Evansville
6/10/1995	1.2	Louisville	8/18/1996	0.35	Evansville
6/11/1995	1.08	Louisville	8/20/1996	0.36	Evansville
6/12/1995	1.44	Louisville	8/21/1996	0.3	Evansville
6/13/1995	1.34	Louisville	8/22/1996	0.31	Evansville
6/14/1995	1.25	Louisville	8/25/1996	0.21	Evansville
6/15/1995	1.2	Louisville	8/27/1996	0.3	Evansville
6/16/1995	0.86	Louisville	8/29/1996	0.16	Evansville
6/17/1995	1.16	Louisville	9/1/1996	0.22	Evansville
6/18/1995	1.1	Louisville	9/3/1996	0.23	Evansville
6/19/1995	1.26	Louisville	9/5/1996	0.16	Evansville
6/20/1995	1.06	Louisville	9/8/1996	0.24	Evansville
6/21/1995	1.2	Louisville	9/10/1996	0.23	Evansville
6/22/1995	1.56	Louisville	9/12/1996	0.23	Evansville
6/23/1995	1.12	Louisville	9/15/1996	0.14	Evansville
6/27/1995	1.9	Louisville	9/17/1996	0.09	Evansville
6/28/1995	1.8	Louisville	9/19/1996	0.13	Evansville

Fixed-Station Monitoring Data				Fixed-Station Monitoring Data		
	Concentration				Concentration	
Date	(ug/L)	Location		Date	(ug/L)	Location
6/29/1995	1.3	Louisville		9/22/1996	0.11	Evansville
6/30/1995	0.82	Louisville		9/24/1996	0.07	Evansville
7/1/1995	0.88	Louisville		9/26/1996	0.08	Evansville
7/2/1995	1.02	Louisville		9/29/1996	0.18	Evansville
7/3/1995	0.72	Louisville		10/1/1996	0.19	Evansville
7/4/1995	1.12	Louisville		10/3/1996	0.08	Evansville
7/5/1995	1.45	Louisville		10/6/1996	0.14	Evansville
7/6/1995	1.36	Louisville		10/8/1996	0.15	Evansville
7/7/1995	0.96	Louisville		10/10/1996	0.19	Evansville
7/8/1995	1.2	Louisville		10/13/1996	0.15	Evansville
7/9/1995	1.24	Louisville		10/15/1996	0.09	Evansville
7/10/1995	1	Louisville		10/17/1996	0.11	Evansville
7/11/1995	1.35	Louisville		10/20/1996	0.17	Evansville
7/12/1995	1.35	Louisville		10/22/1996	0.31	Evansville
7/13/1995	1.24	Louisville		10/23/1996	0.3	Evansville
7/14/1995	1.28	Louisville		10/27/1996	0.27	Evansville
7/15/1995	1.3	Louisville		10/29/1996	0.19	Evansville
7/16/1995	1.4	Louisville		10/31/1996	0.15	Evansville
7/17/1995	1.2	Louisville		11/3/1996	0.08	Evansville
7/18/1995	1.2	Louisville		11/5/1996	0.08	Evansville
7/19/1995	1.45	Louisville		11/7/1996	0.07	Evansville
7/20/1995	1.4	Louisville		1/2/1997	0.14	Evansville
7/21/1995	1.4	Louisville		1/5/1997	0.14	Evansville
7/22/1995	1.4	Louisville		1/7/1997	0.23	Evansville
7/23/1995	1.3	Louisville		1/9/1997	0.12	Evansville
7/24/1995	1.25	Louisville		1/12/1997	0.13	Evansville
7/25/1995	1.28	Louisville		1/14/1997	0.14	Evansville
7/26/1995	1.2	Louisville		1/16/1997	0.13	Evansville
7/27/1995	1.34	Louisville		1/19/1997	0	Evansville
7/28/1995	1.34	Louisville		1/21/1997	0	Evansville
7/29/1995	0.94	Louisville		1/23/1997	0	Evansville
7/30/1995	0.86	Louisville		1/26/1997	0	Evansville
7/31/1995	0.74	Louisville		1/28/1997	0.05	Evansville
8/1/1995	0.67	Louisville		1/30/1997	0	Evansville
