

**SUMMARY OF BULK SEDIMENT DATA  
FROM KENTUCKY STREAMS AND RIVERS  
FROM 1980-1994**

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Kentucky Division of Water  
Water Quality Branch  
Bioassay Section  
Frankfort, Kentucky**

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**This report has been approved for release.**

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## **Executive Summary**

The Division of Water's Water Quality Branch collected more than 500 samples of bulk sediment data from 1980-1994. From these samples, 8,474 analyses have been performed for parameters including trace metals, organics, inorganics (calcium, total cyanide, magnesium, potassium and sodium), nutrients (ammonia-nitrogen, total Kjeldahl nitrogen, nitrate-nitrogen and total phosphorus), chemical oxygen demand (COD), oil and grease, total organic carbon (TOC) and total volatile solids (TVS). After analyzing this information and eliminating all non-detect values from the database (this included practically all of the organics data), a sufficient data set was available for statistical analyses of 22 metals, 2 nutrient species, cyanide, COD, oil and grease, TOC and TVS. From this information, statewide "elevated" values were generated as the 90<sup>th</sup> percentile of the entire data set. No corresponding data was collected to determine biological community health. However, the existing data can be used for comparison to determine if a sample value is considered elevated in the state. In addition, areas of concern can be identified where the 90<sup>th</sup> percentile value for a parameter(s) is exceeded. Further studies are recommended in these areas to determine if the elevated levels have had an effect on aquatic community health.

## **Introduction**

This report is a summary of the chemical analyses of bulk sediment samples taken from 1980-1994. The Division of Water is now using more updated methods for evaluating sediments. These methods include sieving and screening samples for analyses of organics and metals. Consequently, historical sediment data is not readily comparable to current values. At this point, there is not enough data available that were generated under the current procedures to establish revised background levels. Therefore, the purpose of this document is to present this historical sediment data for comparison purposes until enough new information is generated to update these values.

Sampling sites include stations in the ambient monitoring network, intensive surveys, and the reference reach program. Samples were analyzed for both organic and inorganic constituents. However, since most of the organic results were below detection limits, only the metals data were utilized for this report.

The data are organized in several formats to demonstrate the average value by parameter, by river basin, by physiographic region and by the state as a whole. Since the type of sediment can be affected by the physical characteristics of the surrounding land area, this format can aid in the evaluation of data from a particular area.

Statistical analyses were performed to generate 10<sup>th</sup>, 50<sup>th</sup>, and 90<sup>th</sup> percentile values for 22 metals, ammonia-nitrogen, total Kjeldahl nitrogen, total cyanide, COD, oil and grease, TOC and TVS. The 90<sup>th</sup> percentile level, or level at which 90% of the data are less than the reported value, was selected as an “elevated” concentration. While there are no data to indicate biological effects (i.e., toxicity tests or benthic surveys) associated with these results,

these levels can be used to determine if further studies may be required that link the value to an instream effect on aquatic communities. The 50<sup>th</sup> percentile value can be used to indicate a background or normal value for sediments collected and analyzed in the same manner.

**Sample Sites:** The complete list of all sampling sites is given in Appendix A. In this study, data from 374 sites were utilized. The types of sampling sites follow:

### **Ambient Monitoring Network**

A fixed network of biological and physicochemical monitoring stations is maintained to monitor statewide trends in water quality. In 1985, there were 39 stations. Beginning in 1986, the Division of Water (DOW) monitored 45 fixed-station stream ambient monitoring stations (DOW, 1986). These stations are designated as primary network sites and are denoted using a PRI numbering system. The frequency of sediment sampling at these sites varied from one sample in the report period to almost one sample per year. For this report, 60 different stations were sampled.

### **Intensive Surveys**

Biological, toxicological, physicochemical, water-column and sediment data are collected. All information except for sediment data at this time is used to determine what use is attainable in a watershed and whether designated uses are being attained. DOW has conducted these surveys over several years. The extent of field investigations for intensive surveys depends on the amount, quality and applicability of existing data. Intensive surveys include reference (control) stations against which the biotic community, water and sediment quality of a reach can be compared (DOW, 1987). Selection of a waterbody for an intensive survey was based on construction grant priority, existing potential environmental impact, public or agency interest



and/or the possibility of including a waterbody in the Ambient Monitoring Program or as a reference reach site.

Intensive survey sites are assigned an eight digit station number (i.e. 03012019). The first two digits represent the 303(e) river basin number, the next three represent the 303(e)-segment number, and the last three represent the individual site. In this reporting period, 298 intensive survey sites had sediment data available for evaluation.

### **Reference Reach**

The DOW began a program in 1991 to gather physical, chemical and biological data from the state's least impacted streams. This program defines these parameters for the streams of a particular ecoregion and allows a comparison with other streams in the same ecoregion (DOW, 1996). For this report, sediments were sampled at nine stream and seven wetland reference reach sites. These sites are given an REF designation in this report.

### **Sampling Methods**

From 1980-1994, all sediments were collected as bulk samples. For wadeable streams, sediments were collected from the top 2.5 cm, with a stainless steel spoon and bucket. Samples were stored in pre-cleaned borosilicate glass freezer jars with Teflon lids and kept frozen until analyzed.

For deeper streams and rivers, sediment samples were taken with Ponar or Ekman dredge, coring devices or manually by diver. All sampling equipment and techniques follow procedures as described in the DOW SOP (DOW, 1987).

**Parameters :**

Table 1 lists all the parameters measured for sediment samples and the method detection limit. Analyses followed standardized laboratory procedures established by the latest edition of Standard Methods for the Examination of Water and Wastewater, Methods for Chemical Analysis of Water and Wastes and the Annual Book of American Society for Testing and Materials (ASTM) Standards.

<b>Table 1. Sediment Parameters</b>			
<b>Analyte</b>	<b>Method Detection Limit (mg/Kg) (Dry Weight)</b>	<b>DOW Test Method</b>	<b>RCRA Test Method</b>
Chemical Oxygen Demand (COD)	NA	NA	
Ammonia	5	350.1 350.2	NA
Oil and Grease	10	1664	1664
Total Kjeldahl Nitrogen (TKN)	40	351.2	NA
Total Organic Carbon (TOC)	100	415.2	9060
Volatile Solids	100	160.4	NA
Cyanide	0.5	335.2	9013
Polychlorinated biphenyls (PCBs)	0.05	608	8082A
Organic Compounds:			
Aldrin	0.005	608	8081
Dieldrin	0.005	608	8081
DDT, total	0.005	608	8081
O,P'DDE	0.005	608	8081
P,P'DDD	0.005	608	8081
O,P'DDD	0.005	608	8081
P,P'DDT	0.005	608	8081
Chlordane	0.005	608	8081
Cis isomer (chlordane)	0.005	608	8081
Trans isomer (chlordane)	0.005	608	8081
Endosulfan I	0.005	608	8081
Endosulfan II	0.005	608	8081
Endosulfan sulfate	0.005	608	8081
Endrin	0.005	608	8081
Endrin Aldehyde	0.005	608	8081
Endrin Ketone	0.005	608	8081
Hexachlorobenzene	0.005	608	8081
Hexachlorocyclohexane	0.005	608	8081
Alpha BHC, dry solids	0.005	608	8081

Beta BHC	0.005	608	8081
Gamma BHC	0.005	608	8081
Delta BHC	0.005	608	8081
Methoxychlor	0.005	608	8081
Mirex	0.005	608	8081
Pentachlorophenol	0.005	608	8081
Tetrachlorophenol	0.005	608	8081
Tetrachlorophenol 2,3,4,5	0.005	608	8081
Tetrachlorophenol 2,3,4,6	0.005	608	8081
Toxaphene	0.05	608	8081
Total Metals:			
Aluminum (Al)	7.5	200.7	6010
Antimony (Sb)	6.8	200.7	6010
Arsenic (As)	0.2	206.2	7060
Barium (Ba)	0.5	200.7	6010
Beryllium (Be)	0.5	200.7	6010
Cadmium (Cd)	0.5	200.7	6010
Chromium (Cr)	1.1	200.7	6010
Cobalt (Co)	0.8	200.7	6010
Copper (Cu)	0.9	200.7	6010
Iron (Fe)	0.6	200.7	6010
Lead (Pb)	1.9	200.7	6010
Manganese (Mn)	0.5	200.7	6010
Molybdenum (Mo)	0.7	200.7	6010
Mercury (Hg)	0.01	245.5	7471
Nickel (Ni)	1.1	200.7	6010
Selenium (Se)	0.2	270.2	7740
Silver (Ag)	1.1	200.7	6010
Strontium (Sr)	0.5	200.7	6010
Thallium (Tl)	33.7	279.2	7841
Tin (Sn)	1.35	200.7	6010
Vanadium (V)	0.5	200.7	6010
Zinc (Zn)	3.8	200.7	6010

NA: not available

There were very few values for the organics above the detection limit. In fact, there were too few actual numbers for statistical analysis. Table 2 lists the parameters used for statistical analysis and the number of analyses for each.

<b>Table 2. Parameters for Statistical Analysis and Number of Analyses</b>	
<b>Parameter</b>	<b>Number of Analyses</b>
Chemical Oxygen Demand	343
Oil and Grease	421
Total Volatile Solids	427
Calcium	16
Cyanide, total	420
Magnesium	18
Potassium	22
Sodium	22
Aluminum	437
Antimony	22
Arsenic	503
Barium	45
Beryllium	22
Cadmium	505
Chromium	505
Cobalt	22
Copper	505
Iron	435
Lead	500
Manganese	436
Mercury	498
Molybdenum	22
Nickel	465
Selenium	44
Silver	22
Strontium	9
Thallium	22
Tin	18
Vanadium	22
Zinc	494
Ammonia-Nitrogen	425
Total Kjeldahl Nitrogen	423

## **Discussion**

Appendix B shows the statistical analyses for each chemical parameter listed in Table 2. As stated previously, the majority of the values for the organic constituents were below detection, so there were not enough data to perform any statistical analyses. For this reason, there are no screening values for organic compounds in this report. In addition, there were too few values for calcium, magnesium, potassium, sodium, beryllium, cobalt, molybdenum, strontium, thallium, tin and vanadium to conduct statistical analyses. Therefore, these parameters were not included in Appendix B.

The data were analyzed to determine: mean, median, minimum and maximum, coefficient of variation, standard deviation, percentile ranging from the 10<sup>th</sup> to the 90<sup>th</sup> percentile and 95% confidence intervals. From these statistical analyses, it was determined that the 90<sup>th</sup> percentile level would be utilized as a screen for this data set in deciding what would be considered an elevated level. Any sediment data value exceeding this level can be considered as being elevated in comparison to this set of sediment information.

Included in Appendix C is a Spearman Correlation Table. This table is used to determine if a relationship exists between any of the parameters. From this table it can be shown that there is a low probability that the presence of one compound will predict or be related to the presence of a second.

