1994 303 (d) LIST OF WATERS FOR KENTUCKY

Natural Resources and
Environmental Protection Cabinet
Division of Water

October 1995

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Kentucky Department for Environmental Protection
Division of Water

for Jack A. Wilson, Director

Oct. 11, 1995
Date

This report was printed with state funds on re-cycled paper.

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INTRODUCTION

Pursuant to Section 303(d) of the Clean Water Act, the State of Kentucky has developed a list of waterbodies presently not supporting designated uses. As required by 40 CFR 130.7(b)(4), these waters have been prioritized for total maximum daily load (TMDL) development. The purpose of this report is not only to list and prioritize impacted waters, but to describe efforts that have been and continue to be made to address problems in waters listed in previous 303(d) reports.

ONGOING PROJECTS

The Kentucky Division of Water (KDOW) has several watershed projects in progress to address problems found in previous assessments and prioritized in 303(d) reports (KDOW 1990, 1992a) (Table 1). Several TMDL projects (Floyds Fork, Harrods Creek, East Fork Little Sandy River, Mayfield Creek, North Fork Kentucky River, Taylorsville Lake) were recently submitted to EPA for approval (Appendix A). EPA subsequently approved the North Fork Kentucky River, East Fork Little Sandy River, and the Harrods Creek TMDL projects (Appendix A). Decisions on the other TMDL projects submitted to EPA should be forthcoming and will be included in the final report.

The Upper Salt River/ Taylorsville Lake TMDL project began in 1991 with the goals of addressing eutrophication problems in the lake and reducing nutrient and bacteria levels in the Salt River and its tributaries. The KDOW began an intensive sampling program throughout the watershed in 1991 to determine the sources of nutrient input. A report was recently released (KDOW 1994a) that summarized the phosphorus data. High phosphorus concentrations in the Salt River were attributed primarily to nonpoint source runoff from the fertile soils of the Inner Bluegrass physiographic region. The U.S. Army Corps of Engineers (COE) is presently modelling the response of the water quality of Taylorsville Lake to various watershed management techniques by means of the CE-QUAL-W2 model and available water quality data. Modelling results will be used to identify best management practices (BMPs) in the watershed that will most effectively reduce nutrients from nonpoint sources. Over one million dollars have already been spent to implement BMPs to treat wastewater from concentrated animal management areas on dairy farms. These BMPs not only have reduced known bacteria contamination problems, they also were a first step in reducing nutrient input to streams in the watershed. Post-BMP monitoring of streams in the watershed and Taylorsville Lake will determine the effectiveness of the program.

The North Fork Kentucky River was identified as high priority in the 1992 303(d) report (KDOW 1992a) because of a swimming advisory on its entire 163-mile length. As a result of repeated compliance

sampling inspections, fines totalling $31,000 were issued to all permitted dischargers that failed to meet KPDES permit limits for fecal coliform bacteria. Because of the KDOW's compliance and enforcement efforts and capital improvements to the three largest municipal wastewater treatment plants, water quality improved and in 1993 the swimming advisory was removed on approximately 76 miles of the lower river. Further, the Hazard publicly owned treatment works (POTW) is scheduled to begin building a new facility later this year, and the Perry County Sanitation District will begin repairs on broken sewer lines and bypassing lift stations. However, numerous straight pipes discharging raw domestic sewage were found in the upper portion of the drainage. These illegal discharges are preventing the North Fork from attaining the swimming use. This TMDL project was recently approved by EPA Region IV (Appendix A). The maximum load (or concentration in this case) for fecal coliform bacteria is the same as the water quality criteria because the KDOW does not allow instream dilution for indicator bacteria. Educational, technical, and some financial assistance will be made available to a community in the North Fork basin as a demonstration project to gradually eliminate the straight pipe discharges and other nonpoint sources of fecal coliform bacteria contamination. The KDOW's Nonpoint Source Section has obtained Section 319(h) Nonpoint Source Implementation Grant money and is working with the Department for Health Services, Kentucky River Regional Health District, the Division of Plumbing, and local officials and citizens to reduce the occurrences of straight-pipe discharges. This will be accomplished by demonstrating and implementing selected low-cost best management practices for onsite wastewater disposal through a program of education, technical assistance, financial assistance, tiered enforcement, and monitoring. Education is an essential element of the program. Attitudes and behaviors that contribute to water quality degradation must be changed, and project visibility and the perceived need for BMPs must be heightened. Activities include news releases, radio announcements, educational programs in primary and secondary schools, public meetings, development and dissemination of publications, and door-to-door contacts. However, because of the widespread nature of the problem and the rugged topography of eastern Kentucky, the elimination of straight-pipe discharges will be difficult to achieve.

Herrington Lake was identified in the 1992 305(b) report (KDOW 1992b) as not meeting aquatic life use because of low dissolved oxygen levels and repeated fish kills. The lake was given a medium priority in the 1992 303(d) report. The KDOW has collected water quality data from the Dix River just upstream of the lake since 1985. Additional baseline nutrient data collection has begun at a site on Clarks Run downstream of the City of Danville's POTW outfall, at the Danville POTW, and at two other municipalities further upstream of the lake. Recently, Section 104(b)(3) grant monies were obtained from EPA to perform an in-depth study of the sources of nutrients causing water quality problems and to

determine the nutrient assimilation capacity of Herrington Lake. These monies are being passed through the Kentucky Natural Resources and Environmental Protection Cabinet (KNREPC) to the U.S. Geological Survey (USGS). In addition, the USGS will supplement the study with calibration and validation of COE's CE-QUAL-W2 and EPA's WASP physically-based models. The effort will provide an assessment of the lake's nutrient and trophic state dynamics and their link with land use and point source discharges. The work plan prepared by the USGS provided in Appendix B gives further details on this project. The study was initiated in September 1994 and has a scheduled completion date of September 1997. Project progress will be provided in future 303(d) reports.