8/2/1995	0.8	Louisville		2/9/1997	0.07	Evansville
8/3/1995	0.67	Louisville		2/11/1997	0.07	Evansville
8/4/1995	0.71	Louisville		2/13/1997	0.11	Evansville
8/5/1995	0.74	Louisville		2/16/1997	0	Evansville
8/6/1995	0.8	Louisville		2/17/1997	0	Evansville
8/7/1995	0.76	Louisville		2/18/1997	0	Evansville
8/8/1995	0.82	Louisville		2/20/1997	0	Evansville
8/9/1995	0.76	Louisville		2/23/1997	0.12	Evansville
8/10/1995	0.9	Louisville		2/25/1997	0	Evansville
8/11/1995	0.9	Louisville		2/26/1997	0	Evansville
8/12/1995	0.66	Louisville		3/2/1997	0	Evansville
8/13/1995	0.7	Louisville		3/4/1997	0.11	Evansville
8/14/1995	0.6	Louisville		3/6/1997	0	Evansville
8/15/1995	0.57	Louisville		3/9/1997	0.07	Evansville

Fixed-Station Monitoring Data			Fixed-Station Monitoring Data		
	Concentration			Concentration	
Date	(ug/L)	Location	Date	(ug/L)	Location
8/16/1995	0.67	Louisville	3/11/1997	0	Evansville
8/17/1995	0.6	Louisville	3/13/1997	0	Evansville
8/18/1995	0.63	Louisville	3/16/1997	0.07	Evansville
8/19/1995	0.7	Louisville	3/18/1997	0	Evansville
8/20/1995	0.66	Louisville	3/19/1997	0.1	Evansville
8/21/1995	0.66	Louisville	3/23/1997	0	Evansville
8/22/1995	0.56	Louisville	3/25/1997	0	Evansville
8/23/1995	0.6	Louisville	3/27/1997	0	Evansville
8/24/1995	0.56	Louisville	3/29/1997	0	Evansville
8/25/1995	0.5	Louisville	4/1/1997	0.05	Evansville
8/26/1995	0.53	Louisville	4/2/1997	0	Evansville
8/27/1995	0.55	Louisville	4/3/1997	0.08	Evansville
8/28/1995	0.48	Louisville	4/6/1997	0	Evansville
8/29/1995	0.65	Louisville	4/8/1997	0.12	Evansville
8/30/1995	0.75	Louisville	4/10/1997	0	Evansville
8/31/1995	0.65	Louisville	4/13/1997	0	Evansville
9/1/1995	0.7	Louisville	4/16/1997	0.1	Evansville
9/2/1995	0.56	Louisville	4/17/1997	0.06	Evansville
9/3/1995	0.62	Louisville	4/20/1997	0	Evansville
9/4/1995	0.62	Louisville	4/23/1997	0	Evansville
9/5/1995	0.62	Louisville	4/25/1997	0.1	Evansville
9/7/1995	0.7	Louisville	4/27/1997	0	Evansville
9/9/1995	0.64	Louisville	4/29/1997	0	Evansville
9/11/1995	0.62	Louisville	5/1/1997	0	Evansville
9/13/1995	0.54	Louisville	5/4/1997	2.17	Evansville
9/15/1995	0.46	Louisville	5/6/1997	0.98	Evansville
9/17/1995	0.51	Louisville	5/7/1997	0.97	Evansville
9/19/1995	0.51	Louisville	5/8/1997	0.87	Evansville
9/21/1995	0.48	Louisville	5/9/1997	0.62	Evansville
9/23/1995	0.51	Louisville	5/10/1997	1.29	Evansville
9/25/1995	0.42	Louisville	5/11/1997	2.29	Evansville
1/2/1996	0	Louisville	5/12/1997	3.08	Evansville
1/3/1996	0	Louisville	5/13/1997	2.65	Evansville
1/9/1996	0	Louisville	5/14/1997	2.87	Evansville
1/16/1996	0	Louisville	5/15/1997	1.79	Evansville
1/23/1996	0	Louisville	5/16/1997	1.57	Evansville
1/30/1996	0	Louisville	5/17/1997	1.22	Evansville
2/2/1996	0	Louisville	5/18/1997	0.99	Evansville
2/6/1996	0.15	Louisville	5/19/1997	1.37	Evansville