Appendix D shows the mean value for each parameter arranged by river basin, ecoregion, physiographic region and for the entire state. Grouping data by region allows for the comparison of data in areas of similar geomorphology. The physical structure of a region can

have a profound effect on what element is naturally occurring in the soil. The final chart takes the mean for each parameter for the entire state. Concentrations below the detection limits were excluded from the mean calculations. In this appendix, the mean concentrations for calcium, magnesium, potassium, sodium, beryllium, cobalt, molybdenum, strontium, thallium, tin and vanadium were included for information purposes only.

Finally, the 90<sup>th</sup> percentile was derived for each parameter at each site. Appendix E shows sites with data exceeding this value. Statewide summary statistics are given in Appendix F which also gives a comparison to levels associated with several state and federal guidelines.

## **Conclusions**

After analyzing the Division of Water's bulk sediment data from 1980-1994, statewide "elevated" values were generated as the 90<sup>th</sup> percentile of the entire dataset. These values are presented on the table in Appendix F. This table also includes sediment guidelines from U.S. EPA Great Lakes Harbor Sediment Guidelines (1977), U.S. EPA Sediment Quality Guidelines (1994) and the New York Department of Environmental Conservation (1998). In the New York guidelines, two levels of risk have been established for metals contamination in sediments. These are the Lowest Effect Level and the Severe Effect Level. The Lowest Effect Level for each metal is the lowest of either Persaud et al. (1992) Lowest Effect Level or the Long and Morgan (1990) Effect Range-Low. Similarly, the Severe Effect Level is the lowest of either the Persaud et al. Severe Effect Level or the Long and Morgan Effect Range-Moderate. A sediment is considered contaminated if either criterion is exceeded. If both criteria are exceeded, the sediment is considered to be severely impacted. If only the Lowest Effect Level criterion is exceeded, the impact is considered moderate. These guidelines are presented here

as a comparison to the Kentucky data. Note that the referenced comparison levels are based on additional information from toxicity tests and/or biological surveys that linked the values with biological effects to determine the category of sediment pollution. Kentucky's data are from chemical analysis of only bulk sediment samples. Caution should be taken when interpreting these comparisons.

In addition to generating the 90<sup>th</sup> percentile table, the data were further screened for parameters for which potential water quality problems could occur through resuspension because of their known toxicity to aquatic life. The parameters selected included arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc.

From the sediment data set, a list was compiled containing sites for which sediment contamination may be a problem. Criteria for listing a site as a sediment "area of concern" include:

- 1) One or more of the following metals occurred in samples: arsenic, cadmium, chromium, copper, lead, mercury, nickel, or zinc.
- 2) One or more of these metals was found at concentrations greater than the 90<sup>th</sup> percentile for the statewide data set.
- 3) For a given site, a particular parameter was repeated at greater than the level of concern on more than one occasion.

Table 3 shows a preliminary sediment "Areas of Concern" list based on the criteria described above. These areas may deserve further study based on the possibility of contaminant levels high enough to cause biological impairments.

<b>Table 3. Sediment Areas of Concern</b>				
<b>Site ID</b>	<b>Stream/Waterbody</b>	<b>Mile Point</b>	<b>Data Set-Years</b>	<b>Parameters of Concern</b>
05040002	Burning Fork	1.35	1984	Ni
04016006	North Elkhorn Creek	49.7	1986-1987	Cr
04017007	South Elkhorn Creek	0.7	1981-1991	Hg, Pb, Zn
PRI034	South Elkhorn Creek	24.2	1984-1991	Cd, Cu, Hg, Pb
04017004	South Elkhorn Creek	33.8	1981-1990	Cd, Cr, Cu, Hg, Pb
PRI026	Kentucky River	249.0	1980-1990	Cr, Hg
PRI028	Licking River, N Fork	50.1	1982-1990	As, Cr, Ni, Pb
PRI036	Licking River, S Fork	49.1	1985-1990	Cr
WRRMVMU	Murphy's Pond	--	1993-1994	Cd
PRI030A/B	Pond Creek	7.9-15.5	1980-1992	As, Cd, Cu, Hg, Pb
PRI012	Pond River	12.4	1980-1989	Cd, Hg, Ni, Zn
PRI027A/B	Red River	72.6-68.5	1980-1991	Cu, Hg
PRI052	Salt River	82.5	1990-1992	Cr
PRI029	Salt River	22.9	1980-1986	As, Hg, Pb
PRI039	Tradewater River	72.7	1985-1987	Ni, Zn



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**APPENDIX A**  
**Station List**

Station List

Station ID	Stream	MP	Location Description	BASIN
02005005	LILY CREEK	4.1	2.5 MILES SOUTHEAST OF JAMESTOWN	UPPER CUMBERLAND
02006002	LITTLE SOUTH FORK CUMBERLAND	5.5	FREEDOM CHURCH FORD (WILD RIVER)	UPPER CUMBERLAND
02006003	LITTLE SOUTH FORK CUMBERLAND	7.92	RITNER FORD	UPPER CUMBERLAND
02006005	LITTLE SOUTH FORK CUMBERLAND	14.5	KY 92 BRIDGE (WILD RIVER)	UPPER CUMBERLAND
02006009	LICK CREEK	0.18	AT RITNER BELOW UT FROM ABBOTT HOLLOW	UPPER CUMBERLAND
02006010	JONES HOLLOW CREEK	1.02	JUST BELOW JONES CHURCH	UPPER CUMBERLAND
02006012	LICK CREEK	1.5	1.5 MILES UP THE DRAINAGE	UPPER CUMBERLAND
02006019	CANEY FORK	5	RIVERINE PORTION OF LAKE CUMBERLAND	UPPER CUMBERLAND
02008001	ROCK CREEK	0.15	AT MOUTH	UPPER CUMBERLAND
02008002	ROCK CREEK	1.6	AT KOGER CREEK	UPPER CUMBERLAND
02008003	ROCK CREEK	3.8	BELOW WHITE OAK CREEK	UPPER CUMBERLAND
02008004	ROCK CREEK	4.3	ABOVE WHITE OAK CREEK (WILD RIVER)	UPPER CUMBERLAND
02008005	ROCK CREEK	11	PUNCHEONCAMP CREEK	UPPER CUMBERLAND
02008006	ROCK CREEK	17.1	AT HEMLOCK GROVE, ROCK CR-BELL FARM RD (WILD R)	UPPER CUMBERLAND
02008007	ROCK CREEK	21.9	KY/TN STATE LINE (WILD RIVER)	UPPER CUMBERLAND
02008008	WHITE OAK CREEK	0.05	BELOW JONES BRANCH	UPPER CUMBERLAND
02008009	WHITE OAK CREEK	1	AT COOPERATIVE, KY	UPPER CUMBERLAND
02008010	JONES BRANCH	0.05	AT MOUTH	UPPER CUMBERLAND
02008011	WATTS BRANCH	0.05	BELOW JONES BRANCH	UPPER CUMBERLAND
02008012	BIG SOUTH FORK CUMBERLAND	40.2	BELOW KY 92 BRIDGE AT THE MOUTH OF WOLF CREEK	UPPER CUMBERLAND
02008013	BIG SOUTH FORK CUMBERLAND	42.2	BELOW WORLEY	UPPER CUMBERLAND
02008014	BIG SOUTH FORK CUMBERLAND	42.7	BELOW ROARING PAUNCH CREEK	UPPER CUMBERLAND
02008015	ROARING PAUNCH CREEK	0.1	AT MOUTH	UPPER CUMBERLAND
02009003	BIG SOUTH FORK CUMBERLAND	49.5	BELOW BEAR CREEK	UPPER CUMBERLAND
02009005	BIG SOUTH FORK CUMBERLAND	51.8	AT THE MOUTH OF OIL WELL BRANCH	UPPER CUMBERLAND
02009006	BIG SOUTH FORK CUMBERLAND	53	AT THE MOUTH OF TROUBLESOME CREEK	UPPER CUMBERLAND
02018002	CUMBERLAND RIVER	562.1	BELOW CUMBERLAND FALLS	UPPER CUMBERLAND
02018002	CUMBERLAND RIVER	569.1	BELOW MARSH CREEK	UPPER CUMBERLAND
02018003	CUMBERLAND RIVER	573.6	AT SUMMER SHOALS	UPPER CUMBERLAND
02037002	YELLOW CREEK	10	OFF KY HIGHWAY 1588	UPPER CUMBERLAND
02037003	YELLOW CREEK	14.9	BELOW CONFLUENCE WITH BENNETTS FORK	UPPER CUMBERLAND
02037004	YELLOW CREEK	13.5	OFF PINEVILLE-MIDDLESBORO ROAD NEAR MELDRUM	UPPER CUMBERLAND
02037005	YELLOW CREEK	2.2	OFF KY HIGHWAY 1534 NEAR L&N RR BRIDGE	UPPER CUMBERLAND
03008006	BEAVER DAM CREEK	0.9	APPROX 1.3 KM E-SE OF CAVE SCHOOL BELOW UT	GREEN
03012001	WET WEATHER SPRING	0.01	450 M N OF RT 722 & L&N RAILROAD JUNCTION	GREEN
03012004	WET WEATHER SPRING	0.01	BRIDGE ON KY 68, 1.7 MI WEST OF AUBURN	GREEN
03012005	INTERMITTENT UT	0.01	0.5 MI SW OF JUNCTION RT 722 & DUNCAN CHAPEL RD	GREEN
03012006	MUD RIVER	70.6	NORTH OF MUDDY RIVER CHURCH ON KY 68	GREEN
03012007	MUD RIVER	68.2	STEVENSON MILL ROAD BRIDGE	GREEN
03012010	TOWN BRANCH	3.7	BELOW E. DITCH NEAR SOUTHERN STATES STORE	GREEN