The East Fork Little Sandy River, Floyds Fork, Harrods Creek, and Mayfield Creek projects were (and are) similar in that they involved wasteload allocation modelling of watersheds receiving multiple discharges, sampling of instream conditions, and issuing appropriate permit limits for new and existing facilities. Several new facilities were denied surface water discharge permits, and regionalization is proceeding in the first three watersheds listed above. The KDOW continues to closely evaluate all permit requests in these watersheds and to work toward reducing existing package plants and the construction of new ones.

METHODS OF ASSESSING USES FOR 1994 305(b) REPORT

The lists of waters not supporting designated uses were derived from the "1994 Kentucky Report to Congress on Water Quality" (KDOW 1994b) and "Assessment of Water Quality Conditions - Ohio River Main Stem, Water Years 1992 - 1993" (Ohio River Valley Water Sanitation Commission, 1994), hereafter referred to as "305(b) reports." Methods used to assess Kentucky's waters, described in detail in the 305(b) reports, are summarized below.

Monitoring Programs. Information from biological monitoring conducted by the KDOW in 1992-93 at 44 ambient water quality stations, six intensive survey sites, and 40 reference reach sites was the basis of assessing support of aquatic life uses in many instances. Water quality data collected on a regular basis by: 1) the KDOW at 44 stations, 2) the Ohio River Valley Water Sanitation Commission (ORSANCO) at 18 main stem and five tributary stations of the Ohio River, and 3) the U.S. Geological Survey (USGS) at several sites in Jefferson County was another means of assessing water quality and support of aquatic life and recreation uses. Surveys completed by Kentucky Department of Fish and Wildlife Resources District Biologists allowed for the evaluation and assessment of many additional waters in the 1994 report. Intensive bacteriological surveys by the KDOW in the North Fork Kentucky River basin, the lower Licking River basin, the upper Cumberland River basin, and five lakes (the latter with the help of the Big Sandy Area Development District) were also used in assessing the state's

waters for recreational uses.

Domestic water supply use was not often assessed because instream water quality data are not available at points of withdrawal where the use applies. A survey of operators of drinking water plants on lakes regarding algal and taste and odor problems allowed some drinking water use assessments to be made for lakes. To better assess drinking water use, future 305(b) reports will use data recently required by the Safe Drinking Water Act from public water systems.

Lakes were assessed primarily by: 1) a KDOW sampling program that periodically determines the trophic state and water quality of all Kentucky's major lakes and many of its smaller lakes by nutrient and chlorophyll *a* sampling during the growing season, 2) similar data supplied by the COE on several major impoundments, and 3) data collected by Murray State University on Kentucky Lake through funding by a Section 314 Clean Lakes Grant.

Use of Data. Water quality data were compared with their corresponding criteria. All of the criteria except fecal coliform were used to assess warmwater aquatic habitat use support. The segment did not support the warmwater aquatic habitat use if the criteria for dissolved oxygen, un-ionized ammonia, temperature, or pH were exceeded in greater than 25 percent of the samples collected during the period of October 1991 - September 1993.

Data for mercury, cadmium, copper, lead, and zinc were analyzed for violations of acute criteria listed in state water quality standards using three years of data (October 1990 - September 1993). At stations where data were collected quarterly or less frequently, the segment was not supporting if one or more observations exceeded criteria. At stations where data were collected monthly, the segment was not supporting if two or more observations exceeded criteria.

In areas where both chemical and biological data were available, the biological data were generally the determinate factor for establishing warmwater aquatic habitat use support status. This is especially true when copper, lead, or zinc data were contradicted by biological data.

Biological assessments were done by means of selected metrics for fish, macroinvertebrates, and diatom communities and habitat and physicochemical characteristics. A waterbody did not support its designated uses if the biological community was severely altered (dominated by pollution-tolerant organisms, had very high or low biomass, or possessed other significant functional alterations) or habitat characteristics were severely impacted.

Fecal coliform bacteria data were used to indicate degree of support for primary contact recreation (or swimming) use. Primary

contact recreation was not supported if the fecal coliform criterion was exceeded greater than 25 percent of the time based on two years of monthly data collected during the recreation season (May through October). In addition, streams or lakes with a pH below 6.0 units were listed as not supporting the swimming use.

RESULTS OF 1994 USE ASSESSMENTS

Of 15,892 stream miles assessed (including the Ohio River), 11,416 miles (72%) fully supported uses, 2883 miles (18%) did not support uses, and 1593 miles (10%) partially supported uses (Table 2). Individual streams not supporting uses are presented in Appendix C. Full support of warmwater aquatic habitat use was attained in 81% (12,710 of 15,600 miles) of waters assessed (Table 3). Full support of the swimming use was attained in only 42% (2178 of 5228 miles) of waters assessed (Table 3). The two most common causes of swimming and warmwater aquatic habitat use nonsupport were fecal coliform bacteria contamination and siltation, respectively (Table 4). Agriculture activities, package plants, and onsite waste disposal systems were major sources of fecal coliform bacteria contamination. Combined sewer overflows (CSOs) remained a significant problem on the Ohio River. Swimming use was not supported on 128 miles of the Ohio River downstream of cities with CSOs. The remaining 536 miles of the Ohio River bordering Kentucky only partially supported the use (see Appendix D). Coal mining and agricultural activities were the primary sources of siltation (Table 5).