2/14/1996	0	Louisville	5/20/1997	1.43	Evansville
2/20/1996	0	Louisville	5/21/1997	1.84	Evansville
2/27/1996	0	Louisville	5/22/1997	1.2	Evansville
3/5/1996	0	Louisville	5/23/1997	0.78	Evansville
3/12/1996	0	Louisville	5/24/1997	0.64	Evansville
3/19/1996	0	Louisville	5/25/1997	0.97	Evansville
3/26/1996	0	Louisville	5/26/1997	2.14	Evansville
4/2/1996	0	Louisville	5/27/1997	3.99	Evansville
4/9/1996	0	Louisville	5/28/1997	1.98	Evansville

Fixed-Station Monitoring Data			Fixed-Station Monitoring Data		
Date	Concentration (ug/L)	Location	Date	Concentration (ug/L)	Location
4/16/1996	0	Louisville	5/29/1997	1.16	Evansville
4/23/1996	0	Louisville	7/1/1997	1.82	Evansville
4/30/1996	0.22	Louisville	7/2/1997	1.94	Evansville
5/1/1996	0.4	Louisville	7/3/1997	1.7	Evansville
5/2/1996	0.44	Louisville	7/4/1997	2.15	Evansville
5/3/1996	0.4	Louisville	7/5/1997	2.23	Evansville
5/4/1996	0.36	Louisville	7/6/1997	2.34	Evansville
5/5/1996	0.36	Louisville	7/7/1997	2.29	Evansville
5/6/1996	0.36	Louisville	7/8/1997	1.88	Evansville
5/7/1996	0.39	Louisville	7/9/1997	1.83	Evansville
5/8/1996	0.35	Louisville	7/10/1997	1.46	Evansville
5/9/1996	0.41	Louisville	7/11/1997	2.14	Evansville
5/10/1996	0.27	Louisville	7/12/1997	1.79	Evansville
5/12/1996	0.15	Louisville	7/13/1997	1.94	Evansville
5/14/1996	0.15	Louisville	7/14/1997	1.83	Evansville
5/16/1996	0.17	Louisville	7/15/1997	1.59	Evansville
5/17/1996	0.12	Louisville	7/16/1997	1.4	Evansville
5/19/1996	0.24	Louisville	7/17/1997	1.43	Evansville
5/21/1996	0.11	Louisville	7/18/1997	1.22	Evansville
5/23/1996	0	Louisville	7/19/1997	1.55	Evansville
5/24/1996	0.1	Louisville	7/20/1997	1.36	Evansville
5/26/1996	0.21	Louisville	7/21/1997	1.6	Evansville
5/28/1996	0.4	Louisville	7/22/1997	1.5	Evansville
5/29/1996	0.76	Louisville	7/23/1997	1.57	Evansville
5/30/1996	1.6	Louisville	7/24/1997	1.4	Evansville
5/31/1996	1	Louisville	7/25/1997	1.17	Evansville
6/1/1996	1.08	Louisville	7/26/1997	1.15	Evansville
6/2/1996	0.92	Louisville	7/27/1997	1.4	Evansville
6/3/1996	0.96	Louisville	7/28/1997	1.49	Evansville
6/4/1996	1.14	Louisville	7/29/1997	1.77	Evansville
6/5/1996	0.88	Louisville	7/30/1997	1.24	Evansville
6/6/1996	1.02	Louisville	7/31/1997	1.28	Evansville
6/7/1996	1.02	Louisville	8/1/1997	1.44	Evansville
6/8/1996	1.38	Louisville	8/2/1997	1.44	Evansville
6/9/1996	1.65	Louisville	8/3/1997	1.34	Evansville
6/10/1996	4	Louisville	8/4/1997	1.45	Evansville
6/11/1996	3.75	Louisville	8/5/1997	1.37	Evansville
6/12/1996	4.1	Louisville	8/6/1997	1.53	Evansville
6/13/1996	3.5	Louisville	8/7/1997	1.27	Evansville
6/14/1996	1.9	Louisville	8/8/1997	0.82	Evansville
6/15/1996	1.6	Louisville	8/9/1997	0.83	Evansville
6/16/1996	1.6	Louisville	8/10/1997	0.81	Evansville
6/17/1996	2.08	Louisville	8/11/1997	0.68	Evansville