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03012014	TOWN BRANCH	0.45	CONCORD ROAD, NEAR MOUTH WITH MUDD RIVER	GREEN
03012015	MUD RIVER	65.1	ABOVE HANCOCK LAKE DAM	GREEN
03012017	MUD RIVER	60.2	SE OF COOPERSTOWN	GREEN
03012019	MUD RIVER	35.9	KY HIGHWAY 1153 BRIDGE NEAR BEECHLAND	GREEN
03012020	MUD RIVER	38.6	BEECHLAND-QUALITY ROAD BRIDGE NEAR BEECHLAND	GREEN
03012024	MUD RIVER	17.4	KY HIGHWAY 949 BRIDGE NEAR GUS	GREEN
03012027	WOLF LICK CREEK	4	IRON MOUNTAIN ROAD BRIDGE SE OF DUNMOR	GREEN
03012029	MUD RIVER	0.1	AT MOUTH	GREEN
03018001	WIGGINGTON CREEK UT (MP 3.8)	0.01	0.5 MI NW OF JUNCTION DUNCAN CHAPEL RD & RT 722	GREEN
03018002	WIGGINGTON CREEK UT	0.01	0.25 MI N OF JUNCTION DUNCAN CHAPEL RD & RT 1039	GREEN
03018003	WIGGINGTON CREEK	4	END OF BOSTON ROAD OFF 1038	GREEN
03018004	WIGGINGTON CREEK	0.8	0.4 KM N OF KY HIGHWAY 103 BRIDGE	GREEN
03018005	WIGGINGTON CREEK UT	0.01	0.5 MI UPSTREAM OF MOUTH OF WIGGINGTON CREEK	GREEN
03018006	GASPER RIVER	38	SOUTH OF KY 103, OFF AYERS ROAD (HEADWATERS)	GREEN
03018007	GASPER RIVER UT	0.01	SOUTH OF KY 103, 1/3 MI EAST OF AYERS ROAD	GREEN
03018008	GASPER RIVER UT	0.01	WEST OF AYERS ROAD, 0.25 MI SOUTH OF KY 103	GREEN
03018009	GASPER RIVER UT	0.01	BRIDGE ON AYERS RD, 1/8 MI SOUTH OF KY 103	GREEN
03018010	GASPER RIVER	36.9	1 MI DOWNSTREAM OF BRIDGE ON AYERS ROAD	GREEN
03018012	GASPER RIVER	27.09	KY HIGHWAY 73 BRIDGE	GREEN
03018014	INTERMITTENT UT	0.01	NORTH OF L&N RAILROAD	GREEN
03018015	BLACK LICK CREEK	12.5	HEADWATERS	GREEN
03018016	BLUE HOLE, UT TO BLACK LICK CK	0.01	WATERWORKS PLANT AT AUBURN	GREEN
03018017	BLACK LICK CREEK	12.2	BELOW CALDWELL OUTFALL, ABOVE AUBURN WWTP	GREEN
03018018	BLACK LICK CREEK	11.9	NORTH OF L&N ROALROAD AT AUBURN	GREEN
03018019	BLACK LICK CREEK	6.45	KY HIGHWAY 73 BRIDGE	GREEN
03019001	ARROW SPRING	0.5	ARROW SPRING	GREEN
03019002	SHARPS BRANCH	1.6	ABOVE MOUTH OF ARROW SPRING	GREEN
03019003	SHARPS BRANCH	1.5	BELOW ARROW SPRING	GREEN
03019004	WEST FORK DRAKES CREEK	51	HAYDEN-SNYDER ROAD BRIDGE	GREEN
03019005	WEST FORK DRAKES CREEK	43.7	KY HIGHWAY 1171 BRIDGE	GREEN
03019006	WEST FORK DRAKES CREEK	40.6	KY HIGHWAY 1434 BRIDGE	GREEN
03019007	WEST FORK DRAKES CREEK	35.2	SADDLER FORD ROAD BRIDGE	GREEN
03019008	WEST FORK DRAKES CREEK	29.4	FORD ON BARN SCHOOL ROAD	GREEN
03019009	TRAMMEL FORK	7.7	KY HIGHWAY 240 BRIDGE	GREEN
03019010	WEST FORK DRAKES CREEK SPRING	42.9	1.25 AIR MI SOUTH OF SALMORE	GREEN
03019011	DRAKES CREEK	23.2	KY 250 BRIDGE	GREEN
03019012	DRAKES CREEK	6.3	MIDDLE BRIDGE ROAD BRIDGE	GREEN
03024001	LITTLE PITTMAN CREEK	10.5	ABOVE KY HIGHWAY 210 BRIDGE	GREEN
03024003	LITTLE PITTMAN CREEK	3.6	KY HIGHWAY 793 (FORMERLY 1516) BRIDGE	GREEN
03024004	LITTLE PITTMAN CREEK	7.2	SUMMERSVILLE ROAD BRIDGE	GREEN
03024005	LITTLE PITTMAN CREEK	1.5	KY HIGHWAY 793 BRIDGE	GREEN

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03024006	BIG PITTMAN CREEK	11.1	KY HIGHWAY 161 BRIDGE	GREEN
03024007	BIG PITTMAN CREEK	15.7	RAY CHADION ROAD BRIDGE	GREEN
03024008	MIDDLE PITTMAN CREEK	9.4	SALEM ROAD BRIDGE	GREEN
03024009	MIDDLE PITTMAN CREEK	0.2	JUST ABOVE MOUTH	GREEN
03024010	BUCK HORN CREEK	0.11	ABOVE OLD WWTP	GREEN
04007001	EAGLE CREEK	7	NEAR EAGLE VALLEY RECREATION AREA	KENTUCKY
04007002	EAGLE CREEK	21.5	ST 127 BRIDGE AT GLENCOE	KENTUCKY
04008001	TEN MILE CREEK	0.25	467 BRIDGE NEAR MOUTH	KENTUCKY
04010001	EAGLE CREEK	57.5	OFF LUSBY RD./MASON LANE	KENTUCKY
04010002	EAGLE CREEK	70.4	SR 607 BRIDGE AT 2018 JUNCTION	KENTUCKY
04014001	BAILEY RUN	0.2	NEAR MOUTH AT TYRONE	KENTUCKY
04014002	CEDAR BROOK	0.07	ABOVE BAILEY RUN	KENTUCKY
04014003	BAILEY RUN	1.6	ABOVE CEDAR BROOK	KENTUCKY
04014004	CEDAR BROOK	1.4	BELOW DUMP	KENTUCKY
04014005	CEDAR BROOK	1.68	ABOVE DUMP	KENTUCKY
04014006	KENTUCKY RIVER	84	BELOW BAILY RUN	KENTUCKY
04014007	KENTUCKY RIVER	87.25	ABOVE BAILY RUN	KENTUCKY
04014008	CEDAR BROOK UT	0.35	0.35 MILES FROM CONFLUENCE WITH CEDAR BROOK	KENTUCKY
04015001	ELKHORN CREEK	3.5	BEHIND FISH HATCHERY OFF INDIAN GAP ROAD	KENTUCKY
04015002	ELKHORN CREEK	10.45	AT KNIGHTS BRIDGE ON PEAKS MILL ROAD	KENTUCKY
04015003	ELKHORN CREEK	14.5	END OF COLSTON LANE	KENTUCKY
04016001	NORTH ELKHORN CREEK	17.9	OFF SWITZER ROAD NEAR FORKS OF ELKHORN	KENTUCKY
04016002	NORTH ELKHORN CREEK	25.1	AT SWITZER COVERED BRIDGE	KENTUCKY
04016003	NORTH ELKHORN CREEK	34.8	OFF WHITE OAK PIKE, DOWNSTREAM OF MCCONNELL RUN	KENTUCKY
04016005	NORTH ELKHORN CREEK	44.2	BELOW DAM OFF ELKVIEW ROAD	KENTUCKY
04016006	NORTH ELKHORN CREEK	49.7	OFF US 460 AT DOG POUND W OF GEORGETOWN	KENTUCKY
04016009	NORTH ELKHORN CREEK	53	DEGARIS MILL ROAD, BELOW OLD MILL DAM	KENTUCKY
04016012	NORTH ELKHORN CREEK	58.3	AT CRUMBAUGH PIKE BRIDGE	KENTUCKY
04016013	NORTH ELKHORN CREEK	62.5	JOHNSON MILL ROAD	KENTUCKY
04016014	NORTH ELKHORN CREEK	78.3	RUSSELL CAVE ROAD BRIDGE AT DIXIANA FARM	KENTUCKY
04016015	NORTH ELKHORN CREEK	82	AT BRIDGE CROSSING ELMENDROFF FARM	KENTUCKY
04016016	NORTH ELKHORN CREEK	86	JOHNSTON ROAD BRIDGE	KENTUCKY
04016017	LECOMPTES RUN	1.5	BELOW CONFLUENCE WITH LOCUST FORK NEAR KY 1689	KENTUCKY
04016018	MCCONNELL RUN	0.5	OFF WHITE ROAD AT FORD NEAR MOUTH	KENTUCKY
04016019	CANE RUN	0.2	AT US 460 BRIDGE NEAR MOUTH	KENTUCKY
04016021	CANE RUN	15.1	KY 922 BRIDGE	KENTUCKY
04016024	DRY RUN	1.2	OFF US HIGHWAY 25 N OF GEORGETOWN	KENTUCKY
04016025	LANE RUN	0.5	U. S. HIGHWAY 460 BRIDGE EAST OF GEORGETOWN	KENTUCKY
04016028	NORTH ELKHORN CREEK UT	1.1	AT BRYAN STATION RD BRIDGE ON CV WHITNEY FARM	KENTUCKY
04017001	SOUTH ELKHORN CREEK	43.3	UPSTREAM OF U. S. 60, OFF FORT SPRINGS ROAD	KENTUCKY
04017002	SOUTH ELKHORN CREEK	34.5	BROWNS MILL ROAD BRIDGE, ABOVE TOWN BRANCH	KENTUCKY

Station List

04017003	TOWN BRANCH	4.3	YARNALLTON ROAD BRIDGE	KENTUCKY
04017004	SOUTH ELKHORN CREEK	33.8	BROWNS MILL ROAD BRIDGE BELOW TOWN BRANCH	KENTUCKY
04017005	SOUTH ELKHORN CREEK	19.7	KY HIGHWAY 341 BRIDGE, NORTH OF MIDWAY	KENTUCKY
04017006	SOUTH ELKHORN CREEK	9.4	KY HIGHWAY 1685 BRIDGE	KENTUCKY
04017007	SOUTH ELKHORN CREEK	0.7	END OF SCRUGGS LN, 0.5 KM SOUTH OF FK OF ELKHORN	KENTUCKY
04026001	BOONE CREEK	0.3	0.3 MI UPSTREAM OF MOUTH	KENTUCKY
04026002	BOONE CREEK	3.3	GRIMES MILL ROAD BRIDGE	KENTUCKY
04026003	BOONE CREEK	6.5	UPSTREAM OF KY RT. 418 BRIDGE APPROX. 0.4 MI.	KENTUCKY
04026004	BOONE CREEK	12.63	AT SULPHUR WELL ROAD BRIDGE	KENTUCKY
04026005	BAUGHMAN FORK	0.9	GENTRY RD. BRIDGE	KENTUCKY
04026006	BAUGHMAN FORK	3	AT CLEVELAND ROAD BRIDGE	KENTUCKY
04026007	BAUGHMAN FORK UT	0.5	DOWNSTREAM OF BLUE SKY WWTP	KENTUCKY
04026008	BAUGHMAN FORK UT	0.85	ABOVE BLUE SKY WWTP	KENTUCKY
04036001	STATION CAMP CREEK	20.2	OFF KY 1209 BELOW WAR FORK	KENTUCKY
04036002	WAR FORK	7.5	TURKEY FOOT (U. S. FOREST SERVICE) CAMPGROUND	KENTUCKY
04037001	ROSS CREEK	1.4	0.35 KM SSW OF KY HIGHWAY 851	KENTUCKY
04037002	ROSS CREEK	2.5	BELOW MOUTH OF BUCK LICK BRANCH	KENTUCKY
04037003	ROSS CREEK	2.8	ABOVE MOUTH OF BUCK LICK BRANCH	KENTUCKY
04037004	BUCK LICK BRANCH	0.15	JUST ABOVE MOUTH	KENTUCKY
04037005	MILLERS CREEK	1	KY 1571 BRIDGE	KENTUCKY
04037006	MILLERS CREEK	4	KY 1571 BRIDGE NEAR MT. SINAI CHURCH	KENTUCKY
04037007	MILLERS CREEK	6.5	KY HIGHWAY 52 AT CRYSTAL	KENTUCKY
04037008	BIG SINKING CREEK	7.75	KY HIGHWAY 52 AT FAITH BAPTIST CHURCH	KENTUCKY
04037009	BIG SINKING CREEK	10.8	AT CAVE HOLLOW	KENTUCKY
04037010	BIG SINKING CREEK	14.7	ABOVE BALD ROCK FORK	KENTUCKY
04037011	BIG SINKING CREEK	17.1	AT FIXER, KY	KENTUCKY
04037012	BIG SINKING CREEK	19.4	ABOVE ZACHARIAH LAKE	KENTUCKY
04042003	SOUTH FORK RED RIVER	0.05	KY HIGHWAY 11/15 BRIDGE	KENTUCKY
04042004	SOUTH FORK RED RIVER	1.85	OFF KY HIGHWAY 1639 NEAR SOUTH FORK CHURCH	KENTUCKY
04042007	SOUTH FORK RED RIVER	5.45	ABOVE STUMP CAVE BRANCH	KENTUCKY
04042008	STUMP CAVE BRANCH	0.1	JUST ABOVE MOUTH	KENTUCKY
05016001	BRUSHY FORK UT	0.1	BELOW BLUEGRASS KNITTING, AT RR BRIDGE (MP 2.65)	LICKING
05016003	BRUSHY FORK UT	0.7	KY HIGHWAY 32 BRIDGE ABOVE BLUEGRASS KNITTING	LICKING
05016004	BRUSHY FORK	5.1	CARLISLE PARK	LICKING
05016005	BRUSHY FORK	3.5	KY HIGHWAY 36 BRIDGE IN CARLISLE	LICKING
05016006	BRUSHY FORK	2.6	BELOW UT RECEIVING BLUEGRASS KNITTING EFFLUENT,	LICKING
05016008	BRUSHY FORK	2.2	BELOW CARLISLE WWTP	LICKING
05016009	BRUSHY FORK	0.4	MILLER STATION ROAD BRIDGE	LICKING
05016010	BRUSHY CREEK	8.2	OFF US HIGHWAY 68, 0.4 MI E OF KY HIGHWAY 32/36	LICKING
05016011	BIG BRUSHY CREEK	1.1	KY HIGHWAY 386 BRIDGE	LICKING
05040001	BURNING FORK	0.1	KY 7 BRIDGE	LICKING

