

Upper Cumberland River TMDLE Fact Sheet

Project Name:	Upper Cumberland River Fecal Coliform TMDL (equivalent)
Location:	Southeastern Kentucky draining the counties of Knox, Bell, Harlan, Whitley, McCreary and Pulaski.
Scope/Size:	TMDL covers 218 miles of the upper Cumberland River and its tributaries.
TMDL Issues:	Point Source/straight pipes.
Data Sources:	Ambient monitoring, Intensive Surveys, municipal and package plant facilities monitoring, and compliance sampling surveys.
Monitoring Plan:	Monthly sampling of the upper Cumberland River mainstem and tributaries during PCR season and random compliance sampling inspections at wastewater plants.
Control Measures:	NPDES permits and enforcement. Federal funds to upgrade WWTPs. Education campaigns to inform local communities of straight pipe problems. Possible legislation aimed at preventing new straight pipe discharges.
TMDL Development:	Ambient monitoring data collected in 1984 and 1985 indicated exceedances of the FC criteria for primary contact recreation use on the Cumberland River in Pineville. Monitoring in 1990 during bioassay compliance testing, and further intensive survey monitoring in 1993 and 1994 indicated that the majority of the pollution was coming from wastewater plants and straight pipe discharges. All point sources are required to meet a FC limit of 200 colonies/100 ml as an average with a 400 colonies/100 ml maximum (frequency depends upon the size of the facility.) This provides a margin of safety because the stream standard is met at the end of the pipe and dilution from normal flows in the receiving stream will lower the FC concentration well below the standard. The goal for straight pipe discharges is elimination. Enforcement actions resulted in improved performance from permitted discharges. Noncomplying WWTPs and straight pipe discharges continue to cause stream pollution and the need to continue swimming advisories. Education and other forms of assistance with possible state laws requiring adequate wastewater treatment systems from new residences will reduce fecal contamination from straight pipe sources.
Implementation Controls:	Fines, compliance inspections and monitoring have reduced the level of fecal contamination from WWTPs. These will continue. Communities will receive educational, technical, and financial assistance to help eliminate straight pipe sources of fecal contamination.

**REMOVING FECAL POLLUTION FROM THE UPPER CUMBERLAND RIVER
DRAINAGE**

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ABSTRACT

A water quality investigation was conducted on July 21 and August 19, 1993, to identify the source(s) of fecal coliform (FC) bacteria in the upper Cumberland River drainage. The Cumberland River is a sixth-order stream 318 miles long, with a drainage area of 17,914 mi² (46,397 km²) and lies entirely within the states of Kentucky and Tennessee. The upper Cumberland River Basin in Kentucky is 7,220 mi² (18,697 km²). The upper Cumberland River Basin study area has a drainage area of 5,181 mi² (13,419 km²). This area represents 72 percent of the area in Kentucky and 29 percent of the total basin area. Ambient monitoring data from there indicated unacceptable FC levels for primary contact recreation (PCR; i.e. swimming).

In July and August, 1993, 119 samples (including duplicates) were collected from 55 stations (21 mainstem; 34 and 43 tributary stations, respectively) on the Cumberland River, Clear Fork, Poplar Creek, Richland Creek, Fighting Creek, Stinking Creek, Greasy Creek, Straight Creek, Clear Creek, Yellow Creek, Brownies Creek, Puckett Creek, Poor Fork, Cloverlick Creek, Looney Creek, Clover Fork, Catron Creek, and Martins Fork. Included in the survey were nine municipal effluents (Williamsburg, Barbourville, Pineville, Loyall, Harlan, Cumberland, Benham, Lynch, and Everts). As a result of the intensive survey, monthly sampling at selected stations followed for the 1994 - 1996 PCR season.

Fecal coliform analyses indicated that the mainstem was safe for PCR, with the exception of the river encompassing the headwater communities of Pineville, Harlan and Loyall. Most unacceptable FC levels were found in the tributaries. Of the 43 tributary stations sampled August 19, 1993, 23 (53 percent) had unacceptable FC levels for PCR. Six of the nine municipal discharges exceeded their KPDES permit limit for FCs on one occasion or more. The effluents of Williamsburg, Pineville, and Everts were indicative of little or no treatment. A warning regarding swimming health risk was issued in a press release in October.

In June 1994, five samples were collected from six mainstem and ten tributary stations, as well as the municipal effluents of seven facilities. As a result, a swimming advisory was posted on all or parts of the Cumberland River, Martins Fork, Clover Fork, Poor Fork, and Looney Creek. Monthly samples were collected for the rest of the 1994 PCR season, as well as the 1995 and 1996 PCR seasons. Fecal coliform data still indicated a swimming advisory was warranted in various parts of the drainage.

The upper Cumberland River watershed had several streams listed on the 1994 303(d) list for total maximum daily load (TMDL) development. A loading approach was not as appropriate to fecal coliform control because the water quality criteria are based on numbers of colony forming units per 100 ml of water sampled. A TMDL could have been calculated as colonies/day (or colony forming units/day) based on the design flows of the wastewater treatment plants and the permit concentration limits. However, limits based on concentration are the most appropriate for this kind of pollutant because it relates directly to the instream standard and can be easily measured to determine success in implementing the TMDL. Therefore, an instream target for all affected waterbodies was set as equal to or less than 400 colonies per 100 ml (a water quality criteria for primary contact recreation use). This is considered as equivalent to a total maximum daily load. In order to reduce FC contamination through a holistic approach, a watershed monitoring effort was initiated to determine the sources of contamination. Twenty-one main stem stations and seven municipal

effluents were monitored throughout the PCR season while facility upgrading occurred. In 1995, permitted dischargers in the drainage were warned by letter that noncompliance with their Kentucky Pollutant Discharge Elimination System (KPDES) permit limit for FC bacteria would result in a \$1,000 fine. During the 1995 - 1996 PCR seasons, each facility was sampled twice. This strategy of controlling known point sources was successful. Noncompliance among package treatment plants fell from a high in 1995 of 55 percent to a low in 1996 of 11 percent. Compliance and stream sampling continued in 1997. Noncomplying facilities were assessed \$15,000 in penalties. However, FC levels continued to be unacceptable for swimming in the upper part of the drainage, mostly due to numerous illegal straight pipe discharges of untreated waste and noncomplying municipal and package treatment plants. Strategies are being developed and implemented to control these remaining sources.

EXECUTIVE SUMMARY

1993

1. Intensive survey data were collected on July 21 and August 19, 1993, from 21 mainstem stations, four water plant intakes (WPI), nine municipal wastewater treatment plants (WWTP), and 34 and 43 tributary stations, respectively. A total of 146 samples were collected on these two occasions (including duplicates).
2. Streams sampled were the upper Cumberland River, Clear Fork, Poplar Creek, Richland Creek, Fighting Creek, Stinking Creek, Greasy Creek, Straight Creek, Left Fork Straight Creek, Clear Creek, Yellow Creek, Brownies Creek, Puckett Creek, Poor Fork, Cloverlick Creek, Looney Creek, Clover Fork, Catron Creek, and Martins Fork.
3. Water plant intakes sampled were Williamsburg, East Knox County, Harlan, and Cumberland. No fecal coliform (FC) levels were found greater than the Kentucky Surface Water Standard (KSWS; 2,000 per 100 ml, as a geometric mean) for raw water sources.
4. Municipal WWTP effluents sampled were from the cities of Williamsburg, Barbourville, Pineville, Loyall, Harlan, Cumberland, Benham, Lynch, and Evarts.
5. Of the 21 mainstem stations, 3 (approximately 14 percent) had unacceptable FC levels (>400 per 100 ml) on July 21. On Aug. 19, 8 (approximately 38 percent) had unacceptable FC levels. Fecal coliform levels in the tributaries were higher than on the mainstem. Of the 34 stations collected on July 21, 15 (44 percent) had unacceptable FC levels for PCR. Of the 43 stations collected on Aug. 19, 23 (53 percent) had unacceptable FC levels for PCR.
6. The results of the intensive survey indicate fecal pollution in the mainstem is generally coming from four sources: (1) the Pineville WWTP, (2) the Loyall WWTP, (3) the city of Harlan, and (4) tributaries, especially in the headwaters which form the upper Cumberland River mainstem.
7. Based on the instream data (Appendix A), the Cumberland River mainstem was safe for all PCR uses, with the exception of the upper river area that encompasses the headwater communities of Pineville, Loyall, and Harlan. The eight mainstem stations with unacceptable FC levels are located from six miles below Pineville (mp 647.1) to the extreme headwaters of the mainstem (Harlan, mp 694.2; approximately 47 mi). Violations of KSWS for FC bacteria, 401 KAR 5:031, Section 6 were found in this area.

Based on the two intensive survey sampling events within a 30-day period, a swimming advisory was warranted on the upper Cumberland River in the area of Pineville, Harlan, and Loyall and in the tributaries of Poor Fork, Clover Fork, Left Fork Straight Creek, Martins Fork, Cloverlick, Straight Creek, Catron Creek, Greasy Creek, Looney Creek, Puckett Creek, and Richland Creek.

9. Municipal discharges were the most severe impacts of fecal pollution observed in the study area. The municipal effluents of Loyall and Pineville adversely affected water quality in the upper Cumberland River and were a major cause of the impairment to PCR uses.
10. Six of nine municipal facilities tested (67 percent) had unacceptable FC levels in their effluents on at least one of two occasions. Three of nine (33 percent) (Pineville, Loyall, and Evarts) had unacceptable FC levels on both occasions. Those municipal facilities that violated the daily KPDES permit limit of 400 FC per 100 ml during the survey were the cities of Williamsburg, Pineville, Loyall, Benham, Lynch, and Evarts. Effluents of the cities of Evarts and Pineville were indicative of raw sewage on both occasions. The city of Williamsburg's effluent was indicative of raw sewage on one occasion. These WWTP effluents appeared to have little treatment or no disinfection.
11. Ambient monitoring data from the station located on the Cumberland River in Pineville (Table 1) indicated bacterial levels unsafe for primary contact recreational (PCR) uses (401 KAR 5:031, Section 6) on 37 of 76 occasions (approximately 49 percent) during the 1984 - 1996 PCR seasons. As a result of the intensive survey and monthly ambient monitoring data, a press release was issued by DOW warning of the fecal pollution found in the drainage on Oct. 4, 1993 (Appendix F). Swimming was observed in the study area during the survey, as well as numerous straight pipe discharges of untreated waste from private households. On Oct. 5, 1993, the Lexington, Ky., Herald - Leader newspaper published an article concerning the level of fecal pollution and warned the public of a pending swimming advisory and further testing the following spring when the weather was warm enough for swimming (Appendix F).

1994

12. In June, five samples were collected within a 30-day period at 16 locations in the drainage (Appendix B). Since these results indicated unacceptable FC levels for PCR uses, a swimming advisory was issued on July 1, prior to the Fourth of July holiday by the Division of Water and the Kentucky Department for Health Services for portions of the following streams: Cumberland River from Fourmile Bridge (Hwy 2014) to Pineville at Hwy 66 Bridge (approximately 14 mi), Cumberland River from Wallins Creek Bridge (Hwy 219) to Harlan (approximately 14 mi), Martins Fork from Harlan to Cawood Water Plant (approximately 10 mi), the entire stretch of Catron Creek (approximately 8 mi), the entire stretch of Clover Fork (approximately

34.5 mi), Poor Fork from Harlan to Looney Creek (approximately 25 mi), and Looney Creek from the mouth to Lynch Water Plant Bridge (approximately 2.6 mi).

A total of approximately 98.1 miles of stream were placed under a swimming advisory. A press release was issued the same day listing all Kentucky rivers and streams placed under a swimming advisory (Appendix F).

13. The swimming advisory remained in effect for the rest of the 1994 PCR season (May through Oct.) since monthly monitoring of the upper Cumberland River drainage indicated unsafe FC levels.

1995

14. After reviewing FC data from the 1994 PCR season, a decision was made to notify all permitted facilities of an impending compliance sampling of their effluents for FC bacteria. Should they fail to meet their KPDES permit limit, a fine of not less than \$1,000 and up to \$25,000 would be levied against them. This action caused the greatest reduction in fecal pollution since monitoring began in 1993.
15. Monthly FC samples were collected during the six months of the PCR season at seven mainstem stations, 14 tributary stations, and seven municipal WWTP effluents. These FC results continued to show unacceptable FC levels (Appendix B and C) and supported the continuance of the swimming advisory (Appendix F). Of 115 stream samples collected during the 1995 PCR season, 83 (approximately 72%) had unacceptable FC levels for PCR uses (i.e. swimming). The primary sources of fecal pollution in the upper Cumberland River drainage at this time were (1) improperly operating municipal WWTPs, (2) package treatment plants, (3) bypassing lift stations, and (4) illegal (straight pipe) discharges of untreated waste from private homes.
16. As a result of compliance sampling inspections (Appendix D) on Sept. 14, of 22 package treatment plant effluents tested, 12 (approximately 55 percent) failed to have 400 or less FC per 100 ml. On Oct. 16, seven of 22 package treatment plant effluents (approximately 32 percent) failed. Six facilities (approximately 27 percent) failed on both occasions. Twenty-five notices of violation were issued by DOW, London Regional Office, for exceeding KPDES permit effluent FC levels. Fifteen package WWTPs were referred to the DOW Enforcement Branch. Three municipal demand letters (the cities of Harlan, Loyall, and Benham) were issued, with a total of \$3,300 in civil penalties assessed and collected by DOW Enforcement Branch. Seventeen demand letters for penalties were sent by DOW Enforcement Branch. In all, \$20,650 assessed in penalties was collected (Appendix E).
17. The city of Pineville's new WWTP was brought on line. However, it was referred to DOW Enforcement Branch for collection system bypasses.

The city of Loyall was referred to the DOW Enforcement Branch for failing to meet KPDES effluent FC levels.

19. The cities of Lynch, Cumberland, and Evarts were in compliance with their KPDES permit for FC bacteria in their effluents.
20. The city of Benham started construction on WWTP improvements.
21. The city of Harlan made plans for a new WWTP.