6/18/1996	1.96	Louisville	8/12/1997	1.28	Evansville
6/19/1996	1.96	Louisville	8/13/1997	1.02	Evansville
6/20/1996	2.36	Louisville	8/14/1997	0.88	Evansville
6/21/1996	1.96	Louisville	8/15/1997	1.14	Evansville
6/22/1996	2.8	Louisville	8/16/1997	1.28	Evansville

Fixed-Station Monitoring Data			Fixed-Station Monitoring Data		
	Concentration			Concentration	
Date	(ug/L)	Location	Date	(ug/L)	Location
6/23/1996	2.04	Louisville	8/17/1997	1.17	Evansville
6/24/1996	2.8	Louisville	8/18/1997	1.05	Evansville
6/25/1996	2.28	Louisville	8/19/1997	0.55	Evansville
6/26/1996	1.92	Louisville	8/20/1997	0.88	Evansville
6/27/1996	1.68	Louisville	8/21/1997	0.44	Evansville
6/28/1996	1.8	Louisville	8/22/1997	0.56	Evansville
6/29/1996	1.53	Louisville	8/24/1997	0.67	Evansville
6/30/1996	0.93	Louisville	8/25/1997	0.51	Evansville
7/1/1996	0.84	Louisville	8/26/1997	0.47	Evansville
7/2/1996	0.84	Louisville	8/27/1997	0.47	Evansville
7/3/1996	0.98	Louisville	8/28/1997	0.44	Evansville
7/4/1996	0.9	Louisville	8/29/1997	0.22	Evansville
7/5/1996	0.78	Louisville	8/30/1997	0.15	Evansville
7/6/1996	0.96	Louisville	8/31/1997	0.23	Evansville
7/7/1996	0.78	Louisville	9/1/1997	0.12	Evansville
7/8/1996	1.08	Louisville	9/2/1997	0.15	Evansville
7/9/1996	0.78	Louisville	9/3/1997	0.25	Evansville
7/10/1996	0.88	Louisville	9/4/1997	0.52	Evansville
7/11/1996	0.96	Louisville	9/5/1997	0.15	Evansville
7/12/1996	0.88	Louisville	9/6/1997	0.13	Evansville
7/13/1996	0.84	Louisville	9/7/1997	0.29	Evansville
7/14/1996	0.88	Louisville	9/8/1997	0.15	Evansville
7/15/1996	0.78	Louisville	9/9/1997	0.29	Evansville
7/16/1996	0.98	Louisville	9/10/1997	0.15	Evansville
7/17/1996	0.72	Louisville	9/11/1997	0.26	Evansville
7/18/1996	1.02	Louisville	9/12/1997	0.25	Evansville
7/19/1996	0.78	Louisville	9/13/1997	0.13	Evansville
7/20/1996	0.94	Louisville	9/14/1997	0.24	Evansville
7/21/1996	0.8	Louisville	9/15/1997	0.12	Evansville
7/22/1996	0.8	Louisville	9/16/1997	0.76	Evansville
7/23/1996	0.74	Louisville	9/17/1997	0.52	Evansville
7/24/1996	0.84	Louisville	9/18/1997	0.33	Evansville
7/25/1996	0.6	Louisville	9/19/1997	0.24	Evansville
7/26/1996	0.56	Louisville	9/20/1997	0.14	Evansville
7/27/1996	0.54	Louisville	9/21/1997	0.27	Evansville
7/28/1996	0.32	Louisville	9/22/1997	0.11	Evansville
7/29/1996	0.42	Louisville	9/23/1997	0.27	Evansville
7/30/1996	0.34	Louisville	9/24/1997	0.17	Evansville
7/31/1996	0.34	Louisville	9/25/1997	0.37	Evansville
8/1/1996	0.52	Louisville	9/26/1997	0.35	Evansville
8/2/1996	0.38	Louisville	9/27/1997	0.26	Evansville
8/3/1996	0.29	Louisville	9/28/1997	0.34	Evansville
8/4/1996	0.29	Louisville	9/29/1997	0.37	Evansville
8/5/1996	0.36	Louisville	9/30/1997	0.44	Evansville
8/6/1996	0.21	Louisville	10/1/1997	0.77	Evansville
8/7/1996	0.33	Louisville	10/2/1997	0.51	Evansville