Of 103 lakes assessed, uses were fully supported on 67 (193,424 acres), partially supported on 31 (20,510 acres), and not supported on five (3316 acres) (Table 6). Of individual uses, swimming was supported in all but 219 of 217,250 acres assessed, and aquatic life use was supported in 95 percent of the same number of assessed acres (Table 7). Only five lakes did not support uses (Table 8), and another 31 lakes partially supported uses. Nutrients from nonpoint sources caused the majority of use nonsupport in lakes, resulting in low dissolved oxygen levels that affected support of the warmwater aquatic habitat use (Tables 9 and 10). The second leading cause of use nonsupport in lakes was priority pollutants (PCBs) from industrial point sources that affected the fish consumption use in Green River Lake (Tables 9 and 10).

PROGRAMS TO ADDRESS WATER QUALITY ISSUES

Kentucky has several programs in place that address the problems noted above. Two of the most important programs are in the areas of nonpoint source pollution prevention and remediation and wastewater treatment regionalization. Many of the fecal coliform and nutrient problems that cause use nonsupport are addressed by these programs. Both programs have been described in previous

reports, but they are also included in this report to provide a biennial update.

Regionalization efforts in recent years have gradually reduced the number of package plants that treat domestic wastewaters. Each year from 1989 through 1993, an average of about 100 package plants have been inactivated (KDOW 1994c). In that same time, the number of new KPDES permits issued by the KDOW for package plants has declined. The 1992 303(d) report described successful regionalization efforts in several cities and counties in the state. Several of these projects have continued through the current reporting period, and more package plants were eliminated (Figure 1). There were no new major regionalization projects for this reporting period. Several sewer systems, including Metropolitan Sewer District (MSD) in Jefferson County and Campbell-Kenton County Sanitation District #1 in northern Kentucky, continued to gradually eliminate package plants in areas into which service was extended. Several projects in the construction and planning phase will significantly reduce (approximately 170) package plants in the near future in Bath, Boone, Boyd, Daviess, Franklin, Jefferson, McCreary, Perry, and Oldham counties. Progress on these projects will be detailed in the 1996 303(d) report.

Kentucky has 25 combined sewer systems with a total of 354 overflow points. About one-third of the CSO points are in the Louisville-Jefferson County area. Approximately 90 percent of the CSOs discharge to the Ohio River mainstem or immediate tributaries. Discharge permits containing CSO language have been issued to all but four of the combined sewer systems; the remaining systems will have permit language in place by mid-1996. The permit language requires compliance with the nine minimum controls of a sewer operational plan. These minimum controls are:

1) proper operation and regular maintenance programs
2) maximum use of collection system for storage
3) review and modification of pretreatment requirements
4) maximum flow routing to treatment plant
5) elimination of dry weather CSOs
6) control of solid and floatable materials
7) pollution prevention
8) public notification of CSO occurrences and impacts
9) monitoring to characterize CSOs and effect of control measures

Cities are at various stages of development or implementation of the plan. Efforts to date have been to locate and identify CSO points and collect data indicating amount, duration, and frequency of each CSO and to collect rainfall data. Some data on CSO and stream water quality characteristics have been collected and submitted to the KDOW. Grant monies passed through the KNREPC were used by the University of Kentucky and MSD to assess water quality impacts of CSOs in northern Kentucky and Louisville/Jefferson

County, respectively. These assessments will help to prioritize efforts to eliminate CSO discharges. As the combined sewer systems are defined, progress in the elimination of CSOs in several areas should be expected in the next 303(d) reporting period.

Section 319(h) Nonpoint Source Implementation Grant monies have also been awarded to several entities throughout the state to address nonpoint source issues. From 1990 through 1994, annual grants have been obtained from EPA that total over 5.6 million dollars (over nine million dollars when grant matches are included). Projects are currently underway that range from an evaluation of karst feature vulnerability, to urban runoff education programs, to assessing runoff from abandoned mine lands. Four (Floyds Fork, Harrods Creek, North Fork Kentucky River, and Salt River/ Taylorsville Lake) former or current TMDL projects have Section 319(h) Nonpoint Source Implementation Grant monies directed to nonpoint source remediation activities in their watersheds (see Appendix E). The nonpoint source program is described in detail in the Nonpoint Source Management Program document (KDOW 1989), a document that is currently being updated.

Another nonpoint source initiative was established by the 1994 Kentucky legislature. The Agricultural Water Quality Authority will develop BMP manuals for agricultural and silviculture practices and direct cost-share monies to nonpoint sources identified as causing water quality problems. The implications of this legislation are as yet not fully known, but the next 303(d) report will indicate progress that results from the authority's activities.

PRIORITIZATION OF WATERS NOT MEETING USES

The Kentucky Water Interagency Coordinating Committee (KWICC) was formed in 1991 to convene representatives of nonpoint source pollution control interests on a regular basis to discuss water quality issues. The charge of the group is to share information, review and facilitate Section 319(h) Nonpoint Source Implementation Grant projects and project proposals, coordinate activities and data, and promote accomplishments. In November 1994, the committee met to discuss the 303(d) listing and prioritization of waters impacted by nonpoint sources. Representatives of the following agencies were involved:

University of Kentucky (UK) Dept. of Agricultural Engineering
UK Dept. of Agronomy
UK Cooperative Extension Service
KY Dept. of Agriculture, Division of Pesticides
U.S. Dept. of Agriculture, Natural Resources Conservation Service
U.S. Dept. of Agriculture, Farm Service Agency
Kentucky Farm Bureau

Kentucky Geological Survey
Kentucky Division of Conservation
Kentucky Division of Water

The committee produced candidate lists containing 59 medium priority waters and 132 low priority waters impacted by agricultural nonpoint source pollution. Medium priority waters were those that either were not supporting any two uses or were not supporting the drinking water use. Low priority waters were those that did not support either the warmwater aquatic habitat or swimming use. In the opinion of the members of KWICC, no nonpoint source-impacted waters should be identified as high priority because most BMP funds are being targeted to existing watershed projects.