1996

22. Monthly FC samples were collected during the six months of the PCR season at seven mainstem stations, 14 tributary stations, and seven municipal WWTP effluents. These results continued to show unacceptable FC levels and supported the swimming advisory (Appendix B). Of 132 stream samples collected during the 1996 PCR season, 100 (approximately 76 percent) had unacceptable FC levels for PCR uses.
23. As a result of compliance sampling inspections on June 19, of 20 package treatment plants tested, three (15 percent) failed to meet KPDES permit FC levels. On Oct. 9, of 19 effluent samples tested, only two (approximately 11 percent) failed to comply. No facility failed on both occasions. Thirteen notices of violation were issued by DOW, London Regional Office. Five package WWTPs were referred to DOW Enforcement Branch.
24. Two demand letters were issued by DOW Enforcement Branch for \$3,000 in civil penalties against two municipal WWTPs (Pineville and Cumberland). So far, a total of \$2,500 has been collected. For 1996, six demand letters were issued for \$6,000 in assessed penalties against municipal and package WWTPs. So far, \$5,000 has been collected (Appendix E).
25. Nine package WWTP discharges were eliminated by either connecting to the municipal WWTP (seven), ceasing to operate and discharge (one), or being replaced by a septic tank and lateral field (one).
26. The city of Pineville refurbished three lift stations and purchased spare pumps for each station. However, it still has combined sewer overflows.
27. A large straight pipe from the community of Rio Vista that discharged raw sewage into the Cumberland River was connected to the Loyall WWTP.
28. Two combined sewer overflows were eliminated in the city of Harlan, and the city was awarded a grant to help build a regional WWTP.

Monthly sampling will continue during the PCR seasons at approximately 21 stations, as well as at seven municipal WWTPs, until the facilities show consistent compliance and the swimming advisory is removed.

1997

30. Monthly FC samples were collected during the six months of the PCR season at seven mainstem stations, 14 tributary stations, and seven municipal WWTP effluents. The preliminary results supported continuing the summary advisory.
31. Seventeen demand letters and one agreed order were issued to 11 package WWTPs and five municipalities (Evarts, Loyall, Harlan, Cumberland and Lynch.)
32. A total of \$15,000 in assessed penalties were made of which \$9,500 have been collected.

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INTRODUCTION

The Kentucky Division of Water (DOW) uses fecal coliform (FC) data collected at ambient monitoring stations throughout Kentucky to assess water quality for recreational uses. Ambient monitoring and intensive survey FC data are compiled biennially for the 305(b) Kentucky Report to Congress on Water Quality (305[b] report). From that FC data and other information, a list of streams is developed with impairments to recreational uses. The upper Cumberland River drainage was selected from that list for further investigation.

Ambient monitoring data from the station located on the Cumberland River in Pineville (Table 1) indicated bacterial levels unsafe for primary contact recreational (PCR) uses (401 KAR 5:031, Section 6) on 37 of 76 occasions (approximately 49 percent) during the 1984 - 1996 PCR seasons. The 1986 305b report indicated ten of eleven (91 percent) monthly ambient FC samples collected during the 1984 and 1985 PCR seasons (May through October 31) exceeded 400 FC / 100 ml (DOW, 1986).

In 1990, six municipal effluents in the upper Cumberland River basin were tested for FC bacteria during bioassay compliance testing (Table 2). In addition, samples were taken from the receiving stream for FC analyses above and below each municipal outfall (Table 2). These results indicated the city of Pineville Wastewater Treatment Plant (WWTP) effluent exceeded Kentucky Pollutant Discharge Elimination System (KPDES) permit limit for FC bacteria as a monthly geometric mean, with two samples unacceptable as a daily maximum. Instream FC geometric mean levels in the Cumberland River near the effluents of Barbourville and Pineville were unacceptable for PCR (milepoints 632.75 and 653.1, respectively).

Approximately 87.6 miles of the upper Cumberland River did not fully support PCR uses as noted in the 1990 305(b) report, and 41.1 miles downstream of Harlan were reported in the 1992 305(b) report as not meeting PCR uses.

For these reasons, the DOW conducted intensive survey investigations and FC monitoring in the upper Cumberland River watershed. The data that follow will show the extent of the FC pollution and why a swimming advisory was imposed. It will also show how FC compliance sampling inspections with the enforcement of \$1,000 fines for noncompliance on permitted dischargers led to a decrease in fecal pollution. However, the swimming advisory remains in effect.

The FC data in this report are presented in four categories: (1) the 1993 Upper Cumberland River Drainage Intensive Survey Instream FC Data (Appendix A), (2) the 1993 - 1996 Upper Cumberland River Drainage Monthly Instream FC Data (Appendix B), (3) the 1993-1996 Upper Cumberland River Municipal FC Data (Appendix C), and (4) the 1995 - 1996 Upper Cumberland River Compliance Sampling FC Data for Non-municipal Facilities (Appendix D). 1997 data were used in a preliminary analysis and are not included in the appendix.

Table 1. Cumberland River, Pineville Ambient Monitoring Fecal Coliform Data*

	MAY	JUN	JUL	AUG	SEP	OCT
1984	ND	240	700	12,000	20,000	16,000
1985	730	990	830	490	4,000	800
1986	3,100	1,900	200	2,100	200	ND
1987	2,000	5,100	500	800	600	90
1988	300	330	420	930	1,200	310
1989	820	2,000	80	2,500	140	280
1990	420	240	720	360	1	460
1991	1,800	300	>200	440	590	220
1992	20	330	90	140	170	40
1993	90	250	25	20	40	70
1994	570	250	880	270	9	420
1995	120	700	120	45	560	<10
1996	240	560	2,300	90	20	40

* Boldface = unacceptable fecal coliform level for primary contact recreation (>400 per 100 ml)

Table 2. 1990 Municipal Effluent and Receiving Stream Fecal Coliform Data in the Upper Cumberland River Drainage

FACILITY / RECEIVING STREAM / MP	DATE	FC ABOVE	FINAL EFF	FC BELOW
Williamsburg / Cumberland River / 589.45				
	5 Jun 90	2,100	<10	30
	6 Jun 90	<10	<50	<10
	7 Jun 90	400	<10	2,400
	8 Jun 90	200	<10	150
	Geo. Mean	200	<15	<100
Barbourville / Cumberland River / 632.75				
	5 Jun 90	480	<10	620
	6 Jun 90	240 / 200	<10	310
	7 Jun 90	580 / 530	100	450
	8 Jun 90	800	<10	1,200
	Geo. Mean	480	<18	570
Pineville / Cumberland River / 653.1				
	5 Jun 90	>16,000	>80,000	4,000
	6 Jun 90	600	<1,000	600
	7 Jun 90	500	350	<10
	8 Jun 90	<50	40,000	350
	Geo. Mean	700	5,800	300
Middlesboro / Yellow Creek / 14.5 (660.1)				
	5 Jun 90	500	<10	60
	6 Jun 90	300	10	40
	7 Jun 90	570	<10	<10
	8 Jun 90	500	<10	<50
	Geo. Mean	450	<10	33
Corbin / Lynn Camp Creek / 3.0				
	5 Jun 90	170	<10	150
	6 Jun 90	110	10	90
	7 Jun 90	1,800	20	2,000
	8 Jun 90	1,000	<10	<10
	Geo. Mean	430	<12	130

FC = fecal coliforms per 100 ml

Above and below stream samples taken within 0.1 mile of the municipal discharge location

EFF = effluent MP = milepoint

(660.1) = point of confluence with the Cumberland River

The purposes of the 1993 Upper Cumberland Intensive Survey were to verify the 1992 305(b) data; determine if the Cumberland River met uses in the KSWs for PCR, secondary contact recreation (SCR), and as a domestic raw water supply; and identify the source(s) of FC bacteria in the upper Cumberland River drainage. The purpose subsequent to this survey was to find ways to reduce fecal pollution in the upper Cumberland River drainage by determining the sources and developing strategies to return the affected waterbodies to a swimmable condition.

The 1994 303(d) list included several waterbodies as a result of the 1993 survey. The upper Cumberland River (2 segments), Looney Creek and Poor Fork were listed as high priority for total maximum daily load (TMDL) development for fecal coliforms. The Left Fork of Straight Creek and Martins Fork were listed as medium priority for TMDL development. The 1996 303(d) list included Catron Creek and Martins Fork as second priority streams for TMDL development and Greasy Creek, Puckett Creek and Richland Creek as third priority streams for TMDL development. These were listed as a result of the continuing stream surveys that were conducted as part of the Upper Cumberland investigation. In looking at all of the data collected to date it was apparent that other streams should have been included in the 303(d) list of 1996. These were Clover Fork, Cloverlick Creek, Straight Creek and Yocum Creek. All of these waterbodies are now included in the TMDL development for the upper Cumberland River watershed. Bailey Creek should also be included as 1996 data indicated it was impaired because of fecal coliform pollution. The strategies that were used to implement the TMDL for the watershed include these creeks. So, for purposes of developing a TMDL for the upper Cumberland River watershed, the following waterbodies are considered to be under one TMDL.

Waterbody	Segment Milepoints
Upper Cumberland River	650.6 - 654.4 / 684.9 - 694.2
Bailey Creek	0.0 - 2.3
Catron Creek	0.0 - 8.5
Clover Fork	0.0 - 34.5
Cloverlick Creek	0.0 - 5.0
Greasy Creek	0.0 - 11.4
Looney Creek	0.0 - 3.5
Straight Creek	0.0 - 24.4
Left Fork Straight Creek	0.0 - 13.0
Martins Fork	0.0 - 10.1
Poor Fork	694.2 - 719.3
Puckett Creek	0.0 - 10.0
Richland Creek	0.0 - 19.6
Yocum Creek	0.0 - 6.5

The fecal coliform TMDL is expressed as a concentration limit (400 fecal coliform colonies/100 ml) based on the water quality standards for primary contact recreation. This approach is more appropriate for this kind of pollutant because it is directly tied to the standard and can be easily measured to determine the success of TMDL

implementation strategies. It is considered equivalent to a loading approach that could have been calculated as colonies/day based on the design flows of the wastewater treatment plants and the permit concentration limits.

BASIN DESCRIPTION

The Cumberland River is formed by the confluence of the Poor and Clover Forks in the city of Harlan in southeastern Kentucky. From that point, it flows in a southwesterly direction into Tennessee and then northwestward into Kentucky again, where it joins the Ohio River, 58.9 miles above the junction of the Ohio and Mississippi Rivers. The main stem of the Cumberland River flows in a westerly direction, and its tributaries drain from the north or the south. The upper Cumberland River basin drains the East Kentucky counties of Knox, Bell, Harlan, Whitley, McCreary, and Pulaski (Mayes et al., 1975).

The drainage basin of the Cumberland River encompasses an area of 17,914 mi² (46,397km²; U. S. Geological Survey, 81-61). The basin lies entirely within the states of Kentucky and Tennessee. The area of the basin within Kentucky is 7,220 mi² (18,700km²). The upper Cumberland River basin in Kentucky contains an area of 5,181 mi² (13,419km²). This area represents 72 percent of the basin area in Kentucky and 29 percent of the total basin area. The largest tributary is the South Fork of the Cumberland River with a drainage area of 1382 mi² (3,579km²). The second largest tributary is the Rockcastle River with a drainage area of 763 mi²(1,976km²), all in Kentucky (USGS, 1981). Other major tributaries include Clear Fork, Buck Creek, and the Laurel River. The Cumberland River at Harlan is a fifth order stream.

The topography of the upper Cumberland River basin varies greatly. The eastern half of the basin lies in the Eastern Mountains and Coal Field Physiographic region. The topography of this region is that of a highly dissected upland. The major subregions include the Escarpment area, Plateau area, and the Mountain and Creek Bottom area (Mayes et al., 1975).

The Mountain and Creek Bottom area, also known as the Kanawha section, is the largest section in this region and where most of the sample collection sites in the study area are located. The area is very mountainous with relief and elevation increasing toward the east or headwater area. Between Harlan and Pineville, the Cumberland River flows over a mud and gravel bed with infrequent small shoals and rapids and occasional large rocks in evidence in the stream and along the banks. From a width of approximately 50 feet at its origin, the Cumberland broadens quickly to 85 to 105 feet. Running west through the steep, rugged hills of the Cumberland Plateau, the river winds through forest and coal country. As the Cumberland River passes Pineville, it settles down into a mud bottom with steep banks, broadens a bit, and flows smoothly as it progresses through deep valleys past Barbourville to and Williamsburg (Sehlinger, 1978).

The Poor Fork of the Cumberland River drains Harlan and Letcher counties in

Southeastern Kentucky and is the largest of the headwater streams. Flowing swiftly over a bed of rock and gravel, the Poor Fork winds through one of the deepest mountain valleys in Eastern Kentucky. Banks are normally four to eight feet high and gently banked. The river width varies from 25 to 40 feet (Sehlinger, 1978).

The bedrock in this area is Pennsylvanian sandstone, siltstone, shale, limestone, and coal. The surface soils are derived from acid sandstones and shales. Soils suitable for farming are confined to the narrow bottomlands. Pine and Cumberland mountains, separated by Middlesboro basin in the headwater area, comprise the highest and most rugged part of Kentucky (Mayes et al., 1975).

Population, classification of major cities in the study area (KDBD, 88), and the design capacity of their wastewater treatment plants are found in Table 3.

Table 3. Upper Cumberland River Drainage City Classification and WWTP Design Flow

CITY	CLASS	WWTP DESIGN FLOW	COUNTY	1990 CENSUS
Barbourville	4th	1.0	Knox	3,658
Cumberland	4th	0.5	Harlan	3,112
Harlan	4th	0.5	Harlan	2,686
Pineville	4th	0.3	Bell	2,198
Williamsburg	4th	0.8	Whitley	5,493
Benham	5th	0.18	Harlan	717
Burnside	5th	NF	Pulaski	695
Evarts	5th	0.12	Harlan	1,063
Ferguson	5th	NF	Pulaski	929
Loyall	5th	0.185	Harlan	1,100
Lynch	5th	0.2	Harlan	1,166
Science Hill	6th	NF	Pulaski	628
Wallins Creek	6th	NF	Harlan	261

NF = no facility

WWTP = wastewater treatment plant

There were a total of 435 permitted dischargers to the upper Cumberland River drainage in Kentucky at the time of the first intensive survey (DOW files). They are classified in the following categories: 26 municipals, 149 industrials, five subdivisions,

54 schools, 139 small sewage treatment plants, nine landfills, 25 agricultural, and 28 water plants. Of that total, 278 discharge into streams.

MATERIALS AND METHODS

Water samples were collected in sterile 250 ml Nalgene bottles, sterile 120 ml borosilicate glass bottles, or sterile disposable 120 ml plastic bottles (Corning 17-100).

After collection, the samples were placed on wet ice and transported to the Division of Water mobile bioassay trailer or the London Regional Office laboratory for analyses. Chain of custody procedures were maintained on all samples, as outlined in the Ecological Support Section's Quality Assurance Manual (DOW, 1987). An attempt was made to deliver all samples within six hours.

In the laboratory, fecal coliform analysis by membrane filter technique was performed using the methods outlined in Standard Methods For The Examination of Water And Wastewater, 15th edition, and Microbiological Methods For Monitoring the Environment, USEPA 600/8-78-017. All samples were filtered and incubated within eight hours from the time of collection. Duplicate analyses were performed every tenth sample for quality assurance, as well as beginning and ending quality control checks for carry-over of FC bacteria.