8/8/1996	0.29	Louisville	10/4/1997	0.7	Evansville
8/9/1996	0.33	Louisville	10/7/1997	0.48	Evansville

Fixed-Station Monitoring Data			Fixed-Station Monitoring Data		
	Concentration			Concentration	
Date	(ug/L)	Location	Date	(ug/L)	Location
8/10/1996	0.33	Louisville	10/9/1997	0.49	Evansville
8/11/1996	0.38	Louisville	10/11/1997	0.41	Evansville
8/12/1996	0.25	Louisville	10/14/1997	0.32	Evansville
8/13/1996	0.22	Louisville	10/16/1997	0.53	Evansville
8/14/1996	0.2	Louisville	10/18/1997	0.51	Evansville
8/15/1996	0.32	Louisville	10/21/1997	0.47	Evansville
8/16/1996	0.16	Louisville	10/23/1997	0.5	Evansville
8/17/1996	0.12	Louisville	10/25/1997	0.44	Evansville
8/18/1996	0.15	Louisville	10/28/1997	0.27	Evansville
8/19/1996	0.13	Louisville	10/30/1997	0.46	Evansville
8/20/1996	0.1	Louisville	11/1/1997	0.25	Evansville
8/21/1996	0.19	Louisville	11/4/1997	0.24	Evansville
8/22/1996	0.13	Louisville	11/6/1997	0.32	Evansville
8/24/1996	0.16	Louisville	11/8/1997	0.24	Evansville
8/26/1996	0.13	Louisville	11/11/1997	0.11	Evansville
8/28/1996	0.12	Louisville	11/13/1997	0.32	Evansville
8/30/1996	0	Louisville	11/15/1997	0.18	Evansville
9/1/1996	0	Louisville	11/18/1997	0.11	Evansville
9/3/1996	0	Louisville	11/20/1997	0.18	Evansville
9/5/1996	0.15	Louisville	11/22/1997	0.19	Evansville
9/7/1996	0	Louisville	11/25/1997	0.05	Evansville
9/9/1996	0.12	Louisville	11/27/1997	0.15	Evansville
9/10/1996	0	Louisville	12/2/1997	0.22	Evansville
9/11/1996	0.18	Louisville	12/4/1997	0.11	Evansville
9/13/1996	0.15	Louisville	12/6/1997	0.1	Evansville
9/15/1996	0.1	Louisville	12/9/1997	0	Evansville
9/17/1996	0	Louisville	12/11/1997	0.09	Evansville
9/20/1996	0.17	Louisville	12/16/1997	0.09	Evansville
9/22/1996	0.12	Louisville	12/18/1997	0.08	Evansville
9/24/1996	0.15	Louisville	12/19/1997	0	Evansville
9/26/1996	0.17	Louisville	12/23/1997	0	Evansville
9/28/1996	0.17	Louisville	12/25/1997	0	Evansville
9/30/1996	0.19	Louisville	12/27/1997	0	Evansville
10/1/1996	0	Louisville	12/30/1997	0.09	Evansville
10/3/1996	0.25	Louisville	1/6/1998	0.13	Evansville
10/6/1996	0.25	Louisville	1/8/1998	0.01	Evansville
10/9/1996	0.3	Louisville	1/10/1998	0	Evansville
10/12/1996	0.13	Louisville	1/13/1998	0.11	Evansville
10/15/1996	0.2	Louisville	1/15/1998	0.13	Evansville
10/18/1996	0.19	Louisville	1/17/1998	0.05	Evansville
10/21/1996	0.16	Louisville	1/20/1998	0.06	Evansville
10/24/1996	0.21	Louisville	1/22/1998	0.05	Evansville
10/27/1996	0	Louisville	1/24/1998	0	Evansville
10/30/1996	0	Louisville	1/27/1998	0.13	Evansville
11/1/1996	0	Louisville	1/29/1998	0.07	Evansville
1/7/1997	0	Louisville	1/31/1998	0.07	Evansville
1/14/1997	0	Louisville	2/3/1998	0	Evansville
1/21/1997	0	Louisville	2/5/1998	0.1	Evansville

Fixed-Station Monitoring Data			Fixed-Station Monitoring Data		