Waters prioritized for TMDL development are shown in Table 11. Streams chosen as high priority are affected primarily by point sources, and the KDOW will focus efforts in this area. Nonpoint source contamination will be addressed according to available resources.

The streams in the upper Cumberland River basin have been selected as high priority waters because of the widespread fecal coliform bacteria contamination found in 1993 and 1994 surveys that resulted in swimming advisories issued in 1994. Streams included as high priority are two reaches (13 miles) of the Cumberland River, 25 miles of Poor Fork below Harlan, and three miles of Looney Creek. (Mileages are different from those in the 1994 305(b) report because of additional bacteria surveys in 1994.) Similar to the North Fork Kentucky River project, the primary means of attaining the swimming use will be to aggressively pursue compliance and enforcement measures, upgrade several municipal facilities (Evarts, Loyall, Lynch, Harlan, Benhan, Cumberland, Pineville), eliminate outdated and overloaded package plants (by connecting to regional plants wherever possible), and work to eliminate straight pipe discharges.

Chenoweth Run, a tributary of Floyds Fork in the Salt River basin in east-central Jefferson County, has been selected as a TMDL project. The 1994 305(b) report listed nine miles of Chenoweth Run as not meeting either aquatic life or swimming uses because of organic enrichment, nutrients, metals, and pathogens stemming from urban runoff and domestic (both municipal and package plants) wastewaters. Other areas of the Floyds Fork watershed have already been prioritized by the KDOW. Interest in the Chenoweth Run watershed from both developmental and environmental concerns warrants resources now being focused in this particular area as well.

Most other waters rated as medium priority by the KWICC (except those with ongoing TMDL projects) remained as medium priority. Waters not supporting uses not listed on Table 10 and waters partially supporting uses are considered by the KDOW to have low priority.

REFERENCES

Kentucky Division of Water. 1989. Kentucky Nonpoint Source Management Program.

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_____. 1994a. Sources and Loadings of Total Phosphorus into Taylorsville Lake.

_____. 1994b. 1994 Kentucky Report to Congress on Water Quality.

_____. 1994c. Regionalization of Wastewater Treatment Facilities in Kentucky: Progress, Problems, and Recommendations.

Ohio River Valley Water Sanitation Commission. 1994. Assessment of Water Quality Conditions, Ohio River, 1992-93.

Table 1
Waterbodies from 1990 and 1992 303(d) Lists Prioritized as Candidates for TMDL Development

Waterbody Name	Waterbody Number	Miles (Acres)
HIGH PRIORITY		
North Fork Kentucky River	5100201-002 5100201-005 5100201-008	55.1
Taylorsville Lake	5140102-025L01	(3050)
MEDIUM PRIORITY		
Newcombe Creek	5090104-009	11.9
Lick Creek	5100101-037	9.2
Raccoon Creek	5100101-037	5.2
Burning Fork	5100101-038	7.5
State Road Fork	5100101-038	5.1
Rockhouse Fork	5100101-038	5.0
Billey Fork	5100204-009	8.1
Millers Creek	5100204-009	6.4
Big Sinking Creek	5100204-009	14.1
South Fork Red River	5100204-018	10.1
Sand Lick Creek	5100204-018	5.0
East Fork Little Sandy River	5100204-018	6.0
Clarks Run	5100205-039	8.0
Floyds Fork	5140102-007 5140102-011 5140102-014	61.6
Harrods Creek	5140101-004	31.9
Herrington Lake	5100205-038L01	(2940)
Blaine Creek-Mainstem	5070204-006	11.5
Newcombe Creek	5090104-009	6.9
Licking River-Mainstem	5100101-034	6.4
Lick Creek	5100101-037	9.2
Raccoon Creek	5100101-037	5.2
Burning Fork	5100101-038	7.5
State Road Fork	5100101-038	5.1
Big Sinking Creek	5100204-009	14.1
Billey Fork	5100204-009	8.1
Millers Creek	5100204-009	6.4
Sand Lick Fork	5100204-018	5.0
South Fork Red River	5100204-018	10.1
Roaring Paunch Creek	5130104-008	15.6
Harrod's Creek	5140101-004	4.0
Floyds Fork	5140102-007	24.2
Floyds Fork	5140102-011	23.6
Salt River	5140102-029	10.5
Salt River	5140102-031	40.0
Salt River	5140102-033	20.2
Taylorsville Lake	5140102-025	(3050)

Table 2
Summary of Assessed Use Support (miles)

Degree of Use Support	Assessment Basis: Evaluated	Assessment Basis: Monitored	Total Assessed
Miles Fully Supporting	8033.2	3234.4	11,416
Miles Partially Supporting	325.1	731.6	1,593
Miles Not Supporting	991.8	1763.9	2,883
TOTAL	9350.1	5877.8	15,892

Table 3
Summary of Individual Use Support for Rivers and Streams (miles)

	Fish Consumption	Aquatic Life	Swimming
Supporting	14,811.6	12,377.4	2,178.3
Threatened	0.0	134.6	0.0
Partially Supporting	0.0	1,003.1	456.7
Not Supporting	124.9	1,421.4	1,929.4
TOTAL Assessed	14,936.5	14,936.5	4,564.4