Of the eleven municipal facilities in the upper part of the drainage, two were not sampled. The Corbin WWTP was not sampled, since the receiving stream (Lynn Camp Creek) flows into Laurel River Reservoir before joining the Cumberland River. The Middlesboro WWTP was not sampled because of time constraints for getting samples to the laboratory, the upgrade of the facility in 1986, and 1992-1993 monthly discharge monitoring reports that showed no violation of the KPDES permit limit for FC bacteria. The maximum effluent FC level for those two years was 49 per 100 ml (DOW files). A sample was taken from the mouth of Yellow Creek, which is the receiving stream for the Middlesboro WWTP discharge. Acceptable FC levels at this site would indicate the facility was not having a negative effect on the upper Cumberland River.

Initially in 1993, 73 collection sites were chosen in the upper Cumberland River drainage (Figure 1) from Redbird (mp 578.55) upstream to Harlan (mp 694.0), including 21 main stem, 18 tributaries, four water plant intakes, and nine municipal facilities. In all, 146 samples were collected on two occasions (including duplicates). Of those 146 samples, 109 samples (plus nine duplicates) were collected from 55 instream stations on two occasions (Appendix A). Nine municipal effluents (plus one duplicate) were also sampled on both occasions (Appendix C). Most stations were sampled twice, and all stations were sampled on one occasion. On July 21, 1993, 21 main stem, 34 tributary and nine municipal effluents were sampled. On Aug 19, 1993, the same 21 main stem and nine municipal effluents were sampled, but the number of tributary stations was increased to 43. Those streams sampled are found in Table 4. Stream flow information was used from the three U.S.G.S. gaging stations at Harlan, Pineville, and Williamsburg to indicate if samples taken on July 21 and Aug 19, 1993,

Figure 1

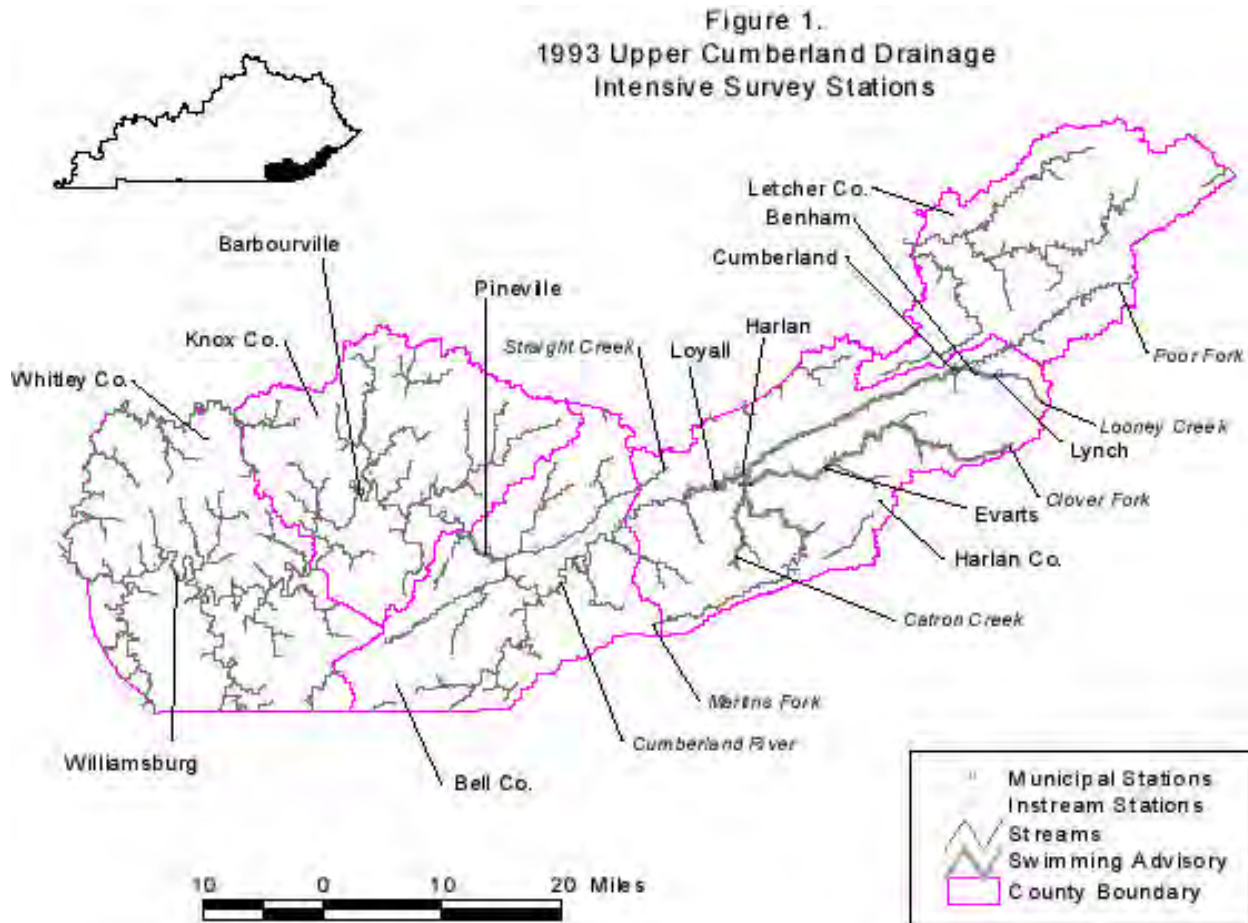


Table 4. 1993 Upper Cumberland River Drainage Streams Sampled

STREAM	LENGTH	NUMBER OF STATIONS
Upper Cumberland River	244.8	21
Poor Fork	49.7	10
Clover Fork	34.5	6
Martins Fork	37.2	6
Straight Creek	24.4	3
Richland Creek	19.6	2
Greasy Creek	11.4	1
Puckett Creek	10.0	1
Looney Creek	8.9	1
Catron Creek	8.5	2
Clear Fork	22.9	1
Stinking Creek	18.8	1
Yellow Creek	18.5	1
Clear Creek	16.4	1
Brownies Creek	16.3	1
Poplar Creek	16.0	1
Left Fork Straight Creek	13.0	2
Fighting Creek	8.2	1
Cloverlick Creek	8.1	1

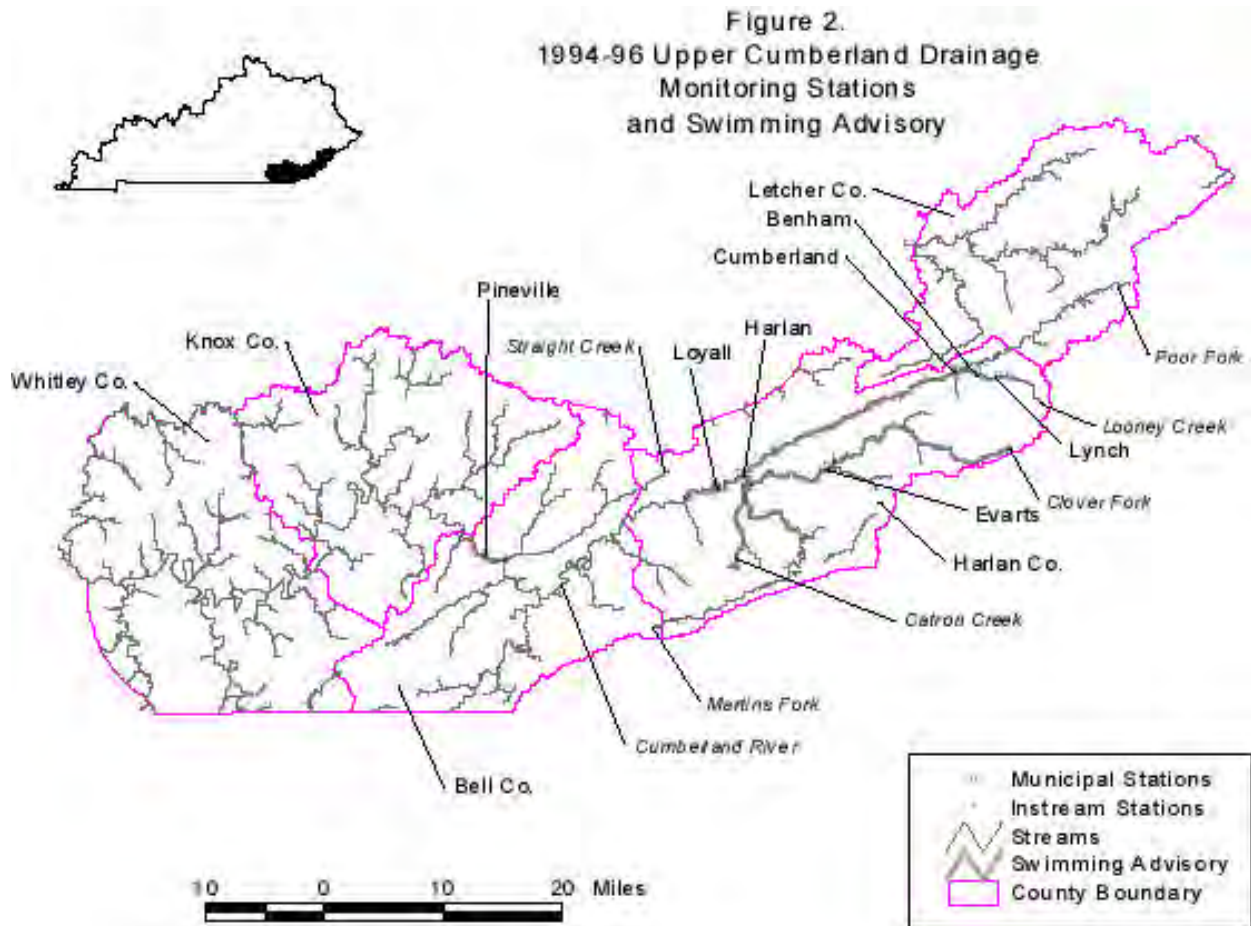
Streams listed in bold face had unacceptable FC levels for PCR

were during a period of low or high flow. High-flow samples would reflect influences of surface water runoff, storm water, or non-point sources. Low-flow samples are influenced by point sources such as municipal effluents, package plant effluents, septic tank discharges, and straight pipe discharges of untreated waste from private households.

In June 1994, five samples were collected within a 30-day period at 16 locations in the drainage (Figure 2). These sites were then sampled on a monthly basis for the rest of the 1994 PCR season. Monitoring in the upper Cumberland River drainage centered on bracketing the municipal effluents of Pineville, Loyall, Harlan, Benham, Lynch, and Evarts. Stream samples were taken above and below these facilities, as well as from their effluents. Domestic raw water withdrawals within the drainage were also targeted by sample location.

Monthly sampling was continued for the 1995 PCR season at 22 instream stations and seven municipal facilities (Appendices B and C, respectively). On September 14 and October 17, 1995, 23 non-municipal permitted dischargers in the drainage were sampled along with seven municipal facilities during compliance sampling inspections

Figure2



(Appendix D). Failure to meet KPDES permit requirements for FC bacteria resulted in a \$1,000 fine. Partial fines were issued if the effluent FC level exceeded 400 per 100 ml,

but was less than 1,000 per 100 ml. Five municipal and 17 package WWTPs were fined on one or more occasions in 1995 and 1996 (Appendix F). In all, 200 water and wastewater samples were collected and analyzed during the 1995 PCR season.

In 1996, monthly sampling continued during the PCR season at 21 instream stations, as well as the seven municipal effluents. Station HCF56B on Dartmond Branch was not sampled. On June 19 and October 9, 21 package treatment plants in the drainage were sampled for KPDES permit compliance for FC bacteria in their effluents. Only the Riverview Mobile Home Park WWTP had no discharge on either occasion. In all, 228 water and wastewater samples were collected and analyzed during the 1996 PCR season.

FECAL COLIFORM RESULTS

INTENSIVE SURVEY DATA

The first of two intensive survey sampling events in the upper Cumberland River basin was conducted on July 21, 1993. Twenty-one mainstem stations and 34 tributary stations, as well as the effluents of nine municipal wastewater treatment facilities (Williamsburg, Barbourville, Pineville, Loyall, Harlan, Cumberland, Benham, Lynch, and Evarts) were sampled. Of those instream stations, five water plant intakes (Williamsburg, East Knox, Harlan, Cumberland, and Cawood) and four USGS gaging stations were included. The second sampling event was conducted on Aug 19, 1993. Twenty-one mainstem stations and 43 tributary stations, as well as the effluents of the same nine municipal wastewater treatment facilities were sampled. Of those tributary stations, the same five water plant intakes and four USGS gaging stations were sampled.

Based on USGS flow data from the upper Cumberland River and Poor Fork, July 21 samples were collected during a period of dry weather (Table 5). Sampling during low-flow conditions helps determine the impact of package plant effluents, failed septic tanks, and straight pipe discharges from private households (point sources). A flow of this magnitude will not represent influences of nonpoint sources, since there should not be any stormwater runoff present in the drainage at the time of sampling. The upper Cumberland River basin also ranks among the lowest areas in the state for livestock production. For these reasons, nonpoint sources of fecal coliforms were felt not to be a contributor to the contamination found. Flow data from the upper Cumberland River and Poor Fork on Aug 19 also indicate samples were collected during a period of dry weather (Table 5). However, the area did experience rain prior to sampling, and the flow was about twice that of the July 21 intensive survey, but still below the long term means. Based on instream data from the two 1993 intensive surveys (Appendix A), the mainstem was safe for all PCR uses, with the exception of the river encompassing the headwater communities of Pineville, Loyall, and Harlan. Of the 21 mainstem stations,

18 (86 percent) had acceptable FC levels for all recreational uses on July 21. On August 19, 13 (62 percent) had acceptable FC levels. The eight mainstem stations with unacceptable FC levels are located from six miles downstream of Pineville (milepoint 647.1) at the U.S. Geological Survey gaging station (most likely influenced by the Pineville WWTP effluent) to the extreme headwaters of the mainstem (Harlan, milepoint 694.2; approximately 47 miles). Fecal coliform levels in the tributaries were higher than the mainstem. Of the 34 stations collected on July 21, 15 (44 percent) had unacceptable FC levels for PCR. Of the 43 stations collected on August 19, 23 (53 percent) had unacceptable FC levels for PCR.