## Station List

05040002	BURNING FORK	1.35	OFF MOUNTAIN PARKWAY, BELOW LICK BRANCH	LICKING
05040003	BURNING FORK	3.25	OFF KY 1888	LICKING
05040004	BURNING FORK	5.1	OFF KY 1888 BETWEEN IVYTON & BRADLEY	LICKING
05040005	ROCKHOUSE FORK	0.6	OFF KY HIGHWAY 1415	LICKING
06004001	EAST FORK LITTLE SANDY RIVER	13.85	AT KY 503 BRIDGE	LITTLE SANDY
06004002	EAST FORK LITTLE SANDY RIVER	28.35	OFF KY RT. 3; 1.1 MI SOUTHWEST OF MAVITY, KY.	LITTLE SANDY
06007001	LITTLE SANDY RIVER	33.75	AT PACTOLUS, KY AT THE KY RT. 1910 BRIDGE	LITTLE SANDY
06010001	BIG SINKING CREEK	0.7	WEST OF HWY 7, NEAR ABBOTT HOLLOW	LITTLE SANDY
06011001	LITTLE SANDY RIVER	45.5	BELOW DAM AT LEON; KY 7	LITTLE SANDY
06012001	LITTLE FORK LITTLE SANDY RIVER	6.7	1.5 MI SOUTH OF HITCHENS, KY AT KY RT. 1 BRIDGE	LITTLE SANDY
06012002	LITTLE FORK LITTLE SANDY RIVER	21.75	AT DOBBINS AT KY 486 BRIDGE	LITTLE SANDY
06013001	LITTLE SANDY RIVER	72.85	BELOW SANDY HOOK, KY 557	LITTLE SANDY
06013002	LITTLE SANDY RIVER	78.24	ABOUT 2 MI ABOVE SANDY HOOK	LITTLE SANDY
06013004	LAUREL CREEK	3.4	OFF SR 32	LITTLE SANDY
06013015	RUIN CREEK	0.5	KY HIGHWAY 556 BRIDGE	LITTLE SANDY
08001001	HUMPHREY CREEK	1.8	BARLOW BOTTOMS IN BALLARD CO WILDLIFE MGT AREA	OHIO
08001002	HUMPHREY CREEK	8	GARRETT ROAD BRIDGE	OHIO
08001003	HUMPHREY CREEK	11.1	KY HIGHWAY 358 BRIDGE	OHIO
08002001	HUMPHREY CREEK	14.15	TERRELL SHELBY ROAD BRIDGE	OHIO
08002002	HUMPHREY CREEK	15.7	HINKLEVILLE ROAD BRIDGE	OHIO
08002003	HUMPHREY BRANCH	1.1	FORD OFF TERRELL SHELBY ROAD	OHIO
08090001	LIMESTONE CREEK	0.25	ABOVE US 68 BRIDGE	OHIO
08090002	LIMESTONE CREEK UT	0.1	STORM DITCH AT WALD MANUFACTURING	OHIO
08090003	LIMESTONE CREEK	0.65	AT WALD PARK AND KY 11 BRIDGE	OHIO
08090004	LIMESTONE CREEK	2	OFF KY 11 BRIDGE	OHIO
08095001	KINNICONICK CREEK	19.9	FORD OFF KY HWY 2524, N OF BLANKENSHIP SCHOOL	OHIO
09012001	CYPRESS CREEK	0.3	NEAR MOUTH AT CALVERT CITY ROAD	TENNESSEE
09012002	CYPRESS CREEK	3.2	AT BENNETT ROAD BRIDGE	TENNESSEE
09012003	CYPRESS CREEK	4	JUST DOWNSTREAM OF LWD LANDFILL	TENNESSEE
09012004	CYPRESS CREEK	5.4	1523 BRIDGE (W. OF CALVERT CITY)	TENNESSEE
09013001	LITTLE CYPRESS CREEK	4.3	WEST OF CALVERT CITY, KY AT US 62 BRIDGE	TENNESSEE
09014001	CYPRESS CREEK	8.35	ALABAMA ST. BRIDGE ADJACENT TO KY. 95	TENNESSEE
09014002	CYPRESS CREEK	8.9	BEECH STREET BRIDGE	TENNESSEE
09014003	NEW CYPRESS CREEK	10	KY 1523 BRIDGE, EAST OF CALVERT CITY	TENNESSEE
09014004	CYPRESS CREEK	11.35	LONE VALLEY ROAD	TENNESSEE
09014005	CYPRESS CREEK	12.55	US 62 BRIDGE, SOUTHWEST OF CALVERT CITY	TENNESSEE
09014006	CYPRESS CREEK	13.6	BELOW SWAMP LAKEVIEW CHURCH RD.	TENNESSEE
10001001	TRADEWATER RIVER	2.7	END OF LOCUST ROAD	TRADEWATER
10010003	TRADEWATER RIVER	72.65	AT KY 1220 BRIDGE IN OLNEY	TRADEWATER
10014001	TRADEWATER RIVER	102.2	HOPKINS PARK ROAD BRIDGE	TRADEWATER
11001001	TYGARTS CREEK	21.8	ABOVE CONFLUENCE OF BEECHY CREEK	TYGARTS

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11004001	TYGARTS CREEK	43.4	OFF KY HWY 2/7 AT MOUTH OF LEATHERWOOD BRANCH	TYGARTS
11006002	TYGARTS CREEK	75.5	UPSTREAM OF US HIGHWAY 60 BRIDGE	TYGARTS
12025001	FLOYDS FORK	1.4	1.0 MI ABOVE KY HIGHWAY 44 BRIDGE	SALT
12026001	CHENOWETH RUN	0.2	SEATONVILLE ROAD BRIDGE	SALT
12027001	FLOYDS FORK	31.1	OFF POPE LICK ROAD, 1.5 MI S OF POPE LICK CREEK	SALT
12028002	CURRYS FORK	0.4	KY HIGHWAY 1408 (TODDS POINT ROAD) BRIDGE	SALT
12029002	MILL CREEK	5.6	PORTER RIVER RD BRIDGE ON FT KNOX MILITARY RES	SALT
12032003	SOUTHERN DITCH	0.3	BELOW MOUTH WILSON CK (12032003A AT MP 0.6-1.0)	SALT
12032004	SOUTHERN DITCH	3.4	MINORS LANE BRIDGE	SALT
12032005	WILSON CREEK	0.05	NEAR MOUTH	SALT
12032006	NORTHERN DITCH	18.4	KY HIGHWAY 1020 BRIDGE	SALT
12032007	NORTHERN DITCH	21.4	BELOW KY HIGHWAY 61 BRIDGE	SALT
12032008	BLUE SPRING DITCH	0.95	FERN VALLEY ROAD BRIDGE	SALT
12032009	NORTHERN DITCH	22.3	ABOVE PRESTON HIGHWAY (KY 61) BRIDGE	SALT
12032010	NORTHERN DITCH	24.05	KY HIGHWAY 2052	SALT
12032011	FERN CREEK	25.5	FEGENBUSH ROAD BRIDGE	SALT
20010008	SINKING CREEK	4.1	KING CHAPEL RD. BRIDGE	LOWER CUMBERLAND
20010011	SINKING CREEK	36.3	AT KY 91 BRIDGE	LOWER CUMBERLAND
20010012	MUDDY FORK	1.2	U.S. 68/80 BRIDGE	LOWER CUMBERLAND
20010013	CASEY CREEK	2.2	KY. 525	LOWER CUMBERLAND
20010014	CASEY CREEK	5.1	KY. 164	LOWER CUMBERLAND
20013001	LITTLE RIVER	61.2	GARY LANE BRIDGE	LOWER CUMBERLAND
20013002	LITTLE RIVER	69.6	KY. 272 BRIDGE	LOWER CUMBERLAND
20013003	NORTH FORK LITTLE RIVER	76.85	KY. 107 AT 1682	LOWER CUMBERLAND
20013004	LOWER BRANCH LITTLE RIVER	4.1	FRUIT CHURCH RD.	LOWER CUMBERLAND
20019001	ELK FORK CREEK	31	OFF POND RIVER ROAD AT SHELBY LASTER TRAILER PK.	LOWER CUMBERLAND
20019002	ELK FORK CREEK	26.9	KY HIGHWAY 102 BRIDGE	LOWER CUMBERLAND
20019003	ELK FORK CREEK	19.5	CURTIS SMALLS ROAD BRIDGE	LOWER CUMBERLAND
20019004	ELK FORK CREEK	8.1	KY HIGHWAY 848 BRIDGE AT DARNELL	LOWER CUMBERLAND
20020001	WHIPPOORWILL CREEK	0.3	KY HIGHWAY 96 BRIDGE	LOWER CUMBERLAND
20020002	SOUTH FORK RED RIVER	7.9	STATE LINE ROAD BRIDGE	LOWER CUMBERLAND
20020003	SOUTH FORK RED RIVER	2.55	ADAIRVILLE-BARREN PLAIN ROAD BRIDGE	LOWER CUMBERLAND
20020004	RED RIVER	58.8	BELOW DAM NEAR KY HIGHWAY 591 BRIDGE	LOWER CUMBERLAND
20020005	RED RIVER	55	DOT-TENNESSEE STATE LINE ROAD BRIDGE	LOWER CUMBERLAND
20020006	WHIPPOORWILL CREEK	23.4	US 68/KY 80 BRIDGE	LOWER CUMBERLAND
PRI001	BLAINE CREEK	9.6	FALLSBURG, AT HWY 3	BIG SANDY
PRI002B	TUG FORK	36.3	RAILROAD BRIDGE AT LOVELY, ABOVE KERMIT	BIG SANDY
PRI003	TUG FORK	78	AT STATE LINE	BIG SANDY
PRI004	PAINT CREEK	0.3	NEAR MOUTH AT PAINTSVILLE	BIG SANDY
PRI005	LEVISA FORK	69.4	AT PAINTSVILLE	BIG SANDY
PRI006	LEVISA FORK	114.6	PIKEVILLE AT KY 1426 BRIDGE	BIG SANDY