	Concentration			Concentration	
Date	(ug/L)	Location	Date	(ug/L)	Location
1/28/1997	0	Louisville	2/7/1998	0	Evansville
2/4/1997	0	Louisville	2/10/1998	0	Evansville
2/11/1997	0	Louisville	2/12/1998	0	Evansville
2/19/1997	0	Louisville	2/14/1998	0	Evansville
2/25/1997	0	Louisville	2/17/1998	0	Evansville
3/4/1997	0	Louisville	2/19/1998	0.13	Evansville
3/11/1997	0	Louisville	2/21/1998	0	Evansville
3/18/1997	0	Louisville	2/24/1998	0	Evansville
3/24/1997	0	Louisville	2/26/1998	0	Evansville
4/1/1997	0	Louisville	2/28/1998	0.16	Evansville
4/8/1997	0	Louisville			
4/15/1997	0	Louisville			
4/23/1997	0	Louisville			
4/29/1997	0	Louisville			
5/1/1997	0	Louisville			
5/2/1997	0	Louisville			
5/3/1997	0	Louisville			
5/4/1997	0.1	Louisville			
5/5/1997	0	Louisville			
5/6/1997	1.3	Louisville			
5/7/1997	2.37	Louisville			
5/8/1997	2.8	Louisville			
5/9/1997	3	Louisville			
5/10/1997	2.02	Louisville			
5/11/1997	1.1	Louisville			
5/12/1997	0.72	Louisville			
5/13/1997	0.85	Louisville			
5/14/1997	0.93	Louisville			
5/15/1997	1	Louisville			
5/16/1997	0.5	Louisville			
5/17/1997	0.4	Louisville			
5/18/1997	0.35	Louisville			
5/19/1997	0.35	Louisville			
5/20/1997	0.33	Louisville			
5/21/1997	0.33	Louisville			
5/22/1997	0.27	Louisville			
5/23/1997	0.29	Louisville			
5/24/1997	0.24	Louisville			
5/25/1997	0.34	Louisville			
5/26/1997	0.5	Louisville			
5/27/1997	0.27	Louisville			
5/28/1997	0.28	Louisville			
5/29/1997	0.79	Louisville			
5/30/1997	0.67	Louisville			
5/31/1997	0.49	Louisville			
6/1/1997	0.74	Louisville			
6/2/1997	1.6	Louisville			
6/3/1997	3	Louisville			

Fixed-Station Monitoring Data			Fixed-Station Monitoring Data		
	Concentration			Concentration	
Date	(ug/L)	Location	Date	(ug/L)	Location
6/4/1997	5	Louisville			
6/5/1997	4.2	Louisville			
6/6/1997	3.7	Louisville			
6/10/1997	2.1	Louisville			
6/11/1997	2.1	Louisville			
6/12/1997	1.88	Louisville			
6/13/1997	1.88	Louisville			
6/14/1997	1.68	Louisville			
6/15/1997	2.24	Louisville			
6/16/1997	1.56	Louisville			
6/18/1997	1.68	Louisville			
6/19/1997	1.5	Louisville			
6/20/1997	1.18	Louisville			
6/21/1997	1.04	Louisville			
6/22/1997	1.48	Louisville			
6/23/1997	1.34	Louisville			
6/24/1997	1.48	Louisville			
6/25/1997	1.64	Louisville			
6/26/1997	1.48	Louisville			
6/27/1997	1.5	Louisville			
6/28/1997	2	Louisville			
6/29/1997	1.8	Louisville			
6/30/1997	2.1	Louisville			
7/1/1997	1.7	Louisville			
7/2/1997	2	Louisville			
7/3/1997	1.88	Louisville			
7/4/1997	1.98	Louisville			
7/5/1997	1.35	Louisville			
7/7/1997	1.62	Louisville			
7/8/1997	1.47	Louisville			
7/9/1997	1.77	Louisville			
7/10/1997	1.47	Louisville			
7/11/1997	1.77	Louisville			
7/12/1997	1.18	Louisville			
7/13/1997	0.78	Louisville			
7/14/1997	1	Louisville			