Table 4
Causes of Use Nonsupport in Rivers and Streams

Cause Category	Miles Affected: Major Impact	Miles Affected: Moderate/Minor Impact
Pathogen indicators	1835.1	169.9
Siltation	1305.8	72.0
Organic enrichment/D.O.	591.3	43.4
Nutrients	325.7	109.7
pH	411.9	0.0
Metals	255.9	34.8
Salinity/TDS/Chlorides	159.5	20.1
Turbidity	234.3	0.0
Priority organics	144.3	0.0
Unknown toxicity	65.3	0.0
Habitat alterations	99.1	43.3
Oil and grease	36.1	0.0
Suspended solids	95.4	0.0
Other	23.4	8.2

Table 5
Sources of Use Nonsupport in Rivers and Streams

Source Category	Miles Affected: Major Impact	Miles Affected: Moderate/Minor Impact
Point Sources		
Municipal/Package Plants	1458.0	70.8
Industrial	158.5	25.4
Combined sewer overflows	23.6	0.0
TOTAL	1640.1	96.2
Nonpoint Sources		
Resource extraction	1561.7	0.0
Agriculture	1027.4	1077.8
Land disposal/septic tanks	552.0	213.8
Urban Runoff/Storm sewers	567.4	90.5
Hydro-Habitat modification	81.7	68.6
Silviculture	43.1	77.0
Construction/Development	2.5	0.0
TOTAL	3835.8	1527.7
Unknown	289.2	85.1

Table 6
Summary of Lake Use Support

Degree of Use Support	Assessment Basis (Monitored)	Percent (by acres)
Acres Fully Supporting	98,585	45
Acres Supporting But Threatened	94,839	44
Acres Partially Supporting	20,510	9
Acres Not Supporting	3,316	2
Total Acres Assessed[a]	217,250	

[a]Total Kentucky Lake Acreage - 228,385

Table 7
Individual Use Support Summary for Lakes

Use	Supporting	Supporting But Threatened	Partially Supporting	Not Supporting
		(by Acres[a])		
Fish Consumption	209,040	0	8,210	0
Aquatic Life	157,084	49,239	7,885	3,042
Swimming	217,031	0	219	0
Secondary Contact	119,528	93,700	4,022	0
Drinking Water[b]	186,757	0	1,572	274
		(by Number[c])		
Fish Consumption	102	0	1	0
Aquatic Life	79	2	19	3
Swimming	101	0	2	0
Secondary Contact	89	2	12	0
Drinking Water[d]	32	0	7	2

[a]Total Assessed Acres = 217,250
[b]Total Assessed Acres for Domestic Water Supply = 188,603
[c]Total Assessed Lakes = 103
[d]Total Assessed for Domestic Water Supply = 41

Table 8
Lakes Not Supporting Uses

Lake	Use Not Supported[a]	Reason	Cause	Source
Briggs	WAH	Dissolved oxygen severely depleted in hypoliminion	Nutrients	Lake fertilization
Corbin	DWS	Chronic taste and odor problems caused by algae	Nutrients	Municipal point sources and Agricultural nonpoint sources
Herrington	WAH	Fish kills and dissolved oxygen averaged less than 4 mg/l in epilimnion	Nutrients	Municipal point sources and Agricultural nonpoint sources, septic tanks
Loch Mary	DWS	Chronic treatment problems caused by poor water quality	Metals (Mn) and other inorganics (noncarbonate hardness)	Surface mining (abandoned lands)
Maŭzy	WAH	Dissolved oxygen severely depleted in hypolimnion and averaged less than 4 mg/l in epilmnion	Nutrients	Lake fertilization

Table 9
Causes of Use Nonsupport[a] In Lakes

Major Impact[b]	Number of Lakes Affected	Acres	Percent Contribution (by Acres)
Nutrients	28	9,881	40
Priority organics (PCBs)	1	8,210	33
Suspended solids	3	3,040	12
Organic Enrichment	1	2,242	9
Other (shallow lake basin)	6	498	2
pH	1	219	1
Metals (Mn)	2	452	2
Other inorganics (noncarbonate hardness)	1	135	<1

[a] Nonsupport is a collective term for lakes either not supporting or partially supporting uses
[b] No moderate or minor impacts were noted

Table 10
Sources of Use Nonsupport[a] in Lakes

Contributions Source		Major Impact (Acres)	Moderate/Minor Impact (Acres)	Percent (by Acres)
Point Sources				
	Industrial	8,210		27
	Municipal/ Package Plants	3,079		10
Nonpoint Sources				
	Agriculture	7,729		25
	Septic Tanks	3,781	317	12
	Resource Extraction	3,394		11
Other				
	Natural	4,125		13
	Lake fertilization	123		<1
	In-place contaminants	140		<1
Unknown		314		1

[a]Nonsupport is a collective term for lakes either not supporting or partially supporting uses.