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PRI007	CUMBERLAND RIVER	393.7	TURKEY NECK ROAD	UPPER CUMBERLAND
PRI008	BIG SOUTH FORK CUMBERLAND	44.8	BLUE HERON AT CANOE ACCESS (WILD RIVER)	UPPER CUMBERLAND
PRI009	CUMBERLAND RIVER	562.4	ABOVE CUMBERLAND FALLS/KY 90 BRIDGE (WILD RIVER)	UPPER CUMBERLAND
PRI010	ROCKCASTLE RIVER	24.7	KY HIGHWAY 1956 BRIDGE AT BILLOWS (WILD RIVER)	UPPER CUMBERLAND
PRI011	CUMBERLAND RIVER	654.4	AT PINEVILLE	UPPER CUMBERLAND
PRI012	POND RIVER	12.4	KY HIGHWAY 85 BRIDGE	GREEN
PRI013	POND RIVER	62.8	KY HIGHWAY 189 BRIDGE	GREEN
PRI014B	ROUGH RIVER	57.1	AT DUNDEE, OFF KY 62 BRIDGE	GREEN
PRI015	MUD RIVER	44.5	KY HIGHWAY 106 BRIDGE	GREEN
PRI016	GREEN RIVER	141.4	DOWNSTREAM OF U.S. HWY. 231 BRIDGE NEAR MORGAN	GREEN
PRI017B	BARREN RIVER	14.6	BELOW LOCK AND DAM 1, AT GREENCASTLE	GREEN
PRI018	GREEN RIVER	229.1	AT H. H. WILSON PARK NEAR MUNFORDVILLE	GREEN
PRI019	GREEN RIVER	279.7	US HIGHWAY 68, AT GREENSBURG	GREEN
PRI020	BACON CREEK	7.2	USGS GAGING STATION NEAR PRICEVILLE	GREEN
PRI021	NOLIN RIVER	80.9	JUST UPSTREAM OF 1866 BRIDGE AT WHITE MILLS	GREEN
PRI022	EAGLE CREEK	20.8	GLENCOE OFF KY 467 BETWEEN RMI 20.2 - 25.5	KENTUCKY
PRI023	KENTUCKY RIVER	55.5	NEAR MOUTH OF ELKHORN CREEK	KENTUCKY
PRI025	KENTUCKY RIVER	135.2	NEAR CAMP NELSON	KENTUCKY
PRI026	KENTUCKY RIVER	249	ABOVE LOCK AND DAM #14 AT HEIDELBERG (KY 399)	KENTUCKY
PRI027A	RED RIVER	72.6	USGS GAUGING STATION AT HAZEL GREEN	KENTUCKY
PRI027B	RED RIVER	68.5	HIGHWAY KY 746 BRIDGE	KENTUCKY
PRI028	NORTH FORK LICKING RIVER	50.1	KY HIGHWAY 419 BRIDGE NEAR LEWISBURG	LICKING
PRI029	SALT RIVER	22.9	SHEPHERDSVILLE KY 61 BRIDGE	SALT
PRI030A	POND CREEK	7.9	BLEVINS ROAD, EAST OF ORELL	SALT
PRI030B	POND CREEK	15.5	MANSLICK ROAD, KY 2055 BRIDGE	SALT
PRI031	NORTH FORK KENTUCKY RIVER	304.5	AT JACKSON, KY; OLD KY 30 BRIDGE	KENTUCKY
PRI032	MIDDLE FORK KENTUCKY RIVER	8.3	KY 708 BRIDGE, AT TALLEGA	KENTUCKY
PRI033	SOUTH FORK KENTUCKY RIVER	11.5	KY 30 BRIDGE, AT BOONESVILLE	KENTUCKY
PRI034	SOUTH ELKHORN CREEK	24.2	MOORES MILL ROAD	KENTUCKY
PRI035	LICKING RIVER	126.95	KY HIGHWAY 11 BRIDGE AT SHERBURNE	LICKING
PRI036	SOUTH FORK LICKING RIVER	49.1	BETWEEN US 62/27 BRIDGE AND KY HIGHWAY 36 BRIDGE	LICKING
PRI037	BAYOU DE CHIEN	15.1	HWY 51 BRIDGE NEAR CLINTON	MISSISSIPPI
PRI038	CLARKS RIVER	53.5	KY 464 BRIDGE NEAR ALMO	TENNESSEE
PRI039	TRADEWATER RIVER	72.7	NEAR OLNEY, HWY 1220	TRADEWATER
PRI040	FLOYDS FORK	50.4	DOWNSTREAM OF KY HIGHWAY 1408 (TODDS POINT ROAD)	SALT
PRI041	BEECH FORK	48	AT MAUD, KY 55 BRIDGE	SALT
PRI042	MAYFIELD CREEK	10.8	HWY 121 BRIDGE; MAGEE SPRING IN OLD MAYFIELD CK	MISSISSIPPI
PRI044	ROLLING FORK	38.8	AT NEW HAVEN, US 31E BRIDGE	SALT
PRI045	DIX RIVER	34.7	AT HWY 52 BRIDGE	KENTUCKY
PRI046	RED RIVER	21.6	AT CLAY CITY	KENTUCKY
PRI048	TYGARTS CREEK	28.1	KY 7 BRIDGE AT LOAD	TYGARTS

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PRI049	LITTLE SANDY RIVER	13.2	HWY 1 AT ARGILLITE	LITTLE SANDY
PRI050	BUCK CREEK	45	KY 70 BRIDGE NEAR EUBANK	UPPER CUMBERLAND
PRI051	HORSE LICK CREEK	1.9	HORSE LICK CREEK ROAD FIRST FORD	UPPER CUMBERLAND
PRI052	SALT RIVER	82.5	AT GLENSBORO, KY 53 BRIDGE	SALT
PRI053	TRADEWATER RIVER	15.15	US 60 BRIDGE, NEAR SULLIVAN	TRADEWATER
PRI055	GREEN RIVER	74.4	OLD FERRY ROAD BELOW KY85 BRIDGE	GREEN
PRI057	ROLLING FORK	12.3	AT KY 434 BRIDGE, NEAR LEBANON JUNCTION	SALT
PRI059	SOUTH FORK LICKING RIVER	11.7	NEAR MORGAN OFF KY 1054	LICKING
PRI060	NORTH FORK LICKING RIVER	2.4	NEAR MILFORD, RILEY MILL ROAD OFF KY 539	LICKING
PRI061	LICKING RIVER	78.2	CLAYSVILLE BOAT RAMP NEAR US 62 BRIDGE	LICKING
PRI062B	LICKING RIVER	228.4	NEAR WEST LIBERTY	LICKING
PRI063B	KINNICONICK CREEK	19.9	NEAR CAMP DIX, OFF HWY 2524	OHIO
PRI064B	LEVISA FORK	35.1	AT DAM NEAR LOUISA	BIG SANDY
REFIPBUC	BUCK CREEK	28.9	OFF BUD RAINEY ROAD	UPPER CUMBERLAND
REFIPMC2	MUDDY CREEK	13.4	KY 52 BRIDGE	KENTUCKY
REFIPRU1	RUSSELL CREEK	60.5	KY 80 AT GENTRYS MILL	GREEN
REFIPTF2	TRAMMEL FORK	26.6	CONCORD CHURCH ROAD BRIDGE	GREEN
REFIPWHP	WHIPPOORWILL CREEK	4.3	KY 2395 BRIDGE	LOWER CUMBERLAND
REFIPWIL	WILSON CREEK	12.2	MT. CARMEL CHURCH ROAD 1ST XING	SALT
REFWALAC	LAUREL CREEK	7.6	CARTER SCHOOL ROAD BRIDGE	LITTLE SANDY
REFWAOSC	STATION CAMP CREEK	19	OFF KY 1209 AT ESTILL/JACKSON BORDER	KENTUCKY
REFWASTU	STURGEON CREEK	4	OFF STURGEON CREEK ROAD	KENTUCKY
WRRIPRAS	ROUNDAABOUT SWAMP	0	NORTH OF LOGAN SCHOOL RD.	GREEN
WRRIRSTS	STRAIGHT SLOUGH WETLAND	0	AT LAKETON	MISSISSIPPI
WRRMABDC	BAYOU DE CHIEN-MOSCOW WETLAND	12.4	NORTH OF BAYOU DE CHIEN, 3/4 MI EAST OFF KY 239	MISSISSIPPI
WRRMAFPS	FISH POND	0	OFF KY 311	MISSISSIPPI
WRRMV MAY	MAYFIELD CREEK	26.7	UPSTREAM OF US 45 BRIDGE	MISSISSIPPI
WRRVMUR	MURPHYS POND	0	OFF HENDERSON RD (MURPHYS POND RD) & KY 1748	MISSISSIPPI
WRRWALSR	MARTINS POND	0	AT KY 784 & KY 1, EAST OF KY 1	LITTLE SANDY

**APPENDIX B**  
**Statistical Analyses for Each Parameter**

<b>Chemical Oxygen Demand</b>	
Sample size	342
Minimum	1600.00
Maximum	199000.00
Std deviation	30168.75
C.V.	77.05
Mean	39155.32
Median	32250.00
Percentiles:	
10	11000.00
25	19000.00
50	32200.00
75	49500.00
90	75800.00
95.00% Confidence Interval:	
Lower limit	35946.57
Upper limit	42364.08

<b>Oil and Grease</b>	
Sample size	420
Minimum	1.00
Maximum	8550.00
Std deviation	827.89
C.V.	194.91
Mean	424.76
Median	160.00
Percentiles:	
10	11.00
25	65.00
50	160.00
75	455.00
90	947.00
95.00% Confidence Interval:	
Lower limit	345.35
Upper limit	504.16