Table 5. United States Geological Survey Flow Data for Poor Fork and the Upper Cumberland River

SOURCE	JULY	AUGUST	SURVEY	SURVEY
	MONTHLY MEAN*	MONTHLY MEAN*	DAILY MEAN 21 JUL 93	DAILY MEAN 19 AUG 93
Poor Fork	70	53	24	36
Cumberland R, Harlan	315	216	88	180
Cumberland R, Pineville	397	471	183	319
Cumberland R, Williamsburg	964	677	294	585

Flow measured in cubic feet per second

* Period of record through 1993

Based on the two intensive survey sampling events within a 30-day period, a swimming advisory was warranted on the mainstem in the area of Pineville, Harlan, and Loyall and in those tributaries that had unacceptable FC levels (Table 6). These tributaries are mostly in the upper part of the drainage. Swimming was observed during the intensive surveys, as well as straight pipe discharges of untreated waste from private households.

MUNICIPAL DATA

Municipal discharges in the upper Cumberland River drainage in 1993 did not show acceptable disinfection (Table 7). Six of the nine municipal facilities tested (67 percent) did not meet KPDES permit limits for FC bacteria (Williamsburg, Pineville, Loyall, Benham, Lynch, and Evarts). The effluents of Williamsburg, Pineville, and Evarts were indicative of raw sewage with little or no disinfection. However, none of the water plant intakes tested had unacceptable FC levels (Appendix A).

Table 6. 1993 Upper Cumberland River Drainage Tributaries with Unacceptable Fecal Coliform Levels

TRIBUTARIES 21 JUL 93	STREAM LENGTH	TRIBUTARIES 19 AUG 93	STREAM LENGTH
Poor Fork	49.7	Poor Fork	49.7
Clover Fork	34.6	Clover Fork	34.6
Straight Creek	24.3	Straight Creek	24.3
Catron Creek	8.0	Catron Creek	8.0
Puckett Creek	11.1	Richland Creek	13.7
Greasy Creek	11.0	Looney Creek	8.0

Table 7. 1993 Upper Cumberland River Intensive Survey Municipal Fecal Coliform Data

MUNICIPAL	DESIGN FLOW (mgd)	KPDES SAMPLE FREQUENCY	FECAL COLIFORMS per 100 ml	
			21 JUL 93	19 AUG 93
Williamsburg	0.8	1 / month	600,000	40
Barbourville	1.0	1 / week	<10	<10
Pineville	0.3	1 / month	180,000	340,000
Loyall	0.1885	1 / month	8,000	50,000
Harlan	0.5	1 / month	270	<10
Cumberland	0.5	1 / month	170	70
Benham	0.18	1 / month	<10	12,000
Lynch	0.2	1 / month	290	2,000
Evarts	0.12	1 / month	610,000	1,300,000

INTENSIVE SURVEY SUMMARY

The results of the intensive surveys indicated that fecal pollution was generally coming from four sources: the Pineville WWTP, the Loyall WWTP, point sources within the city limits of Harlan, and tributaries, especially in the headwaters which form the upper Cumberland River mainstem. Six of nine municipal facilities tested (67 percent) had unacceptable FC levels in their effluent on at least one occasion of the survey. Three of the nine (33 percent) (Pineville, Loyall, and Evarts) had unacceptable FC levels on both occasions.

As a result of the intensive survey and monthly ambient monitoring data, a press release was issued by the Division of Water (DOW) on Oct. 4, 1993, warning of the fecal pollution found in the drainage. A decision was also made to monitor the upper Cumberland River drainage five times within a 30-day period before the Fourth of July weekend in 1994 and issue a swimming advisory, if necessary.

MONTHLY MONITORING

In June 1994, five samples were collected within a 30-day period at 16 locations in the drainage (Appendix B) for the purpose of issuing a swimming advisory if necessary. Of 17 stations sampled, 13 (approximately 76 percent) had unacceptable geometric mean FC levels. A swimming advisory was issued on July 1 by the Division of Water and the Kentucky Department for Health Services, prior to the 4th of July holiday for the following rivers and streams listed in Table 8:

Table 8. 1994 Swimming Advisory Streams for the Upper Cumberland River Drainage

-
- Cumberland River from Fourmile Bridge (Hwy 2014) to Pineville at Hwy 66 Bridge (approx 4 mi)
 - Cumberland River from Wallins Creek Bridge (Hwy 219) to Harlan (approx 14 mi)
 - Martins Fork from Harlan to Cawood Water Plant (approx 10 mi)
 - The entire stretch of Catron Creek (approx 8 mi)
 - The entire stretch of Clover Fork (approx 34.5 mi)
 - Poor Fork from Harlan to Looney Creek (approx 25 mi)
 - Looney Creek from the mouth to Lynch Water Plant Bridge (approx 2.6 mi)
-

Monthly monitoring for the rest of the 1994 PCR season indicated the swimming advisory should remain in effect (Appendix B).

In 1995 and 1996, monthly samples were collected during the six months of the PCR season at seven mainstem stations, 14 tributary stations, and seven municipal wastewater treatment effluents, with the exception of one station (HCF56B, Bailey Creek) which was not sampled in 1995. These results continued to show unacceptable FC levels and supported the swimming advisory. Of 115 stream samples collected during the 1995 PCR season, 83 (approximately 72 percent) had unacceptable FC levels for PCR uses (i.e. swimming). Of 132 stream samples collected during the 1996 PCR season, 100 (approximately 76 percent) had unacceptable FC levels for PCR uses.

COMPLIANCE MONITORING

In October 1994, after reviewing the monthly FC data collected during the PCR season, a decision was made by DOW to notify all permitted facilities in calendar year 1995 of an impending compliance sampling of their effluent for FC bacteria. Should they fail to meet their permit limit, a fine of not less than \$500 and up to \$25,000 would be levied

against them. In May 1995, letters were mailed to permittees with this information. This action caused the greatest reduction in FC levels in the upper Cumberland River drainage since monitoring throughout the drainage began in 1993.

On September 14 and October 16, 1995, 22 package treatment plant effluents were tested at the DOW London Regional Office Laboratory for compliance with their KPDES permit for FC levels in their effluent. Failure to comply would result in a \$1,000 fine. Operators of these facilities were notified in advance of this sampling effort, but not of the date. On September 14, of 22 facilities tested, 12 (approximately 55 percent) failed to have 400 or less FC per 100 ml in their effluent. On Oct. 16, seven (approximately 32 percent) failed. Six facilities (approximately 27 percent) failed on both occasions.

On June 19 and October 9, 1996, package treatment plant effluents in the study area were sampled for compliance with their KPDES permit limit for FC bacteria. Of 20 facilities tested, only three (15 percent) failed to meet effluent FC levels. On Oct. 9, of 19 samples tested, only two (approximately 11 percent) failed to comply. No facility failed on both occasions. Fecal pollution from package treatment plant facilities had been greatly reduced.

ACTIONS TAKEN

The following actions by DOW specifically reduced fecal pollution in the upper Cumberland River and its tributaries: imposing \$1,000 fines on all permitted effluents found not in compliance with KPDES permitting for FC bacteria; bringing municipal effluents within compliance with KPDES permitting for FC bacteria; bringing other permitted effluents (i.e. package treatment plants) into compliance with KPDES permitting for FC bacteria; removing bypasses of raw sewage by enforcing repair of broken lift stations and broken sewer lines.

The reduction of fecal pollution in the upper Cumberland River was accomplished by first proving the problem existed through FC monitoring and then enforcing compliance with KPDES permitting through fines. The compliance monitoring surveys resulted in \$44,000 in fines being levied against permitted dischargers found in violation of their KPDES daily permit limit for FC bacteria. Three demand letters were issued against municipalities as a result of the 1995 compliance sampling in the upper Cumberland River drainage, with a total of \$3,300 in civil penalties assessed and collected. Twenty-five notices of violation were also issued by the DOW. Fifteen package wastewater treatment plants were referred to the DOW Enforcement Branch, resulting in 17 demand letters for penalties. All of \$20,650 assessed in penalties was collected. The city of Pineville brought its new wastewater treatment plant on line. However, the city was referred to the DOW Enforcement Branch for collection system bypasses. At present, some sewer system modifications are underway to correct combined sewer overflow problems. The city of Loyall was referred to the DOW Enforcement Branch. The city of Harlan made plans for a new wastewater treatment plant and took bids for a regional sewer project on Jan. 20, 1998. The city of Benham finished construction on

wastewater treatment plant improvements. The cities of Lynch and Cumberland were in compliance, as well as Evarts, during the last two sampling events.

For the 1996 sampling, two demand letters were issued against municipalities with \$3,000 in civil penalties assessed and \$2,500 collected so far (Appendix E). Thirteen notices of violation were issued in 1996. Five package WWTPs were referred to enforcement. Six demand letters were issued and \$6,000 in penalties assessed, with \$5,000 collected so far. Nine package WWTP discharges were eliminated and one package WWTP was replaced. The city of Pineville refurbished three lift stations and purchased spare pumps for each station. A large straight pipe from the community of Rio Vista, which discharged raw sewage to the Cumberland River, was connected to the city of Loyall's WWTP. Two combined sewer overflows were eliminated in the city of Harlan, and the city was awarded a grant and secured a loan to help build a regional WWTP. The percentage of violations has dropped from a high of 55 percent in 1995 to a low of 11 percent in 1996.

During 1997, a monthly sampling program on the upper Cumberland River drainage continued at 21 instream stations and seven municipal effluents during the PCR season. The municipal discharges and non-municipal facilities continued to have random compliance sampling inspections which resulted in fines for noncompliance. Seventeen demand letters and one agreed order resulted in penalties ranging from \$500 to \$1000 from 11 package WWTPs and the municipalities of Evarts, Loyall, Harlan, Cumberland and Lynch. Twenty of 21 tributary sites exceeded the target FC value of 400 colonies/100 ml on one or more occasions. These are indicative of straight pipe discharges. Sampling will continue until acceptable FC levels are indicated and the swimming advisory is lifted. Removing the straight pipe discharges from the drainage may be the most difficult source of fecal pollution to remove. However, the DOW is actively seeking ways within the affected communities to eliminate them.

Initiatives that may aid in removing sources of pollution include the Kentucky Roundtable on the Environment and Economy and PRIDE. The Kentucky Roundtable on the Environment and the Economy was established in 1994 by the Kentucky Economic Development Partnership Board to create a consensus-building approach on environmental and economic development issues and to provide recommendations for long-term sustainable action. The group chose to investigate and discuss the problems of straight pipes and illegal dumps in Kentucky in late 1996. The Roundtable is made up of representatives from manufacturing, forestry, local government, the Cooperative Extension Service, coal mining, agriculture, small business, an environmental organization, the Council of Area Development Districts, and the secretaries of the Natural Resources and Environmental Protection Cabinet and the Economic Development Cabinet.

PRIDE (Personal Responsibility In a Desirable Environment), a program sponsored by U. S. Rep. Hal Rogers and supported by Natural Resources and Environmental Protection Cabinet Secretary James E. Bickford, is a comprehensive approach to remove sewage and debris problems in southern and eastern portions of Kentucky,

which includes the headwaters of the upper Cumberland River basin. Part of this program includes the mapping of straight pipes and illegal dumps by area development districts in a 40 county area. Six million dollars was procured in 1996 for WWTP improvements which includes the city of Vicco WWTP (\$500,000). In 1998, \$10 million was procured including a special appropriation of \$3 million for the city of Williamsburg WWTP. This will allow upgrading of the existing plant and extension of sewers. The PRIDE program has also improved facilities downstream of the swimming advisory in the upper Cumberland River drainage. Mt. Vernon in Rockcastle County is upgrading its existing plant and adding sewerline extensions and a lift station through a state revolving fund (SRF) project. Burnside, in Pulaski County, has received a 1998 special appropriation of \$2 million through U. S. EPA which will allow sewerage of this unsewered community. The city of Pineville has built a new WWTP. The cities of Harlan and Vicco are planning new WWTPs.

The DOW London Regional Office has monitored the upper Cumberland River drainage extensively for FC bacteria since 1993. Since the swimming advisories remain the same today as they have in the past, the Cumberland Valley Health Department has contacted Secretary Bickford proposing a small loan or grant program in the counties to address failing septic systems and straight pipes. Loan reimbursement would be based on income and administered by local banks. Secretary Bickford sent information on obtaining a 319 grant or possibly a KIA loan to help with funding.

Legislation has been introduced in the 1998 General Assembly of the Kentucky Legislature that would require Health Department inspection and approval of sewer or septic tank hookups in new homes or businesses before the final electrical hookup could be made. This would help prevent new straight pipe discharges from residential sites.

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APPENDIX A

1993 Upper Cumberland River Drainage intensive Survey Fecal Coliform Data

Appendix A. 1993 Upper Cumberland River Intensive Survey Fecal Coliform Data

	STATION (LAT / LONG)	MAP CO.	LOCATION	SOURCE	MP	DATE	FC
1.	WCR01 (84-13-14.0 / 3645-58.3)	3-47 Bell	Redbird, Ky	Cumberland R	578.55	21 Jul 93 19 Aug 93	30 180
2.	WWP02 (84-10-39.7 / 36-45-12.5)	3-47 Whitley	Williamsburg	Cumberland R	584.3	21 Jul 93 19 Aug 93	10 / 10 220
3.	WCR04 (84-09-28.8 / 36-44-41.4)	2-47 Whitley	Ky 290	Cumberland R	590.25	21 Jul 93 19 Aug 93	40 ND
4.	WTR05 (84-08-32.1 / 36-43-27.0)	2-47 Whitley	Savoy Rd	Clear Fork	0.9 (592.4)	21 Jul 93 19 Aug 93	60 50
5.	WCR06 (84-06-11.5 / 36-44-32.3)	2-48 Whitley	Yaden	Cumberland R	600.5	21 Jul 93 19 Aug 93	30 40
6.	WTR07 (83-59-44.0 / 36-44-04.0)	2-49 Whitley	Ky 92	Poplar Creek	2.0(611.4)	21 Jul 93 19 Aug 93	90 230
7.	WCR08 (84-01-07.4 / 36-44-48.0)	2-48 Whitley	Ky 92	Cumberland R	612.4	21 Jul 93 19 Aug 93	20 100
8.	KCR09 (83-57-38.1 / 36-47-49.3)	3-49 Knox	Ky 1530	Cumberland R	620.7	21 Jul 93 19 Aug 93	20 140
9.	KTR11 (83-53-49.3 / 36-51-49.5)	3-49 Knox	Ky 459	Richland Cr	0.4 (634.8)	21 Jul 93 19 Aug 93	>16,000 350
10.	KTR11A (83-53-14.2 / 36-52-08.0)	3-49 Knox	Ky 459	Richland Cr	0.8	19 Aug 93	100
11.	KCR12 (83-53-14.0 / 36-51-43.5)	3-49 Knox	Ky 11	Cumberland R	635.1	21 Jul 93 19 Aug 93	40 400
12.	KTR13 (83-52-25.0 / 36-50-27.0)	3-50 Knox	Ky 225	Fighting Creek	1.0 (637.4)	21 Jul 93 19 Aug 93	80 60 / 40
13.	KTR14 (83-48-48.5 / 36-50-39.6)	3-50 Knox	Ky 930	Stinking Creek	0.2 (642.4)	21 Jul 93 19 Aug 93	60 130
14.	KWP15 (83-48-44.4 / 36-50-13.8)	3-50 Knox	E Knox WPI	Cumberland R	642.6	21 Jul 93 19 Aug 93	60 70
15.	KCR16 (83-45-57.5 / 36-48-48.1)	3-50 Knox	USGS	Cumberland R	647.1	21 Jul 93 19 Aug 93	370 1,400