7/15/1997	0.84	Louisville			
7/16/1997	1.42	Louisville			
7/17/1997	0.72	Louisville			
7/18/1997	0.84	Louisville			
7/19/1997	1.1	Louisville			
7/20/1997	1.35	Louisville			
7/21/1997	0.84	Louisville			
7/22/1997	0.56	Louisville			
7/23/1997	1.02	Louisville			
7/24/1997	0.84	Louisville			
7/25/1997	0.67	Louisville			
7/26/1997	0.96	Louisville			

Fixed-Station Monitoring Data			Fixed-Station Monitoring Data		
	Concentration			Concentration	
Date	(ug/L)	Location	Date	(ug/L)	Location
7/27/1997	0.8	Louisville			
7/28/1997	0.88	Louisville			
7/29/1997	0.68	Louisville			
7/30/1997	1	Louisville			
7/31/1997	0.34	Louisville			
8/1/1997	0.42	Louisville			
8/2/1997	0.3	Louisville			
8/4/1997	0.3	Louisville			
8/5/1997	0.44	Louisville			
8/6/1997	0.42	Louisville			
8/7/1997	0.44	Louisville			
8/8/1997	0.3	Louisville			
8/9/1997	0.42	Louisville			
8/10/1997	0.25	Louisville			
8/11/1997	0.3	Louisville			
8/12/1997	0.27	Louisville			
8/13/1997	0.34	Louisville			
8/14/1997	0.27	Louisville			
8/15/1997	0.27	Louisville			
8/16/1997	0.26	Louisville			
8/17/1997	0.24	Louisville			
8/18/1997	0.21	Louisville			
8/20/1997	0.21	Louisville			
8/22/1997	0.23	Louisville			
8/24/1997	0.19	Louisville			
8/26/1997	0.15	Louisville			
8/28/1997	0.15	Louisville			
8/30/1997	0.2	Louisville			
9/1/1997	0.14	Louisville			
9/3/1997	0.2	Louisville			
9/5/1997	0.34	Louisville			
9/7/1997	0.44	Louisville			
9/9/1997	0.44	Louisville			
9/11/1997	0.54	Louisville			
9/13/1997	0.34	Louisville			
9/15/1997	0.34	Louisville			
9/17/1997	0.36	Louisville			
9/19/1997	0.41	Louisville			
9/21/1997	0.36	Louisville			
9/23/1997	0.38	Louisville			
9/25/1997	0.41	Louisville			
9/27/1997	0.47	Louisville			
9/29/1997	0.37	Louisville			
10/1/1997	0.27	Louisville			
10/3/1997	0.26	Louisville			
10/6/1997	0.34	Louisville			
10/9/1997	0.36	Louisville			
10/12/1997	0.4	Louisville			

Fixed-Station Monitoring Data			Fixed-Station Monitoring Data		
	Concentration			Concentration	
Date	(ug/L)	Location	Date	(ug/L)	Location
10/15/1997	0.34	Louisville			
10/18/1997	0.26	Louisville			
10/21/1997	0.27	Louisville			
10/24/1997	0.27	Louisville			
10/27/1997	0.2	Louisville			
10/30/1997	0.22	Louisville			
11/4/1997	0.36	Louisville			
11/11/1997	0.2	Louisville			
11/18/1997	0.12	Louisville			
11/25/1997	0	Louisville			
12/2/1997	0	Louisville			
12/16/1997	0	Louisville			
12/23/1997	0.13	Louisville			
12/30/1997	0	Louisville			
1/6/1998	0.21	Louisville			
1/13/1998	0.24	Louisville			
1/20/1998	0.11	Louisville			
1/27/1998	0.28	Louisville			
2/3/1998	0	Louisville			
2/10/1998	0	Louisville			
2/17/1998	0	Louisville			
2/24/1998	0.11	Louisville			
3/3/1998	0	Louisville			
3/10/1998	0	Louisville			
3/17/1998	0	Louisville			
3/24/1998	0	Louisville			
3/31/1998	0	Louisville			