<b>Total Organic Carbon</b>	
Sample size	428
Minimum	110.00
Maximum	20100.00
Std deviation	15536.28
C.V.	151.37
Mean	10263.48
Median	5760.00
Percentiles:	
10	1400.00
25	3000.00
50	5720.00
75	11600.00
90	23100.00
95.00% Confidence Interval:	
Lower limit	8787.41
Upper limit	11739.55

<b>Total Volatile Solids</b>	
Sample size	426
Minimum	2000.00
Maximum	730000.00
Std deviation	48065.07
C.V.	83.05
Mean	57873.94
Median	50000.00
Percentiles:	
10	23200.00
25	35000.00
50	50000.00
75	70000.00
90	96000.00
95.00% Confidence Interval:	
Lower limit	53296.62
Upper limit	62451.26

<b>Cyanide</b>	
Sample size	419
Minimum	<0.05
Maximum	247.00
Std deviation	12.20
C.V.	551.28
Mean	2.21
Median	0.85
Percentiles:	
10	<0.49
25	<0.64
50	<0.85
75	<1.11
90	<5.00
95.00% Confidence Interval:	
Lower limit	1.04
Upper limit	3.38

<b>Aluminum</b>	
Sample size	436
Minimum	270.00
Maximum	55300.00
Std deviation	5721.51
C.V.	66.48
Mean	8606.20
Median	7540.00
Percentiles:	
10	2650.00
25	4490.00
50	7490.00
75	11300.00
90	15200.00
95.00% Confidence Interval:	
Lower limit	8067.66
Upper limit	9144.75

<b>Antimony</b>	
Sample size	22
Minimum	<0.49
Maximum	<10.10
Std deviation	1.94
C.V.	73.03
Mean	2.66
Median	2.09
Percentiles:	
10	<1.74
25	<1.88
50	<2.08
75	<2.75
90	<3.52
95.00% Confidence Interval:	
Lower limit	1.80
Upper limit	3.52

<b>Arsenic</b>	
Sample size	502
Minimum	<0.02
Maximum	303.00
Std deviation	14.81
C.V.	311.53
Mean	4.76
Median	2.69
Percentiles:	
10	0.41
25	1.12
50	2.67
75	5.19
90	8.34
95.00% Confidence Interval:	
Lower limit	3.46
Upper limit	6.05

<b>Barium</b>	
Sample size	45
Minimum	29.70
Maximum	318.00
Std deviation	65.06
C.V.	56.88
Mean	114.38
Median	86.50
Percentiles:	
10	56.70
25	64.80
50	86.50
75	139.00
90	198.00
95.00% Confidence Interval:	
Lower limit	94.84
Upper limit	133.93

<b>Cadmium</b>	
Sample size	504
Minimum	0.00
Maximum	434.00
Std deviation	19.67
C.V.	911.08
Mean	2.16
Median	0.306
Percentiles:	
10	0.03
25	0.10
50	0.30
75	0.80
90	2.95
95.00% Confidence Interval:	
Lower limit	0.44
Upper limit	3.88



<b>Chromium</b>	
Sample size	504
Minimum	<0.03
Maximum	831.00
Std deviation	41.67
C.V.	220.71
Mean	18.88
Median	12.95
Percentiles:	
10	4.12
25	7.40
50	12.90
75	20.30
90	35.10
95.00% Confidence Interval:	
Lower limit	15.23
Upper limit	22.53

<b>Copper</b>	
Sample size	504
Minimum	0.20
Maximum	8510.00
Std deviation	380.78
C.V.	1112.12
Mean	34.24
Median	11.35
Percentiles:	
10	4.30
25	7.25
50	11.30
75	17.80
90	29.80
95.00% Confidence Interval:	
Lower limit	0.92
Upper limit	67.56

<b>Iron</b>	
Num missings	0
Minimum	665.00
Maximum	121000.00
Std deviation	14812.56
C.V.	68.27
Mean	21697.89
Median	19700.00
Percentiles:	
10	6600.00
25	11100.00
50	19700.00
75	27200.00
90	37700.00
95.00% Confidence Interval:	
Lower limit	20300.40
Upper limit	23095.38

<b>Lead</b>	
Sample size	499
Minimum	0.80
Maximum	312.00
Std deviation	38.38
C.V.	128.74
Mean	29.81
Median	17.90
Percentiles:	
10	8.87
25	11.90
50	17.90
75	29.60
90	58.90
95.00% Confidence Interval:	
Lower limit	26.44
Upper limit	33.19

### Manganese

Sample size	435
Minimum	<0.12
Maximum	23500.00
Std deviation	1827.59
C.V.	120.98
Mean	1510.60
Median	997.00
Percentiles:	
10	335.00
25	597.00
50	997.00
75	1900.00
90	2860.00
95.00% Confidence Interval:	
Lower limit	1338.38
Upper limit	1682.83

### Mercury

Sample size	497
Minimum	0.00
Maximum	1.03
Std deviation	0.13
C.V.	163.02
Mean	0.08
Median	0.04
Percentiles:	
10	0.02
25	0.03
50	0.04
75	0.08
90	0.17
95.00% Confidence Interval:	
Lower limit	0.07
Upper limit	0.09

<b>Nickel</b>	
Sample size	464
Minimum	0.01
Maximum	15300.00
Std deviation	721.65
C.V.	1153.46
Mean	62.56
Median	17.20
Percentiles:	
10	4.39
25	8.06
50	17.10
75	27.70
90	42.10
95.00% Confidence Interval:	
Lower limit	-3.27
Upper limit	128.40

<b>Selenium</b>	
Sample size	44
Minimum	0.00
Maximum	<5.11
Std deviation	1.84
C.V.	111.52
Mean	1.65
Median	0.39
Percentiles:	
10	0.09
25	0.11
50	0.25
75	<3.47
90	4.01
95.00% Confidence Interval:	
Lower limit	1.09
Upper limit	2.21

<b>Silver</b>	
Sample size	22
Minimum	<0.55
Maximum	2.46
Std deviation	0.51
C.V.	58.10
Mean	0.88
Median	0.69
Percentiles:	
10	<0.55
25	0.64
50	<0.69
75	<0.86
90	<0.88
95.00% Confidence Interval:	
Lower limit	0.65
Upper limit	1.10

<b>Zinc</b>	
Sample size	493
Minimum	<0.36
Maximum	14400.00
Std deviation	669.05
C.V.	541.46
Mean	123.56
Median	58.80
Percentiles:	
10	20.90
25	32.20
50	58.80
75	91.10
90	166.00
95.00% Confidence Interval:	
Lower limit	64.36
Upper limit	182.77

<b>Ammonia</b>	
Sample size	424
Minimum	0.05
Maximum	1130.00
Std deviation	111.80
C.V.	158.20
Mean	70.67
Median	34.05
Percentiles:	
10	6.48
25	13.80
50	33.60
75	80.00
90	161.00
95.00% Confidence Interval:	
Lower limit	60.00
Upper limit	81.34

<b>Total Kjeldahl Nitrogen</b>	
Sample size	422
Minimum	0.44
Maximum	27900.00
Std deviation	1735.55
C.V.	167.02
Mean	1039.12
Median	729.00
Percentiles:	
10	178.00
25	336.00
50	726.00
75	1240.00
90	1860
95.00% Confidence Interval:	
Lower limit	873.05
Upper limit	1205.18

**APPENDIX C**  
**Spearman Correlation Tables**

**Spearman Correlation Table 1**

	<b>CHEMICAL OXYGEN DEMAND</b>	<b>COPPER</b>	<b>IRON</b>	<b>LEAD</b>	<b>MANGANESE</b>	<b>MERCURY</b>	<b>NICKEL</b>	<b>OIL AND GREASE</b>	<b>TOTAL ORGANIC CARBON</b>	<b>TOTAL VIOLATION SOLIDS</b>	<b>ZINC</b>
<b>CHEMICAL OXYGEN DEMAND</b>		0.46 (369) P<.00001	0.27 (370) P<.00001	0.38 (366) P<.00001	0.40 (364) P<.00001	0.43 (367) P<.00001	0.31 (368) P<.00001	0.27 (350) P<.00001	0.45 (362) P<.00001	0.58 (362) P<.00001	0.41 (367) P<.00001
<b>COPPER</b>	0.46 (369) P<.00001		0.53 (470) P<.00001	0.58 (534) P<.00001	0.38 (464) P<.00001	0.43 (530) P<.00001	0.58 (496) P=.00001	0.42 (443) P<.00001	0.29 (460) P<.00001	0.44 (461) P<.00001	0.73 (526) P=.00001
<b>IRON</b>	0.27 (370) P<.00001	0.53 (470) P<.00001		0.43 (467) P<.00001	0.49 (467) P<.00001	0.28 (466) P<.00001	0.48 (470) P<.00001	0.25 (439) P<.00001	0.30 (457) P<.00001	0.36 (457) P<.00001	0.55 (469) P=.00001
<b>LEAD</b>	0.38 (366) P<.00001	0.58 (534) P=.00001	0.43 (467) P<.00001		0.42 (461) P<.00001	0.45 (527) P<.00001	0.40 (493) P<.00001	0.37 (440) P<.00001	0.21 (457) P<.00001	0.33 (458) P<.00001	0.61 (523) P=.00001
<b>MANGANESE</b>	0.40 (364) P<.00001	0.38 (464) P<.00001	0.49 (467) P<.00001	0.42 (461) P<.00001		0.39 (460) P<.00001	0.38 (464) P<.00001	0.18 (434) P=.0002	0.22 (451) P<.00001	0.35 (452) P<.00001	0.47 (463) P<.00001
<b>MERCURY</b>	0.43 (367) P<.00001	0.43 (530) P<.00001	0.28 (466) P<.00001	0.45 (527) P<.00001	0.39 (460) P<.00001		0.31 (493) P<.00001	0.27 (439) P<.00001	0.34 (456) P<.00001	0.34 (457) P<.00001	0.49 (521) P<.00001
<b>NICKEL</b>	0.31 (368) P<.00001	0.58 (496) P=.00001	0.48 (470) P<.00001	0.40 (493) P<.00001	0.38 (464) P<.00001	0.31 (493) P<.00001		0.23 (442) P<.00001	0.28 (459) P<.00001	0.40 (460) P<.00001	0.68 (492) P=.00001
<b>OIL AND GREASE</b>	0.27 (350) P<.00001	0.42 (443) P<.00001	0.25 (439) P<.00001	0.37 (440) P<.00001	0.18 (434) P=.0002	0.27 (439) P<.00001	0.23 (442) P<.00001		0.18 (432) P=.0002	0.29 (434) P<.00001	0.42 (437) P<.00001
<b>TOTAL ORGANIC CARBON</b>	0.45 (366) P<.00001	0.29 (460) P<.00001	0.30 (457) P<.00001	0.21 (457) P<.00001	0.22 (451) P<.00001	0.34 (456) P<.00001	0.28 (459) P<.00001	0.18 (432) P=.0002		0.41 (452) P<.00001	0.31 (455) P<.00001
<b>TOTAL VOLATILE SOLIDS</b>	0.58 (362) P<.00001	0.44 (461) P<.00001	0.36 (457) P<.00001	0.34 (458) P<.00001	0.35 (452) P<.00001	0.32 (457) P<.00001	0.40 (460) P<.00001	0.29 (434) P<.00001	0.41 (452) P<.00001		0.41 (455) P<.00001
<b>ZINC</b>	0.41 (367) P<.00001	0.73 (526) P=.00001	0.55 (469) P=.00001	0.61 (523) P=.00001	0.47 (463) P<.00001	0.49 (521) P<.00001	0.68 (492) P=.00001	0.42 (437) P<.00001	0.31 (455) P<.00001	0.41 (455) P<.00001	