Appendix A. (Cont.) 1993 Upper Cumberland River Intensive Survey Fecal Coliform Data

STATION (LAT / LONG)	MAP	CO.	LOCATION	SOURCE	MP	DATE	FC
16. BTR17 (83-45-30.4 / 36-47-31.7)	3-50	Bell	25E	Greasy Creek	0.1 (649.6)	21 Jul 93 19 Aug 93	180 3,000
17. BCR18 (83-45-34.5 / 36-47-31.7)	3-51	Bell	Fourmile, Ky	Cumberland R	650.55	21 Jul 93 19 Aug 93	7,000 4,000
18. BCR20 (83-44-34.1 / 36-45-59.0)	3-51	Bell	Ky 66	Cumberland R	653.1	21 Jul 93 19 Aug 93	70 240
19. BTR21 (83-41-27.0 / 36-45-55.4)	3-51	Bell	Ky 66	Straight Creek	0.25 (654.5)	21 Jul 93 19 Aug 93	440 800
20. BTR21B (83-40-9.4 / 36-46-27.7)	3-51	Bell	Ky 66	L F Straight Cr	0.1	19 Aug 93	2,000
21. BTR21C (83-38-05.3 / 36-49-30.6)	3-51	Bell	Ky 66	L F Straight Cr	4.8	19 Aug 93	2,200
22. BTR21D (83-38-44.4 / 36-46-27.7)	3-51	Bell	Ky 221	Straight Creek	3.1	19 Aug 93	350
23. BTR21E (83-36-08.6 / 36-47-05.9)	3-52	Bell	Ky 221	Straight Creek	5.9	19 Aug 93	460
24. BCR22 (83-41-31.5 / 36-44-46.8)	2-51	Bell	US 119	Cumberland R	655.7	21 Jul 93 19 Aug 93	30 680
25. BTR23 (83-41-24.7 / 36-44-31.0)	2-51	Bell	Dam	Clear Creek	0.4 (655.7)	21 Jul 93 19 Aug 93	90 140 / 60
26. BTR24 (83-38-39.5 / 36-42-35.6)	2-51	Bell	Ky 1534	Yellow Creek	1.0 (660.1)	21 Jul 93 19 Aug 93	50 60
27. BCR25 (83-37-28.4 / 36-43-20.4)	2-51	Bell	Ky 1534	Cumberland R	661.0	21 Jul 93 19 Aug 93	10 40
28. BTR26 (83-34-50.1 / 36-44-54.1)	2-52	Bell	Ky 987	Brownies Cr	0.9 (666.7)	21 Jul 93 19 Aug 93	210 330
29. BCR27 (83-35-06.5 / 36-45-38.6)	3-52	Bell	Ky 987	Cumberland R	667.0	21 Jul 93 19 Aug 93	<10 / <10 80
30. BTR28 (83-30-37.0 / 36-46-15.2)	3-52	Bell	Off Ky 72	Puckett Cr	1.8 (674.9)	21 Jul 93 19 Aug 93	220 950

Appendix A. (Cont.) 1993 Upper Cumberland River Intensive Survey Fecal Coliform Data

STATION (LAT / LONG)	MAP	CO.	LOCATION	SOURCE	MP	DATE	FC
31. BCR29 (83-31-28.7 / 36-47-40.5)	3-52	Bell	Blackmont	Cumberland R	675.8	21 Jul 93 19 Aug 93	100 170
32. HCR30 (83-29-33.7 / 36-48-49.4)	3-53	Harlan	Molus	Cumberland R	679.2	21 Jul 93 19 Aug 93	80 320
33. HCR31 (83-27-05.8 / 36-48-54.2)	3-53	Harlan	Coldiron	Cumberland R	682.35	21 Jul 93 19 Aug 93	130 600
34. HCR32 (83-24-57.5 / 36-49-41.9)	3-53	Harlan	Wallins Cr	Cumberland R	684.9	21 Jul 93 19 Aug 93	120 600
35. HCR33 (83-22-40.0 / 36-50-29.0)	3-53	Harlan	Wilhoit	Cumberland R	689.0	21 Jul 93 19 Aug 93	370 1,400
36. HCR35 (83-21-21.8 / 36-50-48.8)	3-54	Harlan	Loyall, Ky	Cumberland R	691.85	21 Jul 93 19 Aug 93	1,700 5,200
37. HCR37 (83-19-45.2 / 36-50-31.0)	3-54	Harlan	RR Bridge	Cumberland R	694.0	21 Jul 93 19 Aug 93	2,000 10,000
38. HPF38 (83-19-32.9 / 36-51-42.9)	3-54	Harlan	Harlan WPI	Poor Fork	0.2 (694.2)	21 Jul 93 19 Aug 93	270 420
39. HPF39 (83-14-42.7 / 36-54-00.0)	4-55	Harlan	Ky 413	Poor Fork	701	21 Jul 93 19 Aug 93	50 110
40. HPF40 (83-05-56.7 / 36-56-48.1)	4-56	Harlan	US 119	Poor Fork	711.3	21 Jul 93 19 Aug 93	280 270
41. HPF41 (83-00-17.3 / 36-58-21.8)	4-56	Harlan	US 119	Poor Fork	717.7	21 Jul 93 19 Aug 93	5,400 >16,000(30,000)
42. HTR43 (82-59-50.9 / 36-58-05.8)	4-57	Harlan	Ky 179	Cloverlick Cr	0.5 (718.7)	21 Jul 93 19 Aug 93	<10 1,400 / 2,600
43. HPF44 (82-59-36.1 / 36-58-26.4)	4-57	Harlan	USGS	Poor Fork	718.8	21 Jul 93 19 Aug 93	2,200 / 2,200 1,600
44. HTR45 (82-57-19.6 / 36-58-40.4)	4-57	Harlan	Off Ky 160	Looney Cr	0.1 (719.3)	21 Jul 93 19 Aug 93	790 <10
45. HWP48 (82-59-03.1 / 36-58-52.3)	4-57	Harlan	Cumberland	Poor Fork	719.57	21 Jul 93 19 Aug 93	<10 <10

Appendix A. (Cont.) 1993 Upper Cumberland River Intensive Survey Fecal Coliform Data

STATION	MAP (LAT / LONG)	CO.	LOCATION	SOURCE	MP	DATE	FC
46.	HPF49 (82-54-45.2 / 36-59-58.7)	4-56 Harlan	US 119	Poor Fork	725.3	21 Jul 93 19 Aug 93	240 250
47.	HPF50 (82-50-55.1 / 37-02-07.3)	5-58 Harlan	Off US 119	Poor Fork	730.95	21 Jul 93 19 Aug 93	280 1,200
48.	HPF51 (82-48-30.0 / 37-03-31.8)	5-58 Harlan	Off US119	Poor Fork	735.2	21 Jul 93 19 Aug 93	160 540
49.	HPF52 (82-43-58.4 / 37-04-20.4)	5-59 Harlan	Ky 932	Poor Fork	742.2	21 Jul 93 19 Aug 93	14,000 200 / 150
50.	HPF52F (82-43-42.0 / 37-04-27.0)	5-59 Harlan	Ky 932	Poor Fork	742.7	21 Jul 93 19 Aug 93	ND 200
51.	HCF53 (83-19-00.0 / 36-50-32.3)	3-54 Harlan	Ky 38Clover Fork	0.6		21 Jul 93 19 Aug 93	420 / 340 330
52.	HCF54 (83-19-00.0 / 36-50-32.3)	3-55 Harlan	Verda, Ky	Clover Fork	8.5	21 Jul 93 19 Aug 93	680 1,200
53.	HWP56 (83-11-36.2 / 36-51-56.7)	3-55 Harlan	Ky 38/215	Clover Fork	10.6	21 Jul 93 19 Aug 93	1,600 1,400
54.	HCF57 (83-08-16.0 / 36-53-47.5)	4-55 Harlan	Ky 38Clover Fork	15.1		21 Jul 93 19 Aug 93	360 350
55.	HCF58 (83-04-38.9 / 36-54-21.8)	4-56 Harlan	Blackbottom	Clover Fork	20.0	21 Jul 93 19 Aug 93	1,900 2,700
56.	HCF59 (83-00-44.4 / 36-52-39.3)	4-56 Harlan	Huff Sttlmnt	Clover Fork	25.1	21 Jul 93 19 Aug 93	3,700 1,200
57.	HTR60 (83-19-51.8 / 36-49-34.9)	3-54 Harlan	Off US119	Catron Cr	0.4 (1.0)	21 Jul 93 19 Aug 93	8,000 7,400 / 8,600
58.	HTR61 (83-19-59.2 / 36-46-28.0)	3-54 Harlan	Ky 72	Catron Cr	4.5	21 Jul 93 19 Aug 93	>16,000 3,900
59.	HMF62G (83-19-31.6 / 36-50-27.7)	3-54 Harlan	421 Bridge	Martins Fk	0.2	19 Aug 93	>16,000 (27,000)
60.	HMF62 (83-19-59.2 / 36-50-28)	3-54 Harlan	Harlan	Martins Fk	0.3 (1.6)	21 Jul 93 19 Aug 93	>16,000 >16,000(29,000)
61.	HMF62H (83-19-59.2 / 36-50-28)	3-54 Harlan	Drain Pipe	Martins Fk	0.3	19 Aug 93	>16,000 (270,000)

Appendix A. (Cont.) 1993 Upper Cumberland River Intensive Survey Fecal Coliform Data

STATION (LAT / LONG)	MAP	CO.	LOCATION	SOURCE	MP	DATE	FC
62. HMF62I (83-19-31.6 / 36-49-58)	3-54	Harlan	Sunshine Br	Martins Fk	1.0	19 Aug 93	>16,000 (26,000)
63. HMF63 (83-20-01.0 / 36-46-33.6)	3-54	Harlan	US 421	Martins Fk	4.4	21 Jul 93 19 Aug 93	600 800
64. HWP64 (83-14-12.3 / 36-47-00.0)	3-55	Harlan	Cawood WPI	Martins Fk	10.1	21 Jul 93 19 Aug 93	110 200

ND = no data

FC = fecal coliform per 100 ml

LAT / LONG = latitude / longitude

MP = milepoint

RR = railroad

USGS = United States Geological Survey gaging station

() = approximate fecal coliform count

APPENDIX B

Upper Cumberland River Drainage Fecal Coliform Data, 1994-1996

Appendix B. 1994 1996 Upper Cumberland River Drainage Fecal Coliform Data

STATION (LAT / LONG)	MAP	CO.	LOCATION	SOURCE	MP	DATE	FC
1. BCR18 (36-47-31.7/ 83-45-34.5)	3-51	Bell	Fourmile, Ky	Cumberland R	650.55	7 Jun 94	2,500
						14 Jun 94	750
						15 Jun 94	2,400 / 2,200
						21 Jun 94	650
						28 Jun 94	1,200
						GM	1,300
						28 Jul 94	6,400
						18 Aug 94	2,600
						20 Sep 94	10,000
						11 Oct 94	8,400
						11 May 95	1,400
						8 Jun 95	1,700
						13 Jul 95	5,600
						22 Aug 95	2,400
						14 Sep 95	6,800
						16 Oct 95	1,400
						5 May 96	14,600
						5 Jun 96	320
						10 Jul 96	9,600
						8 Aug 96	360
5 Sep 96	1,900 / 1,800						
9 Oct 96	400						
2. BCR19 (36-45-50.8/ 83-41-34.9)	3-51	Bell	Ky 66	Cumberland R	654.4	7 Jun 94	80
						14 Jun 94	250
						15 Jun 94	200
						21 Jun 94	30
						28 Jun 94	1,600
						GM	180
						28 Jul 94	120
						18 Aug 94	350
						20 Sep 94	100
						11 Oct 94	140
						11 May 95	1,600
						8 Jun 95	300
						13 Jul 95	700
						22 Aug 95	50
						14 Sep 95	560
						16 Oct 95	190
						5 May 96	16,800
						5 Jun 96	250
						10 Jul 96	9,600
						8 Aug 96	190
5 Sep 96	1,400						
8 Oct 96	130 / 150						
11 May 95	ND						
8 Jun 95	ND						
13 Jul 95	4,000						

Appendix B. (Cont.) 1994 - 1996 Upper Cumberland River Drainage Fecal Coliform Data

STATION (LAT / LONG)	MAP	CO.	LOCATION	SOURCE	MP	DATE	FC
3. BCR19A (36-45-50.8/ 83-41-34.9)	3-51	Bell	W Pineville	Cumberland R	653.6	22 Aug 95	6,000
						14 Sep 95	3,600
						16 Oct 95	480
						5 May 96	26,800
						5 Jun 96	580
						10 Jul 96	5,200
						8 Aug 96	180
						5 Sep 96	1,400
						9 Oct 96	250
						4. BTR20 (36-45-56.7/ 83-41-22.7)	3-51
14 Jun 94	490						
15 Jun 94	270						
21 Jun 94	190						
28 Jun 94	1,000						
GM	450						
28 Jul 94	900						
18 Aug 94	1,200 / 1,200						
20 Sep 94	930						
11 Oct 94	170						
11 May 95	2,000						
8 Jun 95	1,600						
13 Jul 95	240						
22 Aug 95	10						
14 Sep 95	1,000						
16 Oct 95	100						
5 May 96	74,000						
5 Jun 96	480						
10 Jul 96	4,000						
8 Aug 96	<10						
5 Sep 96	1,800						
9 Oct 96	500						
5. HCR32 (36-49-41.9/ 83-24-57.5)	3-53	Harlan	Wallins Creek	Cumberland R	684.9	7 Jun 94	540
						14 Jun 94	350
						15 Jun 94	400
						21 Jun 94	140
						28 Jun 94	8,400
						GM	620
						28 Jul 94	1,700
						18 Aug 94	2,600
						20 Sep 94	150
						11 Oct 94	550
						11 May 95	5,000
8 Jun 95	1,700						
13 Jul 95	160						
22 Aug 95	70						

Appendix B. (Cont.) 1994 - 1996 Upper Cumberland River Drainage Fecal Coliform Data

STN (LONG/LAT)	MAP	CO.	LOCATION	SOURCE	MP	DATE	FC
5. HCR32 (36-49-41-41.9/83-24-57.5) (Continued)	3-53	Harlan	Wallins Creek	Cumberland R	684.9	14 Sep 95	310
						16 Oct 95	3,300
						5 May 96	6,600
						5 Jun 96	420
						10 Jul 96	6,200
						8 Aug 96	580
						5 Sep 96	1,000
						9 Oct 96	580
						6. HCR33 (36-50-29.0/ 83-22-40.0)	3-53
14 Jun 94	1,000						
15 Jun 94	950						
21 Jun 94	1,400						
28 Jun 94	3,200						
GM	1,500						
18 Jul 94	8,600						
20 Aug 94	6,000						
20 Sep 94	1,200						
11 Oct 94	720						
11 May 95	2,200						
8 Jun 95	1,100						
13 Jul 95	10,000						
22 Aug 95	750						
14 Sep 95	1,400						
16 Oct 95	13,000						
5 May 96	11,000						
5 Jun 96	330						
10 Jul 96	9,000						
8 Aug 96	1,100						
5 Sep 96	5,000						
9 Oct 96	580						
7. HCR35 (36-50-48.8/ 83-21-21.8)	3-54	Harlan	USGS, Loyall	Cumberland R	691.85	7 Jun 94	4,800
						14 Jun 94	600 / 670
						15 Jun 94	1,000
						21 Jun 94	840
						28 Jun 94	2,800
						GM	1,500
						28 Jul 94	13,000
						18 Aug 94	1,800
						20 Sep 94	600
						11 Oct 94	400
						11 May 95	2,200
						8 Jun 95	1,200
						13 Jul 95	1,400 / 1,600
						22 Aug 95	750
14 Sep 95	8,000						

Appendix B. (Cont.) 1994 -1996 Upper Cumberland River Drainage Fecal Coliform Data

STN (LONG/LAT)	MAP	CO.	LOCATION	SOURCE	MP	DATE	FC
7. HCR35 (36-50- 48.8/ 83-21-21.8) (Continued)	3-54	Harlan	USGS, Loyall	Cumberland R	691.85	16 Oct 95	1,700
						5 May 96	16,000
						5 Jun 96	420
						10 Jul 96	2,000
						8 Aug 96	11,000 / 11,000
						5 Sep 96	3,600
						9 Oct 96	7,400
8. HCR37 (36-50-31/ 83-19-45.2)	3-54	Harlan	Railroad Bridge	Cumberland R	694.0	7 Jun 94	660
						14 Jun 94	1,300
						15 Jun 94	1,000
						21 Jun 94	320 / 250
						28 Jun 94	4,000
						GM	1,000
						28 Jul 94	4,000 / 3,400
						18 Aug 94	2,400
						20 Sep 94	1,600 / 2,100
						11 Oct 94	2,500 / 2,400
						11 May 95	1,600
						8 Jun 95	150
						13 Jul 95	600
						22 Aug 95	240
						14 Sep 95	4,000
						16 Oct 95	240
						5 May 96	50,000 / 43,000
						5 Jun 96	270 / 250
						10 Jul 96	4,800
8 Aug 96	840						
5 Sep 96	ND						
9 Oct 96	420						
9. HPF38 (36-51-42.9 / 83-19-32.9)	3-54	Harlan	413 Bridge	Poor Fork	0.2	7 Jun 94	120
						14 Jun 94	180
						15 Jun 94	160
						21 Jun 94	120 / 140
						28 Jun 94	4,600
						GM	300
						28 Jul 94	480 / 530
						18 Aug 94	2,600
						20 Sep 94	200
						11 Oct 94	180 / 180
						11 May 95	450
						8 Jun 95	140
						13 Jul 95	380
						22 Aug 95	250
						14 Sep 95	560
16 Oct 95	90						

Appendix B. (Cont.) 1994 - 1996 Upper Cumberland River Drainage Fecal Coliform Data

STN	MAP	CO.	LOCATION	SOURCE	MP	DATE	FC
(LONG/LAT)							
9.	HPF38	3-54	Harlan 413 Bridge (36-51-42.9 / 83-19-32.9)	Poor Fork	0.2	5 May 96	6,200
						5 Jun 96	90 / 70
						10 Jul 96	800
						8 Aug 96	310
						5 Sep 96	500 / 530
						9 Oct 96	130
10.	HPF41	4-56	Harlan US 119 Br (83-05-56.7 / 36-58-21.8)	Poor Fork	23.5	7 Jun 94	5,600 / 5,400
						14 Jun 94	1,800
						15 Jun 94	910 / 470
						21 Jun 94	1,400
						28 Jun 94	5,600 / 11,000
						GM	2,600
						28 Jul 94	13,000
						18 Aug 94	1,800
						20 Sep 94	600 / 540
						11 Oct 94	400
						11 May 95	950
						8 Jun 95	850
						13 Jul 95	900
						22 Aug 95	1,000
						14 Sep 95	1,400
						16 Oct 95	1,800
						5 May 96	16,000
						5 Jun 96	420
						10 Jul 96	2,000
						8 Aug 96	1,800
5 Sep 96	3,600						
9 Oct 96	7,400						
11.	HTR45	4-57	Harlan Cumberland (36-58-40.4 / 82-57-19.6)	Looney Creek	0.1	7 Jun 94	490
						14 Jun 94	1,200
						15 Jun 94	460
						21 Jun 94	800
						28 Jun 94	1,200
						GM	760
						28 Jul 94	1,600
						18 Aug 94	950
						20 Sep 94	730
						11 Oct 94	1,200
						11 May 95	500
						8 Jun 95	4,000 / 3,600
						13 Jul 95	1,000
						22 Aug 95	4,600
						14 Sep 95	1,600
						16 Oct 95	420
						5 May 96	13,000
5 Jun 96	620						

Appendix B. (Cont.) 1994 - 1996 Upper Cumberland River Drainage Fecal Coliform Data

STN (LONG/LAT)	MAP	CO.	LOCATION	SOURCE	MP	DATE	FC
11. HTR45 (36-58-40.4 / 82-57-19.6) (Continued)	4-57	Harlan	Cumberland	Looney Creek	0.1	10 Jul 96	2,000
						8 Aug 96	440
						5 Sep 96	12,000
						9 Oct 96	4,600
12. HWP48 (36-58-40.4/82-57-19.6)	4-56	Harlan	Cumberland WPI	Poor Fork	25.37	7 Jun 94	<10
						14 Jun 94	<10 / <10
						15 Jun 94	<10
						21 Jun 94	480
						28 Jun 94	850
						GM	53
						28 Jul 94	<10
						18 Aug 94	<10
						20 Sep 94	480
						11 Oct 94	850
						11 May 95	250 / 450
						8 Jun 95	3,000
						13 Jul 95	250
						22 Aug 95	480 / 450
						14 Sep 95	1,400 / 1,600
						16 Oct 95	200
						5 May 96	3,200
						5 Jun 96	900
						9 Jul 96	800 / 1,300
						8 Aug 96	780
5 Sep 96	5,000						
9 Oct 96	180						
13. HCF53 (36-50-32.3/ 83-19-00.0)	3-54	Harlan	Ky 38 Br.	Clover Fork	0.5	7 Jun 94	480
						14 Jun 94	300
						15 Jun 94	1,600
						21 Jun 94	360
						28 Jun 94	1,600
						GM	660
						28 Jul 94	1,600
						18 Aug 94	1,800
						20 Sep 94	390
						11 Oct 94	120
						11 May 95	2,000
						8 Jun 95	740
						13 Jul 95	260
						22 Aug 95	180
						14 Sep 95	230
						16 Oct 95	230
						5 May 96	54,000
5 Jun 96	350						
10 Jul 96	4,400						
8 Aug 96	2,400						

Appendix B. (Cont.) 1994 - 1996 Upper Cumberland River Drainage Fecal Coliform Data

STN (LONG/LAT)	MAP	CO.	LOCATION	SOURCE	MP	DATE	FC
						5 Sep 96	7,400
						9 Oct 96	3,600
14. HWP56 (36-51-56.7/ 83-11-36.2)	3-55	Harlan	Hwy 38 & 215	Clover Fork	10.55	7 Jun 94	1,200 / 900
						14 Jun 94	1,200
						15 Jun 94	450
						21 Jun 94	1,200
						28 Jun 94	2,000
						GM	1,100
						28 Jul 94	1,800
						18 Aug 94	7,000
						20 Sep 94	5,200
						11 Oct 94	490
						11 May 95	7,200
						8 Jun 95	1,200
						13 Jul 95	8,400 / 10,000
						22 Aug 95	7,600
						14 Sep 95	15,000
						16 Oct 95	530
						5 May 96	17,000
						5 Jun 96	150
						10 Jul 96	1,000
						8 Aug 96	1,000
						5 Sep 96	1,500
						9 Oct 96	1,000
15. HCF56A (36-51-56.7/ 83-11-51.2)	3-55	Harlan	Ky 38 Br.	Yocum Creek	0.05	11 May 95	ND
						8 Jun 95	ND
						13 Jul 95	ND
						22 Aug 95	12,000
						14 Sep 95	15,000 / 15,000
						16 Oct 95	820
						5 May 96	25,000
						5 Jun 96	300
						10 Jul 96	1,500
						16 Oct 95	370
						5 May 96	9,000
						5 Jun 96	560
						10 Jul 96	1,000
						8 Aug 96	6,600 / 7,000
						5 Sep 96	5,400
						9 Oct 96	900
16. HCF56B (36-52-40/ 83-11-16.4)	3-55	Harlan	off Ky 38	Baily Creek	0.1	8 Aug 96	9,700
						5 Sep 96	1,800
						9 Oct 96	1,300
17. HCF56D (36-52-35.3/ 83-10-8.6)	3-55	Harlan	Tom Coal Br.	Clover Fork	12.35	22 Aug 95	450
						16 Oct 95	750 / 380
						5 May 96	6200

Appendix B. (Cont.) 1994 - 1996 Upper Cumberland River Drainage Fecal Coliform Data

STN (LONG/LAT)	MAP	CO.	LOCATION	SOURCE	MP	DATE	FC
						5 Jun 96	150
						10 Jul 96	400
						8 Aug 96	690
						5 Sep 96	2,000
						9 Oct 96	500
18. HTR62 (36-49-34.9/ 83-19-51.8)	3-54	Harlan	Ky 72 Br.	Catron Creek	0.4	7 Jun 94	1,400
						14 Jun 94	1,100
						15 Jun 94	1,300
						21 Jun 94	360
						28 Jun 94	8,800 / 9,600
						GM	1,500
						11 May 95	4,400
						8 Jun 95	11,000 / 13,000
						13 Jul 95	2,200
						22 Aug 95	3,000
						14 Sep 95	1,700
						16 Oct 95	320
						5 May 96	45,000
						5 Jun 96	2,100
						10 Jul 96	4,000
						8 Aug 96	850
						5 Sep 96	10,000
						9 Oct 96	8,600
19. HMF621 (36-49-57.7/ 83-19-35.3)	3-54	Harlan	Sunshine Br.	Martins Fork	1.0	7 Jun 94	140
						14 Jun 94	2,000
						15 Jun 94	1,400
						21 Jun 94	4,400
						28 Jun 94	3,000
						GM	1,400
						28 Jul 94	8,000
						18 Aug 94	3,200
						20 Sep 94	4,600
						11 Oct 94	5,600
						11 May 95	6,800
						8 Jun 95	2,000
						13 Jul 95	12,000
						22 Aug 95	6,000 / 6,000
						14 Sep 95	4,000 / 3,800
						16 Oct 95	1,100
						5 May 96	13,000
						5 Jun 96	840
						9 Jul 96	11,000 / 12,000
						10 Aug 96	1,400
						5 Sep 96	7,800
						9 Oct 96	2,200
20. HCF65 (36-51-24.4/ 83--12-45.2)	3-55	Harlan	Kildav Br.	Clover Fork	9.2	7 Jun 94	3,500
						14 Jun 94	1,400
						15 Jun 94	370

Appendix B. (Cont.) 1994 - 1996 Upper Cumberland River Drainage Fecal Coliform Data

STATION (LONG/LAT)	MAP	CO.	LOCATION	SOURCE	MP	DATE	FC
20. HCF65 (36-51-24.4/ 83--12-45.2) (Continued)	3-55	Harlan	Kildav Br. (Continued)	Clover Fork	9.2	21 Jun 94	1,100
						28 Jun 94	2,200
						GM	1,300
						28 Jul 94	2,000
						18 Aug 94	1,400
						20 Sep 94	1,800
						11 Oct 94	8,200
						11 May 95	800 / 550
						8 Jun 95	1,200
						13 Jul 95	2,000
						22 Aug 95	2,000
						14 Sep 95	9,600
						16 Oct 95	630
						5 May 96	75,000
						5 Jun 96	750
						10 Jul 96	5,600
						8 Aug 96	4,000
						5 Sep 96	7,600
						9 Oct 96	9,400
						21. PTLB	4-57
14 Jun 94	40						
15 Jun 94	40						
21 Jun 94	250						
28 Jun 94	130						
GM	64						
28 Jul 94	1,200						
18 Aug 94	570 / 530						
20 Sep 94	20						
11 Oct 94	50						
11 May 95	850						
8 Jun 95	190						
13 Jul 95	60						
22 Aug 95	160						
14 Sep 95	790						
16 Oct 95	200 / 180						
5 May 96	8,400						
5 Jun 96	30						
10 Jul 96	390						
8 Aug 96	50						
5 Sep 96	20						
9 Oct 96	40						

Br. = Bridge

FC = fecal coliforms per 100 ml

GM = geometric mean of five sample collect within a 30 day period

MP = milepoint

APPENDIX C

Upper Cumberland River Drainage Municipal Fecal Coliform Data, 1993-1996

Appendix C. 1993-1006 Upper Cumberland River Drainage Municipal Fecal Coliform Data