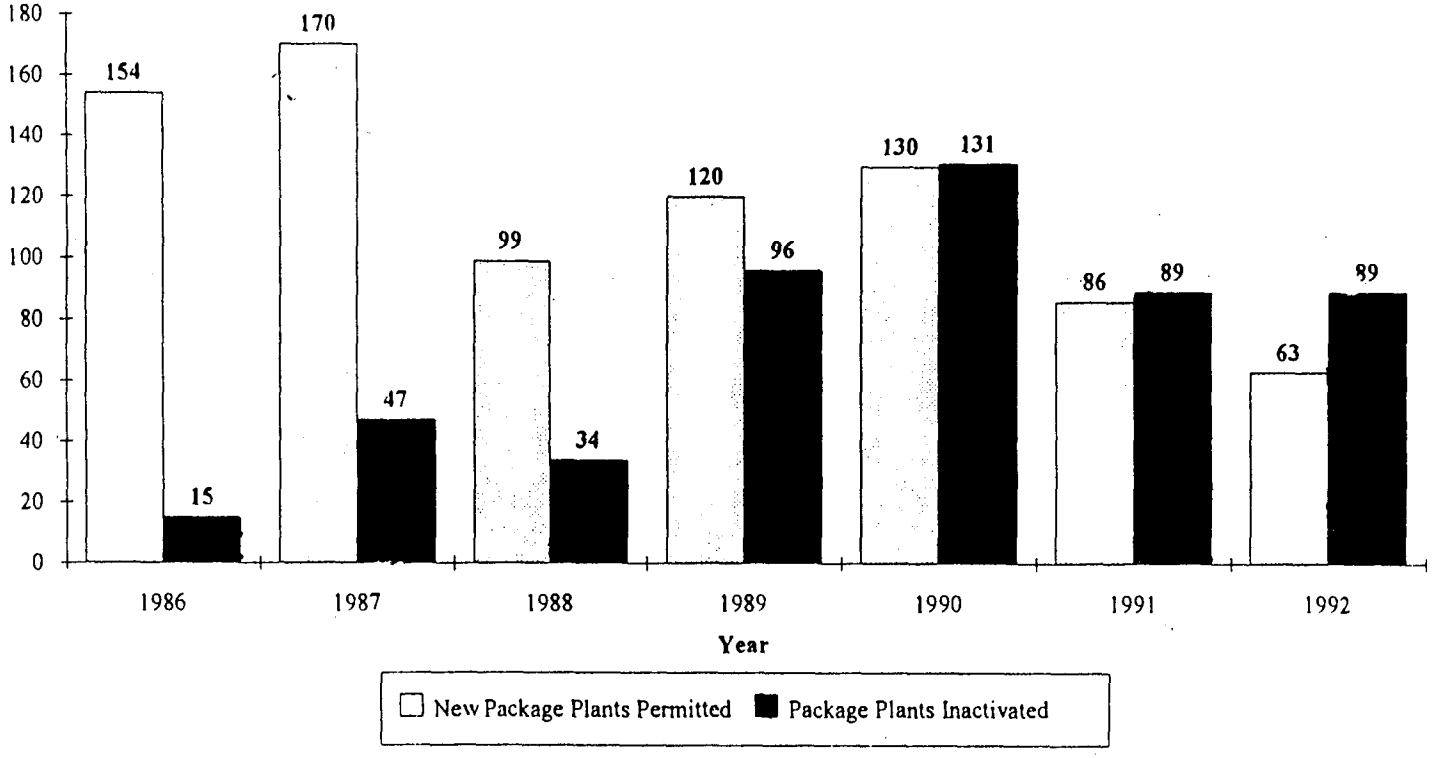
Table 11
Prioritization of Waters for TMDL Development

Name	Waterbody Number	Miles
	High Priority	
Upper Cumberland River Basin		
Poor Fork	KY5130101-036	694.2-719.3
Cumberland River	KY5130101-025	650.6-654.4
	KY5130101-032	684.9-694.2
Looney Creek	KY5130101-036	0-3.5
Salt River Basin		
Chenoweth Run	KY5140102-010	
	Medium Priority	
Big Sandy River Basin		
Tug Fork	KY5070201-001	
Coldwater Fork	KY5070201-002	
Wolf Creek	KY5070201-003	
Meathouse Creek	KY5070201-003	
Pigeon Roost Fork & Davis Fk	KY5070201-003	
White Oak Fork	KY5070201-003	
Peter Cave Fork	KY5070201-003	
Emily Creek	KY5070201-003	
Levisa Fork	KY5070203-001	
Levisa Fork	KY5070203-016	
Middle Creek	KY5070203-014	
Left Fork Middle Creek	KY5070203-014	
Ohio River Tributaries		
Mill Creek	KY5140101-001	
South Fork Beargrass Creek	KY5140101-002	
Middle Fork Beargrass Creek	KY5140101-002	
Goose Creek	KY5140101-003	
Kentucky River Basin		
Leatherwood Creek	KY5100201-018	
Little Leatherwood Creek	KY5100201-018	
Clarks Run	KY5100205-039	

Table 11 (Cont.)

Name	Waterbody Number	Miles
Licking River Basin		
Allison Creek	KY5100101-018	
Doty Creek	KY5100101-018	
Green River Basin		
Lewis Creek	KY5110003-002	
Pond Creek	KY5110003-003	
Bat East Creek	KY5110003-003	
Sandlick Creek	KY5110005-003	
Buck Creek	KY5110005-016	
West Fork Buck Creek	KY5110005-016	
Cypress Creek	KY5110006-002	
Harris Branch	KY5110006-002	
Flat Creek	KY5110006-005	
UT to Flat Creek	KY5110006-005	
Drakes Creek	KY5110006-006	
Loch Mary Lake	KY5140205-008L02	
Upper Cumberland River Basin		
Left Fork Straight Creek	KY5130101-030	
Martins Fork	KY5130101-038	
Cranks Creek	KY5130101-038	
Rock Creek	KY5130104-007	
Roaring Paunch Creek	KY5130104-008	
Bear Creek	KY5130104-009	
Corbin Lake	KY5130101-006L01	
Salt River Basin		
Pond Creek	KY5140102-002	
Northern Ditch of Pond Creek and Fern Creek	KY5140102-002	
Southern Ditch Pond Creek	KY5140102-002	
Spring Ditch Pond Creek	KY5140102-002	
Fishpool Creek	KY5140102-002	
Brooks Run	KY5140102-009	
Tradewater River Basin		
Crab Orchard Creek	KY5140205-003	
Vaughn Ditch	KY5140205-003	
Clear Creek	KY5140205-008	
Lick Creek	KY5140205-008	
Caney Creek	KY5140205-015	
Buffalo Creek	KY5140205-016	