**Note: the values in the table are listed as follows: Correlation value  
(sample size)  
Probability**



**Spearman Correlation Table 2**

	<b>AMMONIA</b>	<b>CHEMICAL OXYGEN DEMAND</b>	<b>OIL AND GREASE</b>	<b>TOTAL KJELDAHL NITROGEN</b>	<b>TOTAL ORGANIC CARBON</b>	<b>TOTAL VOLATILE SOLIDS</b>
<b>AMMONIA</b>		0.44 (356) P<.00001	0.40 (434) P<.00001	0.43 (445) P<.00001	0.14 (440) P=.0024	0.33 (444) P<.00001
<b>CHEMICAL OXYGEN DEMAND</b>	0.44 (356) P<.00001		0.27 (350) P<.00001	0.25 (360) P<.00001	0.45 (366) P<.00001	0.58 (362) P<.00001
<b>OIL AND GREASE</b>	0.40 (434) P<.00001	0.27 (350) P<.00001		0.37 (437) P<.00001	0.18 (432) P=.0002	0.29 (434) P<.00001
<b>TOTAL KJELDAHL NITROGEN</b>	0.43 (445) P<.00001	0.25 (360) P<.00001	0.37 (437) P<.00001		0.35 (443) P<.00001	0.25 (446) P<.00001
<b>TOTAL ORGANIC CARBON</b>	0.14 (440) P=.0024	0.45 (366) P<.00001	0.18 (432) P=.0002	0.35 (443) P<.00001		0.41 (452) P<.00001
<b>TOTAL VOLATILE SOLIDS</b>	0.33 (444) P<.00001	0.58 (362) P<.00001	0.29 (434) P<.00001	0.25 (446) P<.00001	0.41 (452) P<.00001	

**Note: the values in the table are listed as follows:**

**Correlation value**

**(sample size)**

**Probability**

**Spearman Correlation Table 3**

	<b>ALUMINUM</b>	<b>AMMONIA</b>	<b>ARSENIC</b>	<b>CADMIUM</b>	<b>CHEMICAL OXYGEN DEMAND</b>	<b>CHROMIUM</b>	<b>OIL AND GREASE</b>	<b>TOTAL ORGANIC CARBON</b>	<b>TOTAL VOLATILE SOLIDS</b>
<b>ALUMINUM</b>		0.46 (446) P<.00001	0.32 (467) P<.00001	0.28 (469) P<.00001	0.39 (369) P<.00001	0.53 (469) P<.00001	0.31 (437) P<.00001	0.36 (455) P<.00001	0.40 (455) P<.00001
<b>AMMONIA</b>	0.46 (446) P<.00001		0.19 (449) P<.00001	0.05 (452) P=0.3180	0.44 (356) P<.00001	0.30 (452) P<.00001	0.40 (434) P<.00001	0.14 (440) P=0.0024	0.33 (444) P<.00001
<b>ARSENIC</b>	0.32 (467) P<.00001	0.19 (449) P<.00001		0.23 (534) P<.00001	0.19 (368) P=0.0003	0.37 (534) P<.00001	0.18 (443) P=0.0001	0.02 (458) P=.6378	0.27 (459) P<.00001
<b>CADMIUM</b>	0.28 (469) P<.00001	0.05 (452) P=31801	0.23 (534) P<.00001		0.12 (370) P=0.0174	0.22 (539) P<.00001	0.07 (444) P=0.1319	0.25 (461) P<.00001	0.13 (462) P=0.0063
<b>CHEMICAL OXYGEN DEMAND</b>	0.39 (369) P<.00001	0.44 (356) P<.00001	0.19 (368) P=0.0003	0.12 (370) P=.01741		0.27 (370) P<.00001	0.27 (350) P<.00001	0.45 (366) P<.00001	0.58 (362) P<.00001
<b>CHROMIUM</b>	0.53 (469) P<.00001	0.30 (452) P<.00001	0.37 (534) P<.00001	0.22 (539) P<.00001	0.27 (370) P<.00001		0.31 (444) P<.00001	0.20 (461) P<.00001	0.25 (462) P<.00001
<b>OIL AND GREASE</b>	0.31 (437) P<.00001	0.40 (434) P<.00001	0.18 (443) P=0.0001	0.07 (444) P=0.1319	0.27 (350) P<.00001	0.31 (444) P<.00001		0.18 (432) P=0.0002	0.29 (434) P<.00001
<b>TOTAL ORGANIC CARBON</b>	0.36 (455) P<.00001	0.14 (440) P=0.0024	0.02 (458) P=.6378	0.25 (461) P<.00001	0.45 (366) P<.00001	0.20 (461) P<.00001	0.18 (432) P<.00002		0.41 (452) P<.00001
<b>TOTAL VOLATILE SOLIDS</b>	0.40 (455) P<.00001	0.33 (444) P<.00001	0.27 (459) P<.00001	0.13 (462) P=0.0063	0.48 (362) P<.00001	0.25 (462) P<.00001	0.29 (434) P<.00001	0.41 (452) P<.00001	

**Note: the values in the table are listed as follows:**  
**Correlation value**  
**(sample size)**  
**Probability**

**APPENDIX D**  
**Mean Concentration by River Basin, Ecoregion,**  
**Physiographic Region, and State**  
**mg/Kg dry weight**

Mean by Basin

PARA_NAME	BIG SANC GREEN	KENTUCK LICKING	LITTLE S/	LOWER C	MISSISSIF	OHIO	SALT	TENNESS	TRADEWA	TYGARTS	UPPER CUMBERLAND		
Chemical Oxygen Demand	46214	22903.4	43781.39	33091.43	37325	23844	27753.75	25940.83	34693.33	52993.75	42860	16900	63009.74
Oil and Grease	247.5	192.2428	493.508	823.4367	121.4588	113.5524	361.5	381.8	866.8378	822.3529	145.5	80.5	259.8106
Total Volatile Solids	53233.33	44401.56	63550.78	58520	46552.94	34285.71	87000	56127.27	58041.67	53723.53	41150	29400	66044.26
Calcium		6460	32466.25			10800	3130						
Cyanide, total	1.812667	1.438936	3.109427	1.1546	1.094588	4.4895	2.971823	5.328667	1.313853	1.283118	1.469333	0.6275	1.247426
Magnesium	3726.667	878.5	2745	1860		1150	3000		7680				
Potassium	1834	560	1721.875	1200		655	1916.667		1420				
Sodium	106.6667	23.275	86.8125	31.4		21.6	198.1		333.5				
Aluminum	6982.667	5910.369	10710	10549.38	6256.875	4833.857	10243.53	7052.5	10269.46	7909.412	9578.333	6130	7415.625
Antimony	1.634	1.9475	2.47125	1.88		3.52	6.106667		1.1775				
Arsenic	2.735813	4.01246	3.917507	5.732176	2.181176	2.029619	3.681722	4.582917	8.314298	2.109765	37.06222	7.57	3.021714
Barium	113.2667	85.32692	212.95	73.4		80.4	159.6667		83.05				
Beryllium	1.230667	0.536	1.449125	0.792		0.648	0.943333		0.9795				
Cadmium	0.883624	5.438	1.737738	1.1958	0.216941	1.056381	1.637499	4.871832	1.429595	0.365182	2.053	0.935667	0.655379
Chromium	10.8745	13.4396	22.66141	18.48229	10.73424	14.42248	13.66222	81.5475	24.30383	8.741176	12.80778	11.78	15.27205
Cobalt	18.2	8.5325	14.6	13.2		10.9	10.92667		15				
Copper	20.17688	8.563786	86.22727	22.49631	9.228824	6.698571	13.63667	16.69	24.56915	14.23824	17.16667	7.906667	13.15792
Iron	17078	11712.26	27280.62	33245.45	19571.25	8194	20166.25	23287.5	25759.21	18230	27111.67	18700	19195.46
Lead	26.07813	19.22276	37.69562	41.34286	11.60882	15.56905	24.15889	28.20333	49.77383	30.43529	20.34444	15.93333	23.37094
Manganese	773.9567	1188.154	1911.556	1953.333	3021.713	754.1905	1019.824	1290.917	1334.784	1861.529	1999	765	973.1371
Mercury	0.087574	0.053606	0.130697	0.062817	0.053771	0.030429	0.096013	0.03225	0.102715	0.080906	0.060289	0.070583	0.047397
Molybdenum	0.941	0.9235	2.415625	0.891		1.53	2.65		2.2485				
Nickel	23.314	183.4753	49.85871	27.69676	17.90176	4.9828	16.05953	81.43167	30.16816	8.906063	50.91667	8.48	23.68698
Selenium	3.66	0.77764	3.756	3.47		0.15	0.698333		3.255				
Silver	1.152333	0.66575	0.749125	0.69299		0.861	1.48933		0.558				
Strontium		19.525	12.9			33.5	21.4						
Thallium	5.963333	5.8475	7.0475	5.64		7.62	34.6		5.305				
Tin		4.515	5.07375			3.37	3.636667						6.63
Vanadium	18.76667	21.7	27.675	13.6		22.4	37.7		29.55				
Zinc	77.31956	74.13959	224.4678	77.35294	57.63294	39.905	49.23889	243.3417	110.6956	46.98125	136.3	37.3	99.86
Ammonia-Nitrogen	27.30067	35.83462	70.6187	66.69667	40.02941	39.63333	131.1306	74	123.7416	295.6588	36.23333	28.6	30.14395
Total Kjeldahl Nitrogen	469.81	753.7308	1181.72	1131.577	1398	704.7238	1151.882	813.8	1625.489	1034.671	433.1667	399.5	867.1259