NAME	COUNTY	DESIGN FLOW	RECEIVING STREAM	MP	DATE	FC
1. Williamsburg	Whitley	0.8 mgd	Cumberland R	589.45	21 Jul 93	40
					19 Aug 93	600,000
2. Barbourville	Knox	1.0 mgd	Cumberland R	632.75	21 Jul 93	<10
					19 Aug 93	<10
3. Pineville	Bell	0.3 mgd	Cumberland R	653.1	21 Jul 93	340,000
					19 Aug 93	180,000
					7 Jun 94	<10
					14 Jun 94	10
					15 Jun 94	<10
					21 Jun 94	<10
					28 Jun 94	<10
					JUN GM	<10
					28 Jul 94	<10
					18 Aug 94	<10
					20 Sep 94	10
					11 Oct 94	59,000
					13 Jul 95	<10
					22 Aug 95	4,200
					14 Sep 95	<10
					17 Oct 95	<10
					5 May 96	<10
					5 Jun 96	<10
					10 Jul 96	<50
					8 Aug 96	390
5 Sep 96	40					
9 Oct 96	3,100					
4. Loyall	Harlan	0.185 mgd	Cumberland R	691.35	21 Jul 93	50,000
					19 Aug 93	8,000
					7 Jun 94	3,100
					14 Jun 94	10
					15 Jun 94	<10
					21 Jun 94	<10
					28 Jun 94	40,000
					JUN GM	165
					28 Jul 94	41,000
					18 Aug 94	2,900
					20 Sep 94	350,000
					11 Oct 94	<10
					13 Jul 95	ND
					22 Aug 95	10
					14 Sep 95	>60,000
16 Oct 95	84,000					
5 May 96	<10					

APPENDIX C. (Cont.) 1993-1996 Upper Cumberland Municipal Fecal Coliform Data

NAME	COUNTY	DESIGN FLOW	RECEIVING STREAM	MP	DATE	FC
4. Loyall (Continued)	Harlan	0.185 mgd	Cumberland R	691.35	5 Jun 96	<10
					10 Jul 96	43,000
					8 Aug 96	<10
					5 Sep 96	<10
					9 Oct 96	6,000
5. Harlan	Harlan	0.5 mgd	Cumberland R	693.8	21 Jul 93	<10
					19 Aug 93	270
					7 Jun 94	2,700
					14 Jun 94	10
					15 Jun 94	<10
					21 Jun 94	5,000
					28 Jun 94	10
					JUN GM	106
					28 Jul 94	50
					18 Aug 94	110
					20 Sep 94	<10
					11 Oct 94	<10
					13 Jul 95	1,100
					22 Aug 95	10
					14 Sep 95	<10
					17 Oct 95	680
					5 May 96	1,200
					5 Jun 96	<10
					10 Jul 96	100
					8 Aug 96	70
5 Sep 96	<10					
9 Oct 96	<10					
6. Cumberland	Harlan	0.5 mgd	Poor Fork	718.0	21 Jul 93	70
					19 Aug 93	170
					7 Jun 94	52,000
					14 Jun 94	10
					15 Jun 94	<10
					21 Jun 94	<10
					28 Jun 94	4,500
					JUN GM	188
					28 Jul 94	<10
					18 Aug 94	<10
					20 Sep 94	<10
					11 Oct 94	<10
					13 Jul 95	<10
					22 Aug 95	40
					14 Sep 95	<10
17 Oct 95	<10					

Appendix C. (Cont.) 1993-1996 Upper Cumberland River Drainage Municipal Fecal Coliform Data

NAME	COUNTY	DESIGN FLOW	RECEIVING STREAM	MP	DATE	FC
6. Cumberland (Continued)	Harlan	0.5 mgd	Poor Fork	718.0	5 May 96	100,000
					5 Jun 96	<10
					10 Jul 96	48,000
					8 Aug 96	<10
					5 Sep 96	60
					9 Oct 96	80
7. Benham	Harlan	0.18 mgd	Looney Creek	1.42	21 Jul 93	12,000
					19 Aug 93	<10
					7 Jun 94	<10
					14 Jun 94	<10
					15 Jun 94	<10
					21 Jun 94	<10
					28 Jun 94	<10
					JUN GM	<10
					28 Jul 94	<10
					18 Jul 94	<10
					20 Sep 94	<10
					11 Oct 94	<10
					13 Jul 95	<10
					22 Aug 95	<10
					14 Sep 95	> 60,000
					17 Oct 95	<10
					5 May 96	<10
					5 Jun 96	<10
					10 Jul 96	<10
					8 Aug 96	20
5 Sep 96	100					
9 Oct 96	100					
8. Lynch	Harlan	0.2 mgd	Looney Creek	3.3	21 Jul 93	2,000
					19 Aug 93	290
					7 Jun 94	480
					14 Jun 94	16,000
					15 Jun 94	<10
					21 Jun 94	<10
					28 Jun 94	10
					JUN GM	95
					28 Jul 94	<10
					18 Aug 94	10
					20 Sep 94	<10
					11 Oct 94	10
					13 Jul 95	<10
					22 Aug 95	<10
					14 Sep 95	<10
					17 Oct 95	<10

Appendix C. (Cont.) 1993-1996 Upper Cumberland River Drainage Municipal Fecal Coliform Data

NAME	COUNTY	DESIGN FLOW	RECEIVING STREAM	MP	DATE	FC
8. Lynch (Continued)	Harlan	0.2 mgd	Looney Creek	3.3	5 May 96	260
					5 Jun 96	70
					10 Jul 96	600
					8 Aug 96	<10
					5 Sep 96	10
					9 Oct 96	110
9. Evarts	Harlan	0.12 mgd	Clover Fork	10.2	21 Jul 93	1,300,000
					19 Aug 93	660,000 / 610,000
					7 Jun 94	>132,000
					14 Jun 94	22,000
					15 Jun 94	19,000
					21 Jun 94	8,500
					28 Jun 94	2,000
					JUN GM	1,600
					28 Jul 94	720
					18 Aug 94	<10
					20 Sep 94	40
					11 Oct 94	480,000
					13 Jul 95	>60,000
					22 Aug 95	650
					14 Sep 95	<10
					17 Oct 95	20
					5 May 96	230,000
					5 Jun 96	<10
					10 Jul 96	120
					8 Aug 96	<10
5 Sep 96	<10					
9 Oct 96	<10					

FC = fecal coliform per 100 ml

GM = geometric mean

MP = milepoint

APPENDIX D

Upper Cumberland River Drainage Fecal Coliform Data for Non-Municipal Facilities, 1995-1996

Appendix D. 1995-1996 Upper Cumberland River Drainage Permitted Dischargers Fecal Coliform Data

ID NO.	COUNTY	FACILITY	RECEIVING STREAM	DATE	FC
1. 88773	Bell	DOF - Bert T Combs	Clear Creek	14 Sep 95	<50
				17 Oct 95	<50
				19 Jun 96	530
				9 Oct 96	<10
2. 96164	Bell	Lone Jack Elementary	Cumberland River	14 Sep 95	9,000
				17 Oct 95	<50
				19 Jun 96	<10
				9 Oct 96	4,000
3. 73920	Bell	Page Elementary	Bills Branch	14 Sep 95	<50
				17 Oct 95	<100
				19 Jun 96	<10
				9 Oct 96	<10
4. 73946	Bell	Right Fork Elementary	Straight Creek	14 Sep 95	>3,000
				17 Oct 95	5,100
				19 Jun 96	10
				9 Oct 96	60
5. 22134	Harlan	Apogee Coal Company	Pounding Mill Branch	14 Sep 95	<50
				17 Oct 95	>12,000
				19 Jun 96	10
				9 Oct 96	<10
6. 74098	Harlan	Cawood Elementary	Cumberland River	14 Sep 95	>3,000
				17 Oct 95	16,000
				19 Jun 96	<10
				9 Oct 96	<10
7. 73971	Harlan	Cooper / Sukey Ridge	Cumberland River	14 Sep 95	>12,000
				17 Oct 95	>60,000
				19 Jun 96	>60,000
				9 Oct 96	ND
8. 79681	Harlan	Coxton Eastbrook	Clover Fork	14 Sep 95	>3,000
				17 Oct 95	50
				19 Jun 96	<10
				9 Oct 96	40
9. 74276	Harlan	Hall Elementary	Cumberland River	14 Sep 95	1,800
				17 Oct 95	100
				19 Jun 96	<10
				9 Oct 96	10
10. 80004	Harlan	Holiday MHP	Cumberland River	14 Sep 95	<50
				17 Oct 95	200

Appendix D. (Cont.) 1995-1996 Upper Cumberland River Drainage Permitted Dischargers Fecal Coliform Data

ID NO.	COUNTY	FACILITY	RECEIVING STREAM	DATE	FC
10. 80004	Harlan	Holiday MHP	Cumberland River	19 Jun 96 9 Oct 96	<10 <10
11. 73989	Harlan	Intermont Apartments	Cumberland River	14 Sep 95 17 Oct 95 19 Jun 96 9 Oct 96	>12,000 <50 <10 30
12. 92363	Harlan	Tunnels / Jones Motel	Cumberland River	14 Sep 95 17 Oct 95 19 Jun 96 9 Oct 96	<50 >60,000 / >60,000 60 310
13. 74934	Harlan	Koaltown Motel	Poor Fork	14 Sep 95 17 Oct 95 19 Jun 96 9 Oct 96	<50 <100 <10 10
14. 24350	Harlan	Kingdom Come St Pk	UT to Poor Fork	14 Sep 95 16 Oct 95 19 Jun 96 9 Oct 96	<50 600 <10 ND
15. 73831	Harlan	Laurels Rest Home	Catron Creek	14 Sep 95 16 Oct 95 19 Oct 96 9 Oct 96	3,000 1,800 / 22,000 <10 110,000
16. 90492	Harlan	Nolan Howard MHP	Poor Fork	14 Sep 95 16 Oct 95 19 Jun 96 9 Oct 96	<50 / <50 <50 780 180
17. 91197	Harlan	Riverview MHP	Cumberland River	14 Sep 95 16 Oct 95 19 Jun 96 9 Oct 96	>3,000 60,000 ND ND
18. 74063	Harlan	Sid's MHP	Cumberland River	14 Sep 95 16 Oct 95 19 Jun 96 9 Oct 96	>50 <50 <10 <10
19. 73938	Harlan	South Central Bell	Four Mile Branch	14 Sep 95 16 Oct 95 19 Jun 96 9 Oct 96	>3,000 / >3,000 <50 ND <10

Appendix D. (Cont.) 1995- 1996 Upper Cumberland River Drainage Permitted Dischargers Fecal Coliform Data

ID NO.	COUNTY	FACILITY	RECEIVING STREAM	DATE	FC
20. 77615	Harlan	Turner Trailer Park	Jones Creek	14 Sep 95	>3,000
				16 Oct 95	<50
				19 Jun 96	110
				9 Oct 96	10
21. 74101	Harlan	Verda Elementary	Cumberland River	14 Sep 95	>3,000
				16 Oct 95	4,000
				19 Jun 96	<10
				9 Oct 96	<10
22. 77933	Harlan	Wallins Elementary	Cumberland River	14 Sep 95	<50
				16 Oct 95	50
				19 Jun 96	<10
				9 Oct 96	<10

FC = Fecal Coliforms per 100 ml
 ID NO. = Identification Number

APPENDIX E

1995 - 1996 Upper Cumberland River Drainage Enforcement Actions

Appendix E. 1995-1996 UPPER CUMBERLAND RIVER DRAINAGE ENFORCEMENT ACTIONS

<u>FACILITY</u>	<u>COUNTY</u>	<u>RECEIVING STREAM</u>	<u>YR</u>	<u>FINE</u>
Pineville	Bell	Cumberland River	96	\$1,000
Loyall	Harlan	Cumberland River	95	\$2,300
Harlan	Harlan	Cumberland River	95	\$500
Cumberland	Harlan	Poor Fork	96	\$2,000
				\$1,500*
Benham	Harlan	Looney Creek	95	\$500
DOF Bert T Combs	Bell	Clear Creek	96	\$500
				\$0*
Lone Jack Elementary	Bell	Cumberland River	95	\$800
			96	\$1,000
Page Elementary	Bell	Bills Branch	95	\$300
Right Fork Elementary	Bell	Straight Creek	95	\$1,800
Apogee Coal	Harlan	Pounding Mill Branch	95	\$1,000
Cawood Elementary	Harlan	Cumberland River	95	\$1,000
Cooper/Sukey Ridge	Harlan	Cumberland River	95	\$750
			96	**
Coxton Eastbrook	Harlan	Clover Fork	95	\$500
Hall Elementary	Harlan	Cumberland River	95	\$500
Intermont Apartments	Harlan	Cumberland River	95	\$1,000
Tunnels/Jones Motel	Harlan	Cumberland River	95	\$1,000
The Laurels Rest Home	Harlan	Catron Creek	95	\$2,300
			96	\$1,000
Nolan Howard Trailer Park	Harlan	Poor Fork	96	\$500
Riverview MHP	Harlan	Cumberland River	95	\$2,600
South Central Bell	Harlan	Four Mile Branch	95	\$1,800
Turner Trailer Park	Harlan	Jones Creek	95	\$1,000
Verda Elementary	Harlan	Cumberland	95	\$1,000

DOF = Division of Forestry

MHP = mobile home park

Tr = Trailer

* = payment received

** = fine dropped, facility eliminated

	DEMAND LETTERS	AGREED ORDERS	PENALTIES ASSESSED	PENALTIES COLLECTED
1995	17	2	\$20,650	\$20,650
1996	6	0	\$6,000	\$5,000

APPENDIX F

Upper Cumberland River Drainage Swimming Advisory Press Releases



News

from the

Natural Resources and Environmental Protection Cabinet

James E. Bickford, Secretary

Division of Water
14 Reilly Road
Frankfort, Ky. 40601
502-564-3410

Contact: Maleva Chamberlain
Division of Water
(502) 564-3410
David Nichols
Department for Health Services
(502) 564-4856

KENTUCKIANS ADVISED AGAINST SWIMMING IN SOME STREAMS IN THE STATE

FRANKFORT, KY (May 23, 1997) -- The Kentucky Division of Water, together with the Department for Health Services, advises Kentuckians to avoid swimming and other recreational contact with waters in three areas of the Commonwealth.

These advisories have been in place for the last several years because of the presence of high levels of fecal coliform bacteria. The source of the fecal coliform bacteria, present in human and animal waste, includes sanitary (both municipal and package) wastewater treatment plant discharges, malfunctioning septic systems, and illegal straight-pipe discharges.

This type of bacteria indicates the presence of untreated or inadequately treated sewage and creates a potential for acquiring infectious disease, particularly diarrheal illnesses. Persons swimming or playing in the water in areas where swimming advisories are posted face the possibility of illness.

Sampling for 1997 has been initiated for the Licking River, the North Fork of the Kentucky River, and for the Upper Cumberland, and results indicate that the previous advisories should remain in effect.