Figure 1
New Package Plant Permits v. Inactivations
1986-1992



APPENDIX A
TMDL SUBMITTALS AND EPA RESPONSES

PHILLIP J. SHEPHERD
SECRETARY

BRERETON C. JONES
GOVERNOR

COMMONWEALTH OF KENTUCKY
NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
FRANKFORT OFFICE PARK
14 REILLY ROAD
FRANKFORT, KENTUCKY 40601

October 7, 1994

Jim Greenfield
US EPA
345 Courtland Street
Atlanta, Georgia 30365

Dear Jim:

Attached are two copies each of several reports of studies conducted in Kentucky over the past several years, and we request that EPA review these as official TMDL studies. You have seen some of these previously, but we had not formally requested TMDL consideration. All of these reflect known problems, intensive data collection to further define the problem and identify sources, and recommend solutions. We are currently implementing many of these solutions, or in some cases have already done so.

1) Removing Fecal Pollution from the North Fork Kentucky River Basin; Sept. 1994.
2) Sources and Loadings of Total Phosphorus into Taylorsville Lake; Sept. 1993.
3) Water Quality Study of Harrods Creek; Oct. 1990.
4) Water Quality Study of Floyds Fork; Dec. 1991.
5) Water Quality Study of the East Fork Little Sandy River; Feb. 1992.
6) Water Quality Study of Mayfield Creek near Mayfield, KY; March 1992.

If you have any questions concerning this submittal, please call me at (502) 564-3410.

Sincerely,

Dave Leist
Division of Water

DL:mw

Attachments

cc: Terry Anderson

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

JAN 31 1995

Mr. Jack Wilson, Director
Division of Water
Natural Resources and Environmental
Protection Cabinet
Dept. for Environmental Protection
14 Reilly Road
Frankfort, KY 40601

Dear Mr. Wilson:

I am pleased to inform you of the U.S. Environmental Protection Agency's approval of the Total Maximum Daily Load (TMDL) for the North Fork Kentucky River Basin, dated September 1994. The TMDL/water quality strategy recommends that all point discharges meet water quality standard for fecal coliform with strict enforcement by the Commonwealth. Communities in the basin will receive educational, technical, and limited financial assistance regarding fecal contamination from non-point sources.

We are approving the TMDL as being in full compliance with Section 303(d) of the Clean Water Act, which requires that TMDLs be established at levels necessary to implement the applicable water quality standards.

We commend the Division of Water in its efforts to develop a TMDL strategy for the North Fork Kentucky River Basin. We look forward to working with the Division in future TMDL efforts. For your information, we have enclosed a fact sheet which summarizes the information and strategy contained in this TMDL. If you have any questions regarding this action, please ask your staff to call Virginia Buff at (404) 347-2126 ext 6602.

Sincerely yours,

Robert F. McGhee
Acting Director
Water Management Division

Enclosure

cc: David Leist, DOW

North Fork Kentucky River TMDL Fact Sheet

Project Name:	North Fork Kentucky River Fecal Coliform TMDL
Location:	Southeastern Kentucky draining the counties of Letcher, Perry, Breathitt, and Lee
Scope/Size:	TMDL covers all 162.6 miles of the North Fork Kentucky River and its tributaries
TMDL Issues:	PS/NPS
Data Sources:	Ambient monitoring, Intensive surveys, municipal facilities' monitoring, and compliance sampling surveys
Monitoring Plan:	Monthly sampling of the upper North Fork Kentucky River main stem during PCR season and random compliance sampling inspections at wastewater plants
Control Measures:	NPDES Permits and Enforcement. Local communities will receive educational, technical, and limited financial assistance regarding fecal contamination from non-point sources.
TMDL Development:	In 1987, ambient monitoring indicated excessive levels of fecal coliform (FC) caused violations of the FC standard for the North Fork Kentucky River. Several intensive surveys and follow-up monitoring indicated that the majority of the pollution was coming from wastewater plants. All point sources are required to meet the FC standard (400/100 ml) prior to discharge. Strict enforcement of the NPDES permits resulted in improvement of the river, however due to numerous raw discharges from households the standard was still being violated. Education and other forms of assistance will be provided to local residents in order to reduce the fecal contamination from the direct pipe sources.
Implementation Controls:	Fines, compliance inspections and monitoring have reduced the level of fecal contamination from wastewater plants. Strict enforcement of NPDES permits will continue. Communities will receive educational, technical and financial assistance regarding non-point sources of fecal contamination.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

JAN 31 1995

Mr. Jack Wilson, Director
Division of Water
Natural Resources and Environmental
Protection Cabinet
Dept. for Environmental Protection
14 Reilly Road
Frankfort, KY 40601

Dear Mr. Wilson:

I am pleased to inform you of the U.S. Environmental Protection Agency's approval of the Total Maximum Daily Load (TMDL) for the East Fork of the Little Sandy River. The TMDL/water quality strategy recommends elimination of all wastewater treatment plants in the basin. Wastewater will be routed to a regional facility near Ashland with discharge to the Ohio River.

We are approving the TMDL as being in full compliance with Section 303(d) of the Clean Water Act, which requires that TMDLs be established at levels necessary to implement the applicable water quality standards.