Mean by Ecoregion

PARA_NAME	CENTRAL APPALACHIAN	INTERIOR PLATEAU	INTERIOR RIVER LOWLAND	MISSISSIPPI ALLUVIAL PLAIN	MISSISSIPPI VALLEY LOESS PLAIN	SOUTHWESTERN APPALACHIAN	WESTERN ALLEGHENY
Chemical Oxygen Dema	49383	37306.60465	48492.66667		25571.53846	81054.54545	30072.08333
Oil and Grease	374.3164407	495.7701176	582.8333333	186	282.8823529	279.4333333	189.5
Total Volatile Solids	62273.33333	54038.4	75505.88235	101000	50878.94737	91266.66667	55950
Calcium		24553.33333	3980	3330	2080		1730
Cyanide, total	1.356576271	2.601305579	4.341111111	2.68	2.306525789	1.418915833	1.077076462
Magnesium	3726.666667	2954.4	2650	2610	3740		1660
Potassium	1834	1313.571429	1340	1680	2730		1160
Sodium	106.6666667	102.4642857	95.4	72.9	426		36.55
Aluminum	6132.666667	9774.455253	8840.555556	14350	8525.789474	10340.76923	5693.230769
Antimony	1.634	2.133928571	5.41	2.81	10.1		2.72
Arsenic	2.847136364	4.469859016	22.098	4.943333333	2.48505	5.045444444	3.173386533
Barium	115.95	113.3714286	164	133	182		75
Beryllium	1.230666667	1.111214286	0.996	0.724	1.11		0.7895
Cadmium	0.681333303	1.654448651	21.38572682	4.11	0.7324495	0.340166667	0.497132533
Chromium	12.85507576	23.18262171	12.02090909	18.3	10.6805	12.89666667	12.28662667
Cobalt	18.2	12.31642857	13.5	8.58	10.7		16.3
Copper	13.16216667	48.13734539	17.46772727	18.83333333	11.47	20.755	10.80036
Iron	18863.5	22698.23137	28613.88889	22200	16853.88889	25231.07143	19207.21538
Lead	25.203125	34.83099668	19.65181818	29.33333333	31.933	17.83166667	18.28106667
Manganese	903.1841379	1652.875486	2144.277778	694.3333333	1104.631579	1541.892857	1481.540308
Mercury	0.056458636	0.091278567	0.10971381	0.091	0.084038889	0.039915833	0.0649784
Molybdenum	0.941	1.964	2.35	1.22	4.38		1.2205
Nickel	24.06548387	87.7004645	31.37335294	27.06666667	11.11957895	37.28333333	22.58074627
Selenium	2.765	1.644440882	0.657	0.248	1.19		1.814
Silver	1.152333333	0.697142857	1.32	0.68799	2.46		0.782995
Strontium		22.32	23.7	19.4	21.1		12.9
Thallium	5.963333333	6.448571429	29.7	18.2	55.9		6.68
Tin		4.916666667	3.23	1.68	6	6.63	3.02
Vanadium	18.76666667	26.62857143	33.5	21.8	57.8		15.25
Zinc	64.05957797	158.1676923	114.0047619	73.5	39.37	106.075	66.36222222
Ammonia-Nitrogen	31.40758333	79.8939677	199.2888889	185	83.65368421	33.713	33.89011111
Total Kjeldahl Nitrogen	880.6059322	1172.444593	959.5	923	885.0736842	651.45	805.8274194

Mean by Physiographic Region

PARA_NAME	EC	EP	IB	JP	KN	OB	WC	WP
Chemical Oxygen Demand	44013.47	29385.71	50680.26	39100.67	32100.00	39642.94	32056.25	22633.21
Oil and Grease	287.18	775.40	635.59	541.11	379.07	481.99	136.07	176.20
Total Volatile Solids	62401.52	50665.96	65361.90	65392.31	67166.67	58441.03	45827.78	38486.67
Calcium	1730.00		37700.00	3130.00		31800.00		7328.00
Cyanide, total	1.24	1.22	4.20	3.18	1.73	1.12	1.95	2.38
Magnesium	2900.00	7680.00	3130.00	3000.00		3260.00		932.80
Potassium	1564.40	1420.00	1565.83	1916.67		3260.00		579.00
Sodium	78.62	333.50	84.30	198.10		147.00		22.94
Aluminum	6397.16	8568.04	12665.81	8520.00	8638.33	12242.75	9254.44	5271.42
Antimony	2.07	1.18	2.41	6.11		1.74		2.26
Arsenic	3.12	4.95	4.15	2.99	15.33	6.47	18.68	2.76
Barium	97.96	83.05	226.33	159.67		269.00		85.14
Beryllium	1.05	0.98	1.50	0.94		1.83		0.56
Cadmium	0.57	0.85	2.45	1.02	1.01	2.51	17.99	1.00
Chromium	12.81	20.44	26.88	10.79	23.41	41.16	13.10	14.07
Cobalt	17.44	15.00	13.67	10.93		15.40		9.01
Copper	12.82	18.15	126.73	13.34	28.84	24.45	14.88	7.22
Iron	19804.03	16970.96	30245.12	20159.49	29416.67	33733.33	21793.89	10146.42
Lead	21.57	35.42	48.68	24.85	48.96	42.30	21.73	17.96
Manganese	1215.08	897.25	2408.53	1341.60	1885.17	1981.98	2212.00	952.15
Mercury	0.06	0.08	0.17	0.08	0.06	0.05	0.10	0.04
Molybdenum	1.05	2.25	1.34	2.65		9.71		1.04
Nickel	24.54	23.00	60.74	12.19	29.47	46.01	40.18	193.70
Selenium	2.92	3.26	4.45	0.70		3.21		0.75
Silver	1.00	0.56	0.76	1.49		0.55		0.70
Strontium	12.90			21.40				22.32
Thallium	6.25	5.31	7.24	34.60		5.23		6.20
Tin	5.43		5.59	3.64		4.04		4.29
Vanadium	17.36	29.55	27.57	37.70		39.10		21.84
Zinc	69.58	130.03	302.08	45.15	87.06	127.24	130.79	60.68
Ammonia-Nitrogen	32.65	91.16	94.79	184.79	126.14	66.12	45.07	37.12
Total Kjeldahl Nitrogen	830.04	1258.63	1525.96	996.09	1778.27	1043.07	566.89	731.02

EC - Eastern coalfield  
 EP - Eastern pennyrile  
 IB - Inner bluegrass  
 JP - Jackson Purchase  
 KN - Knobs  
 OB - Outer bluegrass  
 WC - Western coalfield  
 WP - Western pennyrile

Mean By State

Chemical	Avg	Unit (dry weight) N	Min	Max
Chemical Oxygen Demand	39155.32164	mg/kg	342	1600 199000
Oil and Grease	465.5259211	mg/kg	380	1.68 8550
Total Organic Carbon	10301.8267	mg/kg	427	110 201000
Total Volatile Solids	57928.90995	mg/kg	422	2000 730000
Calcium	19110	mg/kg	16	1730 56800
Cyanide, total	10.40503448	mg/kg	29	0.51 247
Magnesium	2946.888889	mg/kg	18	699 12800
Potassium	1452.818182	mg/kg	22	389 3260
Sodium	110.0863636	mg/kg	22	16.2 560
Aluminum	8617.597701	mg/kg	435	270 55300
Antimony	2.660772727	mg/kg	22	0.492 10.1
Arsenic	5.145986906	mg/kg	459	0.04 303
Barium	115.0181818	mg/kg	44	29.7 318
Beryllium	1.075363636	mg/kg	22	0.436 2.89
Cadmium	2.416549932	mg/kg	440	0.0001 434
Chromium	19.21146951	mg/kg	984	0.112 831
Cobalt	13.29136364	mg/kg	22	5.99 23.6
Copper	34.66150302	mg/kg	497	0.198 8510
Iron	21724.21016	mg/kg	433	665 121000
Lead	30.18573469	mg/kg	490	0.8 312
Manganese	1516.693256	mg/kg	433	7.35 23500
Mercury	0.082185386	mg/kg	479	0.0001 1.03
Molybdenum	3.4378	mg/kg	5	0.738 9.71
Nickel	63.19023963	mg/kg	459	0.00899 15300
Selenium	0.5805596	mg/kg	25	0.079 4.01
Silver	0.990398	mg/kg	5	0.574 2.24
Thallium	34.6	mg/kg	3	18.2 55.9
Tin	4.96	mg/kg	5	3.02 9.37
Vanadium	26.03181818	mg/kg	22	10 57.8
Zinc	124.1725979	mg/kg	490	0.81299 14400
Ammonia-Nitrogen	72.05325781	mg/kg	415	0.05 1130
Total Kjeldahl Nitrogen	1040.659783	mg/kg	420	0.442 27900

**APPENDIX E**  
**Sample Sites with Data Exceeding the 90<sup>th</sup> Percentile Value**



**APPENDIX F**  
**Sediment Quality Parameters for the State of Kentucky**

**SEDIMENT QUALITY PARAMETERS FOR THE STATE OF KENTUCKY**

STORET Parameter Code	Parameter mg/kg (unless stated) (Dry weight)	Kentucky Division of Water Data (1980-1994)					New York (1998) Sediment Guidelines EL-L EL-S	U.S. EPA (1977) Great Lakes Harbor Sediment Guidelines			U.S. EPA (1994) Sed. Qual. Guidelines	
		% Below N	Detection	10	50	90		Non-Poll.	Moderately-Poll.	Heavily-Poll.		
339	Chemical Oxygen Demand	342	0	11000	32200	75800			<40000	40000-80000	>80000	
557	Oil and Grease	420	9.29	11	160	947			<1000	1000-2000	>2000	
80153	Total Organic Carbon	428	0	1400	5720	23100			<50000	50000-80000	>80000	
70322	Total Volatile Solids	426	0.7	23200	50000	96000			<0.10	0.10 - 0.25	>0.25	
721	Cyanide, Total	419	93.08	<0.49	<0.85	<5.00						
1108	Aluminum	436	0	2650	7490	15200						
1098	Antimony	22	100	<1.74	<2.08	<3.52	2 25					25
1003	Arsenic	502	8.17	0.41	2.67	8.34	6 33				>8	85
3626	Barium	45	0	56.7	86.5	198			<20	20-60	>60	
1028	Cadmium	504	12.3	0.03	0.3	2.95	0.6 9		*	*	>6	9
1029	Chromium	504	4.37	4.12	12.9	35.1	26 110		<25	25-75	>75	145
1038	Cobalt											
1043	Copper	504	0.79	4.3	11.3	29.8	16 110		<25	25-50	>50	390
1170	Iron	434	0	6600	19700	37700			<17000	17000-25000	>25000	
1052	Lead	499	1.2	8.87	17.9	58.9	31 110		<40	40-60	>60	110
1053	Maganese	435	0.23	335	997	2860	460 1110		<300	300-500	>500	
71921	Mercury	497	3.22	0.02	0.04	0.17	.15 1.3		*	1	>1.0	1.3
1063	Molybdenum											
1068	Nickel	464	0.65	4.39	17.1	42.1	16 50		<20	20-50	>50	50
1148	Selenium	44	40.91	0.09	0.25	4.01						
1078	Silver	22	77.27	<0.55	<0.69	<0.88	1 2.2					2.2
1093	Zinc	493	0.2	20.9	58.8	166	120 270		<90	90-200	>200	270
611	Ammonia-Nitrogen	424	1.89	6.48	33.6	161			<75	75-200	>200	
627	Total Kjeldahl Nitrogen	422	0.24	178	726	1860			<1000	1000-2000	>2000	
39351	Chlordane (ug/kg)											0.0015
39519	PCBs (ug/kg)								*	42-650	>10.0	0.14
	<b>Revised: 10/00</b>								<b>*Lower limits not established</b>			<b>~PCB-1260</b>

Effect Level - Low

Effect Level -Severe