-more-

KENTUCKIANS ADVISED AGAINST SWIMMING IN SOME STREAMS IN THE STATE - page 2

Swimming advisories are still in effect by the Division of Water and the
Kentucky Department for Health Services for the following:

Upper Cumberland River

- The Cumberland River from Fourmile Bridge (HWY 2014) to Pineville at HWY 66 Bridge
- The Cumberland River from Wallins Creek Bridge (HWY 219) to Harlan
- Martins Fork from Harlan to Cawood Water Plant
- The entire stretch of Catrons Creek, the entire stretch of Clover Fork, and the entire stretch of Straight Creek
- Poor Fork from Harlan to Looney Creek
- Looney Creek from the mouth to Lynch Water Plant Bridge.

Problems in the area contributing to poor water quality include many bypasses from sewage collection systems as well as other noncompliance problems.

North Fork of the Kentucky River

A swimming advisory is being continued for the North Fork of the Kentucky River upstream of Chavies. Problems with municipal wastewater collection systems as well as numerous illegal straight pipe discharges of sewage contribute to water quality problems in the area that remains posted.

Licking River

A swimming advisory is being continued for the Licking River from Banklick Creek to the confluence with the Ohio River. The advisory includes the entire length of both Banklick Creek and Three Mile Creek. Problems in this area that contribute to high fecal coliform pollution include combined sewer overflows and sanitary sewer overflows.

Urban areas

The agencies also recommend that there be no swimming or other full-body contact with rivers in and directly below urban areas, particularly after a significant rainfall. This recommendation is for urban areas along waterways throughout Kentucky because of the increased potential for exposure to pollution from illegal straight pipe discharges, bypasses from sewage collection systems, and combined sewer overflows.



News

from the
**Natural Resources and
Environmental Protection Cabinet**

James E. Bickford, Secretary

Division of Water
14 Reilly Road
Frankfort, Ky. 40601
502-564-3410

Contact:

KENTUCKIANS ADVISED AGAINST SWIMMING IN SOME STREAMS IN THE STATE

FRANKFORT, KY (May 23, 1996) -- The Kentucky Division of Water, together with the Department for Health Services, advises Kentuckians to avoid swimming and other recreational contact with waters in three areas of the Commonwealth.

These advisories were issued in July 1994 and were re-issued in 1995 because of the presence of high levels of fecal coliform bacteria. The source of the fecal coliform bacteria, present in human and animal waste, includes sanitary (both municipal and package) wastewater treatment plant discharges, malfunctioning septic systems, and illegal straight-pipe discharges.

This type of bacteria indicates the presence of untreated or inadequately treated sewage and creates a potential for acquiring infectious disease, particularly diarrheal illnesses. Persons swimming or playing in the water in areas where swimming advisories are posted face the possibility of illness.

Sampling for 1996 has been completed for the North Fork of the Kentucky River and for the Upper Cumberland. High waters from recent heavy rains have delayed sampling of the Licking River this year, but the advisory there is considered still in effect until sampling is completed.

Swimming advisories are still in effect by the Division of Water and the Kentucky Department for Health Services for the following:

-more-

Upper Cumberland River

Results of recent sampling indicate the need to re-issue the advisory for the Upper Cumberland River for the following areas:

- The Cumberland River from Fourmile Bridge (HWY 2014) to Pineville at HWY 66 Bridge
- The Cumberland River from Wallins Creek Bridge (HWY 219) to Harlan
- Martins Fork from Harlan to Cawood
- The entire stretch of Catrons Creek, the entire stretch of Clover Fork, and the entire stretch of Straight Creek
- Poor Fork from Harlan to Looney Creek
- Looney Creek from the mouth to Lynch Water Plant Bridge.

Problems in the area contributing to poor water quality include many bypasses from sewage collection systems as well as other noncompliance problems.

North Fork of the Kentucky River

A swimming advisory is being re-issued for the North Fork of the Kentucky River upstream of Chavies. Problems with municipal wastewater treatment plants as well as numerous illegal straight pipe discharges of sewage contribute to water quality problems in the area that remains posted.

Licking River

A swimming advisory is still in effect for the Licking River from Banklick Creek to the confluence with the Ohio River. The advisory includes the entire length of both Banklick Creek and Three Mile Creek. Problems in this area that contribute to high fecal coliform pollution include combined sewer overflows and sanitary sewer overflows.

Urban areas

The agencies also recommend that there be no swimming or other full-body contact with rivers in and directly below urban areas, particularly after a significant rainfall. This recommendation is for urban areas along waterways throughout Kentucky because of the increased potential for exposure to pollution from illegal straight pipe discharges, bypasses from sewage collection systems, and combined sewer overflows.

NOTE TO EDITOR: Sampling data for the North Fork and for the Upper Cumberland are available from the Division of Water upon request.

State Government News

Commonwealth of Kentucky

Brereton C. Jones, Governor

—
Capitol Building

Frankfort, Ky. 40601

502-564-2611

News Line: 1-800-633-1019

(In Kentucky)

CONTACT: Maleva Chamberlain

Division of Water

(502) 564-3410

Janet Hoover

Department for Health Services

(502) 564-6786

KENTUCKIANS ADVISED ABOUT SWIMMING IN STREAMS IN THE COMMONWEALTH

FRANKFORT, KY. (June 28, 1995) -- As a result of recent stream sampling, the Kentucky Division of Water, together with the Department for Health Services, advises Kentuckians to avoid swimming and other recreational contact with waters in three areas of the Commonwealth.

These advisories were issued in July 1994 and are being re-issued now because of the presence of high levels of fecal coliform bacteria. The source of the fecal coliform bacteria, present in human and animal waste, includes sanitary (both municipal and package) wastewater treatment plant discharges, malfunctioning septic systems, and illegal straight-pipe discharges.

This type of bacteria indicates the presence of untreated or inadequately treated sewage and creates a potential for acquiring infectious disease, particularly diarrheal illnesses. Persons swimming or playing in the water in areas where swimming advisories are posted face the possibility of illness.

Swimming advisories are being re-issued by the Division of Water and the
Kentucky Department for Health Services for the following:

Upper Cumberland River

Swimming advisories for the following areas are being re-issued:

- The Cumberland River from Fourmile Bridge (HWY 2014) to Pineville at HWY 66 Bridge
- The Cumberland River from Wallins Creek Bridge (HWY 219) to Harlan
- Martins Fork from Harlan to Cawood Water Plant

KENTUCKIANS ADVISED ABOUT SWIMMING IN STREAMS IN THE COMMONWEALTH - Page 2

- The entire stretch of Catrons Creek, the entire stretch of Clover Fork, and the entire stretch of Straight Creek
- Poor Fork from Harlan to Looney Creek
- Looney Creek from the mouth to Lynch Water Plant Bridge

Problems in the area contributing to poor water quality include many bypasses from sewage collection systems as well as other noncompliance problems.

North Fork of the Kentucky River

A swimming advisory is being re-issued for the North Fork of the Kentucky River upstream of Chavies. Problems with municipal wastewater treatment plants as well as numerous illegal straight pipe discharges of sewage contribute to water quality problems in the area that remains posted.

Licking River

A swimming advisory is being re-issued for the Licking River from Banklick Creek to the confluence with the Ohio River. The advisory includes the entire length of both Banklick Creek and Three Mile Creek. Problems in this area that contribute to high fecal coliform pollution include combined sewer overflows and sanitary sewer overflows.

Urban areas

The agencies also recommend that there be no swimming or other full-body contact with rivers in and directly below urban areas, particularly after a significant rainfall. This recommendation is for urban areas along waterways throughout Kentucky because of the increased potential for exposure to pollution from illegal straight pipe discharges, bypasses from sewage collection systems, and combined sewer overflows.

Signs bearing information on the swimming advisories will be posted along the affected stretches of the Cumberland, the North Fork, the Licking and the creeks listed.

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NOTE TO EDITORS: Sampling data from each of these three areas is available from the Division of Water upon request.

State Government News

Commonwealth of Kentucky

Brereton C. Jones, Governor

__ Capitol Building

Frankfort, Ky. 40601

502-564-2611

News Line: 1-800-633-1019

(In Kentucky)

CONTACT: Maleva Chamberlain

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(502) 564-3410

Janet Hoover

Department for Health Services

(502) 564-6786

KENTUCKIANS ADVISED ABOUT SWIMMING IN STREAMS IN THE COMMONWEALTH

FRANKFORT, KY. (July 1, 1994) -- As a result of recent stream sampling, the Kentucky Division of Water, together with the Department for Health Services, advises Kentuckians to avoid swimming and other recreational contact with waters in three areas of the Commonwealth.

These advisories are being issued because of the presence of high levels of fecal coliform bacteria . The source of the fecal coliform bacteria, present in human and animal waste, includes sanitary (both municipal and package) wastewater treatment plant discharges, runoff from agricultural activities, malfunctioning septic systems, and illegal straight-pipe discharges.

This type of bacteria indicates the presence of untreated or inadequately treated sewage and creates a potential for acquiring infectious disease, particularly diarrheal illnesses. Persons swimming or playing in the water in areas where swimming advisories are posted face the possibility of illness.

Swimming advisories are being issued by the Division of Water and the

Kentucky Department for Health Services for the following:

Upper Cumberland River

The following areas are to be posted with swimming advisories:

- The Cumberland River from Fourmile Bridge (HWY 2014) to Pineville at HWY 66 Bridge
- The Cumberland River from Wallins Creek Bridge (HWT 219) to Harlan
- Martins Fork from Harlan to Cawood Water Plant
- The entire stretch of Catrons Creek and the entire stretch of Clover Fork

-more-

KENTUCKIANS ADVISED ABOUT SWIMMING IN STREAMS IN THE COMMONWEALTH - Page 2

- Poor Fork from Harlan to Looney Creek
- Looney Creek from the mouth to Lynch Water Plant Bridge

Problems in the area contributing to poor water quality include many bypasses from sewage collection systems as well as other noncompliance problems.

North Fork of the Kentucky River

A swimming advisory is being re-issued for the North Fork of the Kentucky River upstream of Chavies.

The advisory against swimming in the 80-mile stretch of the river from Chavies to Beattyville was lifted in June 1993, and this spring's sampling results indicate that water quality in this portion of the river remains safe for recreational activities. The Division of Water has put considerable effort into improving the water quality of the North Fork, and lifting the advisory for this stretch of the river has been a positive result. Numerous illegal straight pipe discharges of sewage contribute to water quality problems in the area that remains posted. A task group comprised of the Division of Water, the Department for Health Services, Kentucky River District Health Department, Kentucky River Area Development District, and the Division of Plumbing continues to work to find solutions to these problems.

Licking River

A swimming advisory is being reissued for the Licking River from Banklick Creek to the confluence with the Ohio River. The advisory includes the entire length of both Banklick Creek and Three Mile Creek.

Problems in this area that contribute to high fecal coliform pollution include combined sewer overflows and sanitary sewer overflows.

The agencies also recommend that there be no swimming or other full-body contact with rivers in and directly below urban areas, particularly after a significant rainfall. This recommendation is for urban areas along waterways throughout Kentucky because of the increased potential for exposure to pollution from illegal straight pipe discharges, bypasses from sewage collection systems, and combined sewer overflows.

Signs bearing information on the swimming advisories will be posted along the affected stretches of the Cumberland, the North Fork, the Licking and the creeks listed.

NOTE TO EDITORS: Sampling data from each of these three areas is available from the Division of Water upon request.

Cumberland River pollution levels high

Swimming called unsafe in part of upper stretch

BY ANDY MEAD
HERALD-LEADER STAFF WRITER

Extremely high levels of sewage-related pollution have been found in the upper reaches of the Cumberland River in southeastern Kentucky.

At several places, state inspectors making unannounced tests in July and August noticed people swimming in the same water from which they took samples.

Water is unsafe for swimming and other contact when more than 200 colonies of fecal coliform bacteria are found in 100 milliliters of water.

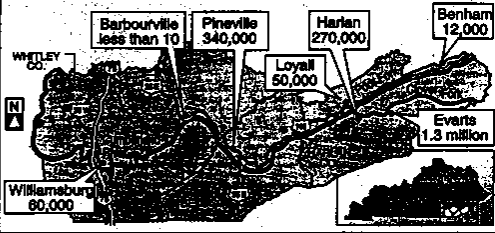
The worst case: 1.3 million colonies at the Everts sewage treatment plant on Clover Fork in Harlan County.

"That's like it's getting no treatment at all," said Jim Sproles, supervisor of the state Division of Water's London office.

Everts Mayor Ronnie King said the high reading was caused by a

POLLUTION IN THE UPPER CUMBERLAND RIVER

Fecal coliform bacteria found in samples taken in July and August. Numbers represent colonies of bacteria in each 100 milliliters of water. It is unsafe to swim in water containing more than 200 colonies.



MARTHA LYONS/HERALD-LEADER

faulty part that has been replaced. But Sproles said Everts has had longstanding problems with treating sewage.

Fecal coliform is found in the intestines of warm-blooded animals, including humans.

Its presence in creeks and rivers is considered a sign that untreated or partially treated sewage is pre-

sent. And that can signal the presence of other, disease-causing bacteria.

Because the recreation season ends this month, the state is not officially issuing a swimming advisory. But the Division of Water recommends that people avoid con-

SEE CUMBERLAND, A5

CUMBERLAND: Pollution levels high in upper stretch of river

FROM PAGE ONE
tact with the water.

More tests are planned next spring before the water is again warm enough for swimming.

Seven of the nine municipal sewage treatment plants between the Cumberland's headwaters and Williamsburg were given notices of violation after the tests.

Everts, Loyall and Pineville received notices for the July and August tests; Harlan, Benham, Lunch and Williamsburg received one each.

No fines have been levied, but representatives of the towns were brought into the Division of Water London office to set up a schedule for bringing their plants into compliance with state regulations.

They are required to make weekly reports to the state on the

steps they are taking.

"So far everybody has made progress, or at least they're working on making progress," Sproles said.

More tests will be conducted this month or next, Sproles said. He will not say when.

If the plants do not fall in line, tougher measures will be used, he said.

In a similar crackdown on the North Fork of the Kentucky River in 1991, more than \$31,000 in fines was levied.

By last summer, most treatment plants on the North Fork had improved, but officials still are grappling with how to deal with hundreds of pipes that dump sewage directly from homes.

Monitoring stations on the Cumberland have long showed

indications of pollution problems, but state officials say they do not have enough inspectors for widespread testing.

For the recent tests, Sproles borrowed inspectors from two other regional offices.

Besides the nine treatment plants, tests were conducted at 34 places along tributaries and at 21 in the river's main stem.

Barbourville's was by far the best, with fewer than 10 colonies of bacteria, but most failed miserably.

Although Harlan's plant passed, inspectors found two pipes dumping sewage that bypassed the plant. Both had extremely high bacteria counts.

Because rivers dilute and clean pollution, some sections of the Cumberland's main stem were relatively clean.

The farthest downriver sample was taken 16 miles above Cumberland Falls. It showed acceptable numbers of bacteria.