We commend the Division of Water in its efforts to develop a TMDL strategy for the East Fork of the Little Sandy River. We look forward to working with the Division in future TMDL efforts. For your information, we have enclosed a fact sheet which summarizes the information and strategy contained in this TMDL. If you have any questions regarding this action, please ask your staff to call Virginia Buff at (404) 347-2126 ext 6602.

Sincerely yours,

Robert F. McGhee
Acting Director
Water Management Division

Enclosure

cc: David Leist, DOW

East Fork Little Sandy River TMDL Fact Sheet

Project Name:	East Fork Little Sandy River Dissolved Oxygen TMDL
Location:	Boyd County, KY
Scope/Size:	River mile 25 to mile 19 of the East Fork Little Sandy River near Ashland, KY
TMDL Issues:	Point Source
Data Sources:	Ambient monitoring and 1991 water quality survey
Data Mechanism:	KY QUAL2E predictive modelling and in stream monitoring
Control Measures:	NPDES Permits
Summary:	In 1991 KY DOW collected water quality data on the East Fork Little Sandy River to verify a predictive QUAL2E model run. As expected dissolved oxygen (D.O.) violations were found along the East Fork Little Sandy River and Shope Creek near Ashland. Forty wastewater package plants ranging in size from 500 gallons per day (gpd) to 50,000 gpd discharge in the area and contribute pollutants resulting in violations of the D.O. standard. The model run and survey showed that the critical condition for D.O. is during high temperatures (summer) and low flow conditions.
TMDL Development:	Due to the small size, improper maintenance and poor operation of the package plants, it was concluded that the best TMDL strategy would be to eliminate all the package plants and send the flows to a regional facility near Ashland discharging to the Ohio River. Thus, the TMDL for point source discharge is 0 mg/l for BOD5 and ammonia for the East Fork Little Sandy River.
Implementation Controls:	The DOW will not permit new wastewater discharges or approve a plant expansion in the referenced basin. All existing dischargers will be required to tie into the regional sewer line. The project should be completed by 1997. Monitoring of the stream is planned after removal of the dischargers.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

APR 10 1995

Mr. Jack Wilson, Director
Division of Water
Natural Resources and Environmental
Protection Cabinet
Dept. for Environmental Protection
14 Reilly Road
Frankfort, KY 40601

Dear Mr. Wilson:

I am pleased to inform you of the U.S. Environmental Protection Agency's approval of the Total Maximum Daily Load (TMDL) for Harrods Creek in Oldham and Jefferson Counties. The TMDL/Water Quality Strategy recommends elimination of all small wastewater treatment plants discharging to lower Harrods Creek and those discharging above Sleepy Hollow Lake. Wastewater in lower Harrods Creek will be routed to the regional Morris Forman plant on the Ohio River and wastewater plants above Sleepy Hollow Lake will be routed to the regional advanced waste treatment facility located on Hite Creek.

We are approving the TMDL as being in full compliance with Section 303(d) of the Clean Water Act, which requires that TMDLs be established at levels necessary to implement the applicable water quality standards.

We commend the Division of Water in its efforts to develop a TMDL strategy for Harrods Creek. We look forward to working with the Division in future TMDL efforts. For your information, we have enclosed a fact sheet which summarizes the information and strategy contained in this TMDL. If you have any questions regarding this action, please ask your staff to call Virginia Buff at (404) 347-2126 ext. 6602.

Sincerely yours,

Robert F. McGhee
Acting Director
Water Management Division

Enclosure

cc: David Leist

Harrods Creek TMDL Fact Sheet

Project Name:	Harrods Creek Dissolved Oxygen TMDL
Location:	Oldham and Jefferson Counties, Kentucky
Scope/Size:	River mile point 7.5 to mile point 0 of Harrods Creek which flows into the Ohio River. Due to downstream dams and locks in the Ohio River water in Harrods Creek will slow down or reverse (backwater).
TMDL Issues:	Point Source
Data Sources:	Ambient monitoring and 1990 water quality survey
Data Mechanism:	KY QUAL2E predictive modeling and in-stream monitoring
Control Measures:	KPDES Permits
Summary:	In 1990 KY DOW collected water quality data on Harrods Creek to examine D.O. from mile point (MP) 0 to MP 12. Of primary concern is the backwater area (MP 0 to MP 4.2) where a D.O. sag below the D.O. standard was measured for nearly 3 miles. Eight package plants in or near the backwater area contribute oxygen consuming constituents, BOD5 and ammonia, to Harrods Creek. Predictive model runs showed that if these 8 small plants are removed from lower Harrods Creek, D.O. will be maintained at the 5.0 mg/l standard. The model run and survey showed that the critical condition for D.O. is during high temperatures (summer) and low flow conditions. Also, a number of small package plants discharging above Sleepy Hollow Lake will be removed.
TMDL Development:	The TMDL strategy calls for elimination of the 8 package plants in the backwater area of Harrods Creek. Flows will be sent to a regional plant located on the Ohio River in another basin. Wastewater plants upstream from Sleepy Hollow Lake have also been recommended for removal. Flows from these plants will be rerouted to the Hite Creek regional plant. KY QUAL2E modeling predicts that the in-stream D.O. standard will be maintained at effluent limits of CBOD5 = 10 mg/l, NH3-N = 2 mg/l and D.O. = 7 mg/l for the Hite Creek plant and no discharge allowed from the other 8 backwater plants and the plants upstream from Sleepy Hollow Lake.

Implementation Controls:	The facility owners with plants in or near the backwater area of Harrods Creek have already been contacted and informed that their current NPDES permits will not be renewed. Existing permits will expire in mid-1998. Monitoring of Harrods Creek is planned after removal of the dischargers. Based on that information it will be determined if additional point source or non-point source controls are